BARIATRIC SURGERY WORKSHOP

May 29 & 30, 1980
Iowa City, Iowa

The University of Iowa
College of Medicine
Department of Surgery
BARIATRIC SURGERY WORKSHOP

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOALS AND CRITERIA</td>
<td>1</td>
</tr>
<tr>
<td>Edward E. Mason, M.D.</td>
<td></td>
</tr>
<tr>
<td>GASTRIC BYPASS</td>
<td>2</td>
</tr>
<tr>
<td>Dale C. Rank, M.D.</td>
<td></td>
</tr>
<tr>
<td>GASTRIC BYPASS, ROUX-EN-Y</td>
<td>5</td>
</tr>
<tr>
<td>Jose C. Torres, M.D.</td>
<td></td>
</tr>
<tr>
<td>SYMPOSIUM: GASTRIC BYPASS</td>
<td>8</td>
</tr>
<tr>
<td>Edward E. Mason, M.D., Moderator</td>
<td></td>
</tr>
<tr>
<td>POUCH VOLUME MEASUREMENT</td>
<td>22</td>
</tr>
<tr>
<td>Boyd E. Terry, M.D.</td>
<td></td>
</tr>
<tr>
<td>POUCH VOLUME, WEIGHT LOSS AND MARGINAL ULCERS</td>
<td>24</td>
</tr>
<tr>
<td>Kenneth J. Printen, M.D.</td>
<td></td>
</tr>
<tr>
<td>STAPLE LINE DEHISCENCE IN THE LABORATORY</td>
<td>27</td>
</tr>
<tr>
<td>Murry G. Fischer, M.D.</td>
<td></td>
</tr>
<tr>
<td>PATHOLOGY OF STAPLING</td>
<td>30</td>
</tr>
<tr>
<td>Kenneth J. Printen, M.D.</td>
<td></td>
</tr>
<tr>
<td>VERTICALLY STAPLED GASTROPLASTY</td>
<td>32</td>
</tr>
<tr>
<td>Gifford V. Ekhout, M.D.</td>
<td></td>
</tr>
<tr>
<td>VERTICAL STAPLING UPDATED</td>
<td>35</td>
</tr>
<tr>
<td>Lawrence L. Tretbar, M.D.</td>
<td></td>
</tr>
<tr>
<td>SYMPOSIUM: POUCH VOLUME AND STAPLING</td>
<td>38</td>
</tr>
<tr>
<td>Kenneth J. Printen, M.D., Moderator</td>
<td></td>
</tr>
<tr>
<td>GASTRIC STAPLING WITH GASTROGASTROSTOMY</td>
<td>44</td>
</tr>
<tr>
<td>George K. Alexander, M.D.</td>
<td></td>
</tr>
<tr>
<td>GASTRIC STAPLING WITH GASTROGASTROSTOMY</td>
<td>46</td>
</tr>
<tr>
<td>Charles E. Yale, M.D.</td>
<td></td>
</tr>
<tr>
<td>IMPORTANCE OF THE NASOGASTRIC TUBE</td>
<td>50</td>
</tr>
<tr>
<td>E. Christopher Ellison, M.D.</td>
<td></td>
</tr>
<tr>
<td>ENDOSCOPY</td>
<td>52</td>
</tr>
<tr>
<td>Jeffrey W. Lewis, M.D.</td>
<td></td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>DISTAL GASTROSTOMY AND OUTLET OBSTRUCTION</td>
<td>55</td>
</tr>
<tr>
<td>Luigi M. De Lucia, M.D.</td>
<td></td>
</tr>
<tr>
<td>MATTRESS SUTURES FOR STOMA</td>
<td>58</td>
</tr>
<tr>
<td>Joel B. Freeman, M.D.</td>
<td></td>
</tr>
<tr>
<td>MARLEX MESH AROUND THE CHANNEL</td>
<td>61</td>
</tr>
<tr>
<td>John M. Kroyer, M.D.</td>
<td></td>
</tr>
<tr>
<td>EXTERNALLY BANDED GASTROPLASTY</td>
<td>64</td>
</tr>
<tr>
<td>Edward E. Mason, M.D.</td>
<td></td>
</tr>
<tr>
<td>SYMPOSIUM: STOMA</td>
<td>67</td>
</tr>
<tr>
<td>Edward E. Mason, M.D., Moderator</td>
<td></td>
</tr>
<tr>
<td>ACHALASIA: CASE REPORT</td>
<td>77</td>
</tr>
<tr>
<td>Jesse H. Meredith, M.D.</td>
<td></td>
</tr>
<tr>
<td>ESOPHAGITIS MANAGEMENT</td>
<td>78</td>
</tr>
<tr>
<td>Jeffrey W. Lewis, M.D.</td>
<td></td>
</tr>
<tr>
<td>SYMPOSIUM: ESOPHAGEAL PROBLEMS</td>
<td>81</td>
</tr>
<tr>
<td>William R. Jewell, M.D., Moderator</td>
<td></td>
</tr>
<tr>
<td>WOUND INFECTION, AGE, AND HERNIA</td>
<td>91</td>
</tr>
<tr>
<td>Edward E. Mason, M.D.</td>
<td></td>
</tr>
<tr>
<td>FUNDIC BLOWOUT</td>
<td>92</td>
</tr>
<tr>
<td>Luigi M. De Lucia, M.D.</td>
<td></td>
</tr>
<tr>
<td>POSTOPERATIVE ACID SECRETION</td>
<td>95</td>
</tr>
<tr>
<td>William W. Kridelbaugh, M.D.</td>
<td></td>
</tr>
<tr>
<td>ISCHEMIA</td>
<td>96</td>
</tr>
<tr>
<td>John H. Linner, M.D.</td>
<td></td>
</tr>
<tr>
<td>SYMPOSIUM: COMPLICATIONS</td>
<td>99</td>
</tr>
<tr>
<td>Edward E. Mason, Moderator</td>
<td></td>
</tr>
<tr>
<td>MANAGEMENT OF COMPLICATIONS</td>
<td>102</td>
</tr>
<tr>
<td>Otto L. Willbanks, M.D.</td>
<td></td>
</tr>
<tr>
<td>BILIOPANCREATIC BYPASS</td>
<td>105</td>
</tr>
<tr>
<td>Nicola Scopinaro, M.D.</td>
<td></td>
</tr>
<tr>
<td>SYMPOSIUM: INTESTINAL BYPASS</td>
<td>108</td>
</tr>
<tr>
<td>J. Patrick O'Leary, M.D., Moderator</td>
<td></td>
</tr>
<tr>
<td>DOCUMENTATION OF OPERATION</td>
<td>118</td>
</tr>
<tr>
<td>Boyd E. Terry, M.D.</td>
<td></td>
</tr>
<tr>
<td>ACTUAL AND INDICATED REVISION RATE</td>
<td>119</td>
</tr>
<tr>
<td>Edward E. Mason, M.D.</td>
<td></td>
</tr>
</tbody>
</table>
REGISTRY .............................. 122
   David H. Scott, B.S.

SYMPOSIUM: QUALITY CONTROL AND RESULTS  ....... 125
   Edward E. Mason, M.D., Moderator
GOALS AND CRITERIA

Edward E. Mason, M.D.

The list of goals and criteria is something that I thought you might use as a starting point when listening to the papers. As far as the workshop is concerned I would like to emphasize that we are trying to increase the benefits and decrease the risks. I believe that we want a reversible operation, not that we intend to reverse it, but we are working in a new field and in a new area and there are possibilities that some of these patients may not tolerate the procedures that we are doing. Therefore, they ought to be potentially reversible. The operations should be predictable. We like to have as low a variability as possible. They ought to be effective for a lifetime. They ought to be safe, obviously, and with as few side effects as possible.

Most of the procedures that are being done are on the stomach. Therefore, most of the attention that we are going to devote to this problem relates to operations on the stomach.

We might start out with the following criteria for an effective procedure: 1) a measured < 50 ml pouch volume; 2) a secure partition dividing the stomach; 3) a 12 mm diameter outlet; and 4) prevention of dilatation of the outlet. These criteria do not rule out change. They represent something to think about and maybe by the end of the conference we can expand on the criteria. You will notice that bypass is not listed. Perhaps you will want to add bypass as a part of an effective operation.
GASTRIC BYPASS

Dale C. Rank, M.D.

The topic today is conventional gastric bypass and posterior gastrojejunostomy. It is important to keep reviewing all of these procedures because the successful surgeon who treats morbid obesity must have many operations at his disposal for the many kinds of patients that present themselves. Conventional gastric bypass certainly is one way to control obesity and we will look at it step by step.

You have all heard of Arnie's army. You have probably heard of Lee's fleas. Because of one of my patients, a 540 lb young lady of five feet two inches, they started a new one in Arlington called Dale's whales. These people lose weight successfully with gastric bypass and are not depleted. Beauty is still possible. They are all twice normal weight at the time of surgery. They can become healthy, happy-looking, and physically active. None of the patients of which I am speaking had remedial surgery. This can be accomplished with a little work.

The whole physiologic background for all of this type of surgery has its roots in the medical treatment which simply showed that total fast and protein-sparing modified fast as designed in Boston are both compatible with good cerebral circulation and function and that the morbidly obese body thrives on ketosis. The bottom line is that gastric bypass plus motivation will produce a permanent semi-fasting state. One must be reminded that motivation equals a good self-image linked with goals and purpose. The reason goals and purpose are important is simply because of the saying that if you don't know where you're going you'll probably end up somewhere else.

The requirements for any successful gastric pouch surgery will include a maximum pouch volume of 50 to 60 ml and an 8 to 9 mm nondilatable stoma. The advantages of a gastric bypass with a posterior gastrojejunostomy include: a dependent stoma which functions well and less esophageal reflux in a healthy pouch. Furthermore, the emptying mechanism is good and this makes pernicious vomiting rare which lessens the temptation to increase the pouch or the stomal size. There is more margin for error probably because of the duodenal bypass which may contribute to weight loss through an absorption defect. The revision procedure, if necessary, is simple.

There are many disadvantages, however. First of all the duodenum is excluded which leads at least to iron deficiency and perhaps to deficiency of other vital substances. The pouch is endoscopically and radiographically excluded by virtue of the bypass. Thus, the excluded segment is no longer visible. It is a very difficult operation and the failures are highly symptomatic because of alkaline gastritis, esophagitis, bile vomiting, and occasionally even dumping syndrome. If you want to do this kind of surgery, there are some minimums of instrumentation and some of these things have been learned painfully and are worth reviewing for some persons in the audience who perhaps have not yet done a lot of this kind of surgery.
A Poly-tract® retractor is very helpful. I call to your attention something fashioned by Mr. Bruce Lavonne who is in the audience today. It is a full circle clamp that will prevent slippage of these clamps. Outstanding anesthesia is absolutely important. In Arlington we utilize intra-arterial lines for blood gases, which are monitored throughout the procedure, and for monitoring the blood pressure. Central venous lines are used to monitor the heart and brain. Good pulmonary care is also extremely important.

Some adaptations of the retractor blades, again made by Mr. Bruce Lavonne for us, include the liver blade. It is an old fashioned Harrington which lends itself very nicely for retracting the liver and can be placed in a position exactly where you want it. The Deaver blades were fashioned to fit the Poly-tract and are very useful for under the rib margins or the lateral abdominal wall. These are etched to prevent slipping and sliding. Some special instruments such as very long needle holders are also important but can cause problems. You must know the basic instrument. The old-fashioned student Balfour can have many adaptations. Long suckers, long sponge forceps, very long Babcocks, and double angled needle holders which give better access and exposure, are also important. Ethicon has just put out a new instrument that is an alligator forceps clip applier. This really gets way up in there without having to insert your hand. This instrument will get to anyone's esophagus or diaphragm without being obstructive.

The incision is made by tearing through the midline, right down to the fascia. This causes almost no bleeding. Next, a lesser curvature window is created. It is about 2.5 cm wide. One does not have to worry about bleeding or abrading the gastric surface with such a comfortable window. The greater curvature is freed. Packs are not used. The surgeon has two Babcocks on the greater curvature and also the student Balfour which is placed down into the lesser sac. This is pulled back and the first assistant puts a little traction there. When the pouch is nicely freed, you can do anything with it. But freeing it is the hardest part of this operation.

The pouch is measured in the conventional way. It is a 50 cc divided pouch. To create the anastomosis the two edges are opposed with sutures in the conventional way. The short limb posterior gastrojejunostomy is the second most difficult part of the operation. It must be high on the transverse mesocolon. The stoma is actually 8 or 9 mm rather than 12 mm. It is checked. There are two posterior and one anterior layers. At this point one usually uses the student Balfour retractors. The use of these retractors is very important for obtaining adequate exposure. It is almost impossible without the use of some retractors to get visibility as the transverse colon is moved upward. The afferent limb is fixed.

A couple of things to call to mind in regard to postoperative instructions are the exercise program, which is absolutely essential, the dietary program and goal setting. For some people, weight loss will slow down but with protein and amino acid supplements it picks back up. Margarines can be used for weakness. Corn oil margarines provide essential fatty acids. Potassium is also very valuable in the immediate postoperative phase.
The cause of failure is not due to stretching. It is the loss of elasticity or an atonic pouch. An atonic pouch can literally be blown up with no difficulty at all to 1000 ml. Such a pouch can suck up bile and cause reflux and pain. When this happens the patient eats continuously to relieve the pain and the emesis of bile. The management is to totally mobilize the pouch, do a total fundectomy and reinforce the wall and include stomal reduction if needed.

A carefully constructed has, in my hands, been used in some 259 patients without deaths, leaks, or wound infections. Fifty percent of patients will reach physiologic weight. Twenty-five percent of patients will have satisfactory results which means they need some care. Some will need diet pills. Others will need management, and some will need continued care with a wide variety of dietary programs. The remaining 25% of patients are complete failures. Of that 25%, half are technical failures but the other half are patient failures. This includes a small number of people whom I call physiologic failures. They are people who have a good pouch, which is not dilated, who do not overeat, and do most of the program but simply fail to lose weight. They appear to have some sort of lipodystrophic program that defies starvation as a cause of weight loss.
GASTRIC BYPASS, ROUX-EN-Y

Jose C. Torres, M.D.

Last year after the Workshop here in Iowa City I began work on a new technique for the gastric bypass. I would like to share with you this morning the results of this operation. My study consists of 60 patients. The age ranged from 19 to 60, the average was 32 years. There were 54 females and six males. The average height was five feet two inches. The average weight was 120 kg. Fifty-six kg was the ideal weight and 64, the overweight, making the patients 114% overweight.

Every patient was interviewed at the office, first by the gastric bypass nurse. After the patient had met the requirements for gastric bypass, he would be admitted to the hospital two or three days pre-operatively for a complete routine workup. A few patients had a psychiatric consultation. One of the points I want to stress is that every patient received aspirin, 10 grains b.i.d. for the first three or four days in preparation for the operation. A few other patients had IPPBs, IVPs and as a routine we gave antibiotics before surgery.

Our criteria is 100 lb overweight or 45.5 kg. Many of the patients had a concomitant disease. Patients should be within 19 to 50 years old. They should have already tried to reduce weight in different ways. Patients should be willing to attend the gastric bypass clinic. They should also be willing and able to accept medical or psychiatric consultation if indicated.

We used staples in all of the procedures except the first two. The EEA25 was used in the first two. In 34 patients, we used the TA90 on the gastric bypass. In 16 patients we used the TA55 and TA30 was used in 15 patients for closure of the enterotomy. The EEA25 is the smallest sized stapler we used in our 58 patients.

One of the main points is the limited space. We have divided the jejunum about 18 inches from the ligament of Treitz. It is very important to mention that this procedure mainly has been done as a bypass from the angle of His to the lesser curvature, trying to avoid the left gastric artery and its branches. We have put in two lines of staples using the TA55 only in the last 16 patients and we are getting better results. We can bypass about 95 to 97% leaving about 25 to 30 cc of gastric capacity. The main thing is you have to isolate the esophagus as if you were going to do a hiatal hernia repair. We staple from the angle of His toward the lesser curvature. Then we divide the jejunum and we put in purse-string sutures with the instrument. We pass retrocolically to the upper part of the stomach. Then we do an enterotomy or jejunostomy to insert the EEA instrument. We tie the purse-string suture on the EEA.

Next we begin the imbrication of the gastrojejunostomy to reduce the size of the stoma to eight to 10 mm in diameter. We put a number 28F catheter (10 mm in diameter) through the enterotomy into the upper stomach pouch and we tie around the opening with 2-0 Prolene" using a running
mattress imbricating suture. We close the enterostomy with the TA30.
Next we secure the jejunum and mesocolon. We put a purse-string suture in the proximal jejunum about 36 inches from the gastric stoma to complete the Roux-en-Y.

We keep patients who have gastric bypass in the hospital about 5.3 days on the average. The patients who had some concomitant operations stay about 6.6 days on the average; the overall average was 5.6 postoperative days in the hospital.

Eighteen percent of the patients had post-hospital discharge complications. The main complications were GI bleeding in two patients, alopecia in two and persistent vomiting in one. That makes a total of 11 patients. The hospital complication rate was 6% in four patients. One patient, who had pulmonary artery disease, had a mild MI. Two patients had atelectasis and there was one wound infection.

In six weeks we have a 15.6 kg or 24% weight loss and in three months, 23.8 kg or 37%, in six months 32.3 kg or 53% and in nine months with six patients followed up, 40 kg or 66%. As yet we do not have one-year followup on this procedure.

The operative time for the gastric bypass alone ranged from one hour nine minutes to three hours 23 minutes with two hours seventeen minutes as average. When we add concomitant operations the average was two hours 48 minutes. The overall was two hours 25 minutes.

Forty-four patients had gastric bypass alone and sixteen patients had concomitant operations. The most common concomitant operations were hiatal hernia repair and cholecystectomy. The concomitant diseases found in about 50% of patients were hypertension, diabetes and cholelithiasis.

In regard to the postoperative follow-up, a patient is discharged usually five days after surgery and, more recently, in about four days. The patient returns in 10 to 14 days to the office for suture removal and counseling. At four and six weeks the patients are seen by a nurse and by us also for counseling. At six weeks we discharge the patient to go back to work. Then we schedule a follow-up appointment at three, six, and nine months, and at one year and so on.

After the operation we keep the nasogastric tube for 24 hours. We give antibiotics usually one hour before surgery and for 48 hours thereafter. We infuse Ringer's lactate for 48 hours. We give heparin totaling at least 3,000 units every six hours for 48 hours. The patients are given ice cubes and sips of water the same day of surgery and then a clear liquid diet for 14 days. Then we give baby food the third and fourth weeks. After the first four weeks we start with the gastric bypass diet following Dr. Mason's diet regime. We give analgesics for 48 hours. One of the more important things we do is to give postanesthetic suggestion and we are getting very good results. Many of the patients are not in pain. They do not have any medication for the first two or three days. This may be one of the reasons these patients are cooperating a lot.
I think one of the main points is that in order to have a successful operation we have to have a maximum of 35 ml gastric capacity. I have measured this many times. We try not to go over 30 ml of capacity and the stomach is 10 mm. This is the technique that we are using and we are getting good results.

In summary we consider that the problem of leakage or perforation is being avoided because of the use of the EPA instrument. In addition, the position of the anastomosis which is almost a continuation of the esophagus may prevent leakage. The nasogastric tube is placed about 1 cm above the stoma so that it is almost floating. A couple of times we forgot to place the nasogastric tube close to the stoma and it probably was in the esophagus. Nevertheless, we did not have any problems.
SYMPOSIUM: GASTRIC BYPASS -- EDWARD E. MASON, MODERATOR

QUESTION: What is your preoperative protocol for bypass?

DR. TORRES

Patients must be at least 100 lb overweight. It is preferable that the patient have some concomitant disease. A patient should be willing to accept the postgastrectomy diet regime. Those are the main parts of the protocol. Of course, patients should have already tried medically supervised dieting.

QUESTION: I was referring to the preoperative studies.

DR. RANK

Although there has been some disagreement and some people are recommending that they simply be admitted a day before surgery, we have a very exacting procedure in Arlington. Excluding Pickwickians who may come in ten days to two weeks ahead and those people who are, as Ken Printen says, "metabolically bankrupt" from previous jejunoleal bypass (most of those are conversions), the average fat person will come into the hospital four full days before surgery. They have a complete and thorough study of the gastrointestinal tract, the urinary tract, pulmonary functions and very many of them have cardiac stress tests. We have discovered four patients with major inflammatory disease of the gut who were morbidly obese. They were excluded from surgery. We have also found carcinomas. We have one patient who came in with unexpected achalasia and megaesophagus. A wide variety of lesions have been found and also gallstones which are very common. I for one cannot always feel gallstones in the patient at surgery if I do not know that they already have them. So they are very carefully studied.

We begin pulmonary care four days ahead when the patient is admitted. They are begun on foot and ankle exercises and other breathing exercises. They are given supplements. We begin eight tablets per day of Slow K on everybody. Because these people are going to be subjected to a ketosis we give amino acid solution during and following the operative procedures. It's important that their potassium stores be intact at that time. That is why we place them on potassium. They are also given vitamin saturation. We give them vitamin A, for example, on the last day to a dose of one million units because of the now reported influence it has on the immune mechanism. These people are all immune depleted. They are not resilient in their immunity response so they receive vitamin A the day before.

We prepare the bowel on everyone. A conventional preparation as though for a colon resection is used. It is very important as this is the source of most of the endogenous infections that occur. We have had no wound infections in 250 consecutive cases. That cannot be accidental. The patients are started on a broad spectrum antibiotic. I happen to use Doxycycline or Vibramycin. It is begun the morning of the day prior to surgery and it is infused intravenously during the operative procedure.
The patients are also started on heparin the night before surgery. This is done not so much to prevent clots, though we have had pulmonary embolism, but to help to perfuse the antibiotic into the fat and into the lungs and general parieties. That is how every patient is managed prior to surgery and I'm confident that taking care of the little details has helped to reduce mortality and morbidity.

QUESTION: What about psychiatric evaluations?

DR. RANK

That's all done before the patient comes into the hospital. In our particular hospital, about five years ago we started a Gastric Bypass Club that meets once a month and which I always attend. Before any surgery is scheduled, these people have attended these bypass meetings. The meetings deal with such things as the scientific aspects of gastric pouch surgery. They go into goal-setting and how to improve your self-image. More importantly, they go into how the patients interact with each other and former patients. In short, the new patient learns about gastric bypass procedures from other patients. At that time the patients are receptive to see whether or not they are good candidates. If they are not, they are seen by psychologists or psychiatrists or other physicians prior to coming into the hospital.

DR. TORRES

We did not schedule any psychiatric consultation in the second group of the Roux-en-Y cases. Before we used to have a psychiatric consultation but we avoid it now because most of these patients are very anxious to have surgery and are borderline. With the operation they improve a lot. Therefore, we completely avoid the psychiatrist except for the few patients who are not accepted for operation.

QUESTION: How do you decide who needs to see the psychiatrist?

DR. RANK

The psychiatrists themselves have described the patients who do not do well. The patient who has a high degree of psychosomatization certainly should be watched. The person who has a lot of expressed physical illnesses and complaints above and beyond those related to weight may have problems. In the patient that is extremely mentally depressed, one must make absolutely sure that the depression is not the cause of the obesity. Now the general run-of-the-mill patient has mild depression because of a poor self-image. That can be corrected by the exciting adventure of losing weight postoperatively. But there is a group of patients that has severe endogenous mental depression. The third type of patient that should not be accepted is the patient whom you suspect is psychotic. There is a good, almost fail-proof device to detect such patients. When you and the patient are conversing and you keep saying to yourself, "What did that patient say? Have I lost my train of thought? Let me try a different approach." When the conversation goes along a line and you feel as though you're not really communicating with the patient, be on the lookout for a psychotic patient.
QUESTION: Dr. Torres, why did you have to perform second takedowns?

DR. TORRES

Those patients had loop gastric bypasses. Two of them did not lose weight and one of them had a gastric fistula. The tape was pulled off. I had to redo it. I did the Roux-en-Y type of gastric bypass.

QUESTION: Is there any reason why you do the antecolic Roux-en-Y with a stapler rather than by hand?

DR. TORRES

In the first two patients we did the anastomosis by hand but it was very difficult. After we discovered we had this new instrument I started using it and it is so simple that now we do not have any problems.

QUESTION: Dr. Torres, you said that in seven of your patients you did a hiatal herniorrhaphy. What type of herniorrhaphy was done?

DR. TORRES

I approximate the crus, put in two or three sutures, and that's it.

DR. MASON

Dr. Rank, do you do anything with the crus on any patients?

DR. RANK

No sir.

QUESTION: How many spleens have you had to remove?

DR. TORRES

I do not see the spleen. I isolate the esophagus, as you would do for a hiatal hernia. Then I dissect posteriorly with the right finger, and then I open the lesser curvature about 4 cm from the GE junction and I communicate with my two fingers. Then I put in my staples. Therefore, I stay completely away from the greater curvature. I do not even cut any arteries or veins if possible.

QUESTION: Do you free the greater curvature at all?

DR. TORRES

No. Just from the angle of His down to the lesser curvature.

DR. MASON

Dr. Rank, how many spleens?
DR. RANK

I have not taken out a lot of spleens. But it is because one does not have to remove the injured spleens as often today. There are a lot of little things that can be done and a lot of new knowledge about what happens to the spleen. We have actually taken out three, one of which was a sick spleen. I honestly believe that one can put too many packs in the left upper quadrant. I would like to call your attention again to how we lift the stomach out of the splenic bed. The retractor is placed in the lesser sac and that student Balfour retractor has a little leverage. The nurse-assistant can push and put the material on a little tension. With the two Babcocks on the greater curvature, I lift it up and if necessary the first assistant holds up the fat that overlies those vessels. There is always fat that overlies and hides those vessels. We just trim that off the greater curvature. Now the vessels become apparent and one can get those vessels without getting gastric wall. There are no packs and no pressures actually against the spleen at all. This is the reason why most of the tears of the spleen involve the gastrocolic fat along the lower pole. Occasionally there is clip slippage and one has to struggle to get a vessel. But most injuries are of this type rather than abrasions to the spleen. We try not to actually retract it. We lift the greater curvature out. Three splenectomies is not bad in that number of cases.

QUESTION: Do you give potassium preoperatively?

DR. RANK

Yes, very frequently. You know you are not going to find anything that you do not look for. A person who is 150 to 250 lb overweight, and goes on a ketosis-producing diet, is the person who will have rapid weight loss and rapid fluid shifts. Potassium is almost always necessary in those circumstances; ust as potassium is necessary when you are giving intravenous hyperalimentation. I think you will find that if you give potassium supplements to the patient who has rapid weight loss during the first three months, your patient will do and feel better.

QUESTION: Dr. Rank, I am perturbed by the last statement of your presentation. You said that you have one-fourth of patients who are complete failures. Should this be accepted or should you perhaps change or modify your operation?

DR. RANK

That is a very good question, and yes absolutely, I am changing my operation. The operation that I described in my presentation represents just one of the operative procedures that I do. I said 50% will reach physiologic weight and 75% will be satisfactory. I would like to get it up to 90%, but if I could have an operation that would have people reach physiologic weight 75% of the time, I think that would be a good operation. I will stop at this point because I will probably hear some rebuttals. However, if there is someone who can treat such an illness or disability as morbid obesity (for which, according to Ernst Drenik,
there is currently only a 3% satisfactory long-term management rate) and not be happy with a twenty-fivefold improvement to 75% through an operative procedure with a minimum of safeguards and side effects, I am very willing to hear about it. If one can improve the success rate I am even more willing to hear about it. However, I do not think anyone can get more than 75% under our current knowledge. I think some of that 25% who fail are salvagable. But I do not think you will take any operative procedure by itself and be able to fulfill those requirements in more than 75%. I think the other 25% either should never have been done or will require some sort of a remedial, reconstructive procedure and may even need to be converted to a different procedure altogether. There's no one operation that will solve all the problems for all the people and I am anxious to hear someone comment on that.

QUESTION: Maybe we need to define what failure is. Does it arbitrarily involve failure to lose 20% in six months? Would that be failure?

DR. RANK

I can give you my classification of failure. My classification of morbid obesity is 100 lb or more overweight. My criteria for physiologic success is to be within 10% of physiologic or ideal weight. My criteria for just being good old fat folks who sometimes come in to see you are those people who are 25% overweight or up to 50 lb overweight. Such people require some sort of a constant physical or dietary program to keep their weight near the normal level. These are the people that are at health spas, who are on diets and who take diet pills. It is this group of patients that can get along and maintain their weight by doing the ordinary things that I consider satisfactory, but who, at the same time, are still failures. These are the people who continually have to work at it to maintain their weight to near physiologic levels, and 25% of my patients are in that category. I wish they weren't in that category but they are. Nevertheless, they are really happy, because now they can do the things they did before only do them successfully. That means one out of four must work to reach their goals.

QUESTION: Is it only weight?

DR. RANK

No, it is not only weight. If weight control is maintained for this operative procedure, it is maintained because the pouch is functioning. If the pouch is functioning, there are no physiologic side effects. The patients do not have bile reflux, upper abdominal pain or any side effects with a healthy functioning pouch. If those criteria are met, then they also have control of their weight. I cannot separate the four parts.

QUESTION: How are you judging the functioning pouch? The question asked regarding criteria is critical. Your data is phenomenal, but I am having trouble accepting it because I do not see the criteria to reach that kind of a statement.
DR. RANK

What in particular?

QUESTION: What about your failures? Are you studying them in terms of function?

DR. RANK

Yes, absolutely. They all have the same failure. They have developed nonelastic stretched pouches. This is why such attention is given to the greater curvature and why the procedures that you heard about, the Roux-en-Y and Dr. Fabito's procedure, have a lot of allure. They handle or eliminate the greater curvature which after devascularization, has a tendency to become demuscularized and nonelastic. The failures are caused by that nonelastic, stretched, dilated, noncontractile fundal segment. When that occurs, it leads to practically all of the side effects, the major portion of which are motions with respiration, failure to contract, and the reflux of bile and alkaline secretions up into the pouch. This last problem in turn produces highly symptomatic continuous pain for relief of which the patient begins to nibble constantly. This then results in progressive increases in weight. That almost uniformly describes the failures. They all follow the same thing. The pouch becomes enormous. If, however, one controls the pouch size, I just do not see failures.

QUESTION: How soon does all this show up?

DR. RANK

I would say that if the person has a pouch maintained at three months, the pouch is not going to stretch. You already know at three months which patients are going to have a pouch that is nonelastic.

DR. TORRES

I think you have to consider that pouch and stomal size are very important. In 30 patients in whom I have done the loop gastric bypass with a 50 to 60 cc pouch, the failure rate was 25%. We have patients who lose no more than 20 to 30 lb. After we started doing this other procedure with a 30 cc pouch and a stomal size less than 10 mm, we gained complete control in those patients. In the first two patients I could not diminish the size of the stoma because I did it by hand. One patient was overeating. We had to control this patient by diet and this patient has to be followed up in the office and assisted to the clinic. The operation of gastric bypass does not end on the table. I think there has to be follow-up and there have to be clinics and nurses who are specialized. The patient has to be given some guidelines and we have to see them very often. I think these combinations are the reasons for the success of gastric bypass.
QUESTION: Did you say that some of your unsatisfactory results were because your pouches were too big?

DR. RANK

Yes. When we first started doing this we talked about a 90% bypass tailored so the greater curvature would be long and accessible. We used the GIA and to make a tubular pouch. This turned out to be the very opposite of what we found to be optimal. We went from that to a 100 cc pouch. Then we went from that to a 60 cc pouch and then to a 50 cc pouch until a man came down from Maine to talk about making it shotglass size, or a 30 cc pouch. Now what we try for is the smallest pouch possible in which you can make an anastomosis safely.

COMMENT

I would like to suggest the use of a head lamp. We tried a head lamp in some of our patients and they were very helpful in improving exposure so that the small pouch could be fashioned.

QUESTION: Why are we seeing alopecia?

DR. MASON

It is probably due to low protein intake. Are there other thoughts about this?

COMMENT

A few years ago I read in one of the dermatology journals a description of the level of stress in relationship to hair loss. I have seen that in many patient situations or illnesses. It is not necessarily an outgrowth of the gastric bypass, this is often seen after a major operative procedure or illness. But within six months it invariably returns to normal.

QUESTION: Dr. Rank, you defined the 50% overweight group as those that are controlled by dieting. You defined patients 100 lb overweight as those that are bypass candidates. What about the group that is 80 lb above their ideal weight, the patient who has arthritis in the knees or diabetes or some other severe low back pain, for example. What would be your approach to these patients?

DR. RANK

Let me answer the question with an analogy. If one were to see two men jogging down the street, they may both appear fit. However, one man may be loafing and the other man may be going all out to keep up. In regard to a person who is 80 lb overweight, a lot depends on whether that person has been following good health habits, and has made major attempts to lose weight or is continuing to attempt to lose weight. An 80 lb well-motivated person who has literally been on a diet program all of his life (and this is not uncommon) and is still 80 lb overweight, as
compared to a beer-drinking, candy-eating, nonexercising person that is 80 lb overweight is in very different physical conditions. I would have to say that an 80 lb overweight person with bad knees who has been someone who has attempted to control their weight in some reasonable fashion and with some reasonable medical care over the years would be a good candidate as compared to the other one who would be no candidate at all. There is more to consider than just pounds, you are quite right.

Many times we hear the story that a patient has said "You mean, I'm going to have to go home and gain 20 lb before you can operate on me?" and it does sound rather silly and stupid. But by today's standards we have certain handicaps placed on us such as agency and third party approval. I do not know what I would do for some of those patients if third parties were not involved.

QUESTION: In the classic way of doing the procedure, the channel along the greater curvature, in the upright position, is higher than it is on the lesser curvature. The pouch has to fill and then overflow. Dr. Torres, I am curious about how your pouches empty.

DR. TORRES

Actually, it is straight down.

QUESTION: Then don't you negate the value of your small pouch? Aren't you just basically making a longer esophagus and doing a total gastrectomy with straight gastrojejunostomy and aren't your patients going to have problems because of it in the long run?

DR. TORRES

The longest follow-up is nine months and we have not had problems up to this time. There has been no esophagitis at all.

DR. MASON

It appears that the lesser curvature position is just as good as the greater curvature. Do you have any other thoughts about this? I think this is one of the new things to me about these procedures and it will come up later with regard to some other operations.

COMMENT

We have some data on Roux-en-Y procedures although not combined with the gastric bypass operation. Roux limbs seem to empty more slowly than a loop gastrojejunostomy. Some of the patients who we operated upon for postgastrectomy syndrome caused by alkaline reflux gastritis will have failure to empty the pouch that is hooked up to the Roux limb. Part of the effect of your particular Roux-en-Y at the lesser curvature may be similar. Because of the Roux-en-Y the stomachs are not emptying quite as rapidly as they would with a loop, and that may add to the distension of the pouch and therefore signal back.
QUESTION: When you want to reverse your procedure, Dr. Torres, how would you do it? It seems a very difficult thing to do.

DR. TORRES

We could just remove the staples, and do the gastrojejunalostomy or divide the stomach completely and make an anastomosis which, as yet, we haven't had to do. I do not think there is any problem.

QUESTION: How long does it take?

DR. TORRES

The average is one hour and 25 minutes.

QUESTION: I would like to ask Dr. Rank to comment further about diet. Also we have found that a number of our patients have a lot of salt craving and I wonder if this ties in with your program?

DR. RANK

The postoperative dietary program is identical with that which has been utilized at The University of Iowa. I have not seen salt craving. I have actually put people on a no-table-salt regimen, I ask these people not to use any table salt whatsoever because water follows the salt and it has been fairly well demonstrated that the weight loss is intimately associated with differential bindings of water to the protein and water to the fat. Therefore, weight loss occurs by plateau levels, or water readjustments, rather than in a linear fashion. If necessary we give substitutes like Adolph's which are potassium based. We also give the usual vitamins. The patients probably do not complain about salt, at least to me, because they know how adamant I am about it.

COMMENT

We have a lot of people who love and crave salt and we have not been able to figure out why. We do not feed them a lot of salt either.

DR. RANK

I would say, at least in my practice, that the major factor that makes the difference between success and failure is pouch size. The pouch size is crucial to success and must be controlled. The second thing would be exercise. I would say that the people who get on a regular exercise program, including aerobic exercises at least three times a week and then some daily stretching exercises, are the people that are healthy, happy, that do not have sagging skin, and whose body contours appear to return to normal. Finally, the patients must set for themselves good goals in their life. I do not think any person can lose weight that wants just to lose pounds. I think the people who lose weight are people who have things they want to do with a better body, the people who want to improve their jobs, their education, the people who want to get married or salvage their marriage. It has to be more
than just "get thin." They have to want to reach and set new goals for themselves. Would you agree with that?

DR. TORRES

Yes, that is important.

DR. RANK

They cannot do that unless they feel good about themselves. Therefore, they must improve their self-image.

COMMENT

I would like to return to the question about the salt. I believe the patients develop ketosis and therefore they have a water and salt diuresis at the same time. That has been shown in patients who have been on protein sparing diets for a period of six weeks. They lose a lot of body water and then they lose a lot of salt.

DR. MASON

Has this been a problem early or is it something that you see later on?

ANSWER

I think it comes later on. Not right after surgery.

DR. MASON

We need to check ketones especially while the patients are still rapidly losing weight. Many hypotheses need to be tested.

COMMENT

In regard to preoperative tests I would like to suggest the oxygen consumption test. I have found this test to be helpful in estimating how many calories the patients use at rest. First you measure how many millimeters of oxygen the patient consumes at rest. It is normally between 200 and 300 per minute. You multiply this times seven to calculate the daily at rest calorie expenditure per patient. Preoperatively, this will help to predict to the patient about how fast they will lose. Some patients consume only 1000 calories at rest and therefore, they will lose slowly and will not do well.

COMMENT

The calories per pound ratio is also an important factor. A 500 lb patient is going to burn up twice as much oxygen per minute as the 250 lb patient. Once the patients go into a severe fasting state, automatically their thermostats will shut down because of their trying to conserve. There will be a shift downward in their basic metabolic rates. It is related to calories per pound rather than calories to patient.
DR. MASON

Therefore, the question hinges on what to use for a denominator and whether you should use body weight or surface area or whether you can just say per patient.

DR. O'LEARY

This sort of discrimination does not depend totally on body weight. The metabolic expenditure of, for example, muscle is considerably greater than fat. The test is only an indicator that may be worthwhile. However, it is not related to the weight effect but rather the biologically active material of the body and particularly the muscle mass. You will find that a heavy but active male patient who weighs 500 lb will use a lot more calories than a 400 lb woman, for example, whose muscle mass is much smaller.

DR. MASON

Do you think we could use 24-hour urinary creatinine tests?

DR. O'LEARY

Yes, we can in order to get an idea of what the metabolic rate is. The patients should all be at the same metabolic standard at the beginning of the test. Someone who comes in starved and in a state of ketosis will have a big difference in oxygen consumption compared with the person who is well fed.

DR. GOMEZ

I have been doing some studies with basilar energy expenditures (BEE) which can be determined using the Harris-Benedict equation. This equation is different for men than it is for women. There are specific figures for it. From these one can determine the BEE and by adding 10% to that, one can determine the basic energy requirements of the patient. I have such studies on about 45 patients.

If we find decreased energy requirements in a patient preoperatively, is it wrong to provide something postoperatively that will increase the energy consumption? What about thyroid?

DR. MASON

The question is related to evaluation of thyroid function and apparently it does not tell you anything and so you go ahead and give them thyroid to boost their energy expenditure.

QUESTION: How much thyroid were you giving?

ANSWER

Twenty-five micrograms q.i.d.
DR. DRENICK

As far as thyroid is concerned, obviously, it will increase basal metabolism. It will increase sympathetic output and people will be more active and feel better. The danger in this is that many of these people may have coronary artery disease and you will rapidly and dramatically increase the metabolic needs of the heart without being able to furnish a new blood supply. Therefore there have been a number of serious ill effects including angina de novo in people who never had it before and myocardial infarction. A second disadvantage of giving thyroid is that it disproportionately increases the lean tissue erosion at the expense of fat utilization. In general I think its use is frowned upon. You may have some real catastrophes with it. I would not use it and I would not suggest it.

In regard to the question of calorie expenditure, obviously many different factors have to be considered. Weight is one of them and lean tissue mass is another. The activity level is obviously also important. In addition we now know that there really are slow losers and good losers. Basal metabolism is involved but it does not only have to do with energy requirements of lean tissue. There is something that is now being carefully studied which is the so-called "brown fat." Apparently the difference between the rapid losers and the poor losers is the amount of brown fat that these individuals may have. Brown fat has the capability of wasting oxygen and energy which are then put out in the form of body heat. Those people who are good losers are the ones who have larger amounts, perhaps, and more effective wasting of dietary energy.

DR. MASON

The brown fat is the hibernating organ. Where is that in humans?

DR. DRENICK

It's probably found throughout the body but more commonly between the shoulders up in the neck region probably around the adrenals and some other areas.

QUESTION: Does the medical committee still want endocrine evaluation?

DR. TORRES

No, we do not have any of these kinds of committees in my hospital.

DR. MASON

Do you have endocrine evaluation if you think the patient looks like they have Cushing's or myxedema or something like that?

DR. TORRES

Yes, we send the patient to the internist to do the workup studies ahead of time.
DR. MASON

Dr. Drenick, what do you think about endocrine workup? When is it indicated? Is there any routine? Should it be required?

DR. DRENICK

I think as far as making a decision whether or not to operate, such a workup is not very helpful and not very practical. I think that in the postoperative course it may have some bearing on how you manage the patient. For this reason, we routinely do a glucose tolerance test and we do a thyroid workup. We may do some adrenal function tests such as urinary ketosteroids and so on. I do not think it has ever stopped us from operating on anybody, but for the postoperative management of diabetes and so on it may be of value.

I think it is very rare that somebody with a Cushing's syndrome really becomes a hundred pounds overweight. We have routinely done a.m. cortisol tests. As yet, I have not found anybody who is morbidly obese with Cushing's disease. I am sure it will occur some day and somebody will report it but I think it will be quite unusual. We have seen people who have been severely hypothyroid who are grossly obese. I think that is very rare, but it does not change anything in the decision to operate. Obviously, if somebody is really hypothyroid, he will need thyroid replacement to bring him up to normal. But his overweight is not caused by the hypothyroidism. His overweight is caused by calorie intake.

DR. MASON

Dr. Printen, how many patients with Cushing's disease reach more than twice their estimated ideal weight?

DR. PRINTEN

Of all the patients with proven Cushing's disease at The University of Iowa in the past ten years, there has only been one who would ever have been considered for any kind of operation. She was probably overweight long before she began to develop Cushing's disease. Dr. Drenick is absolutely correct. People with Cushing's disease are sick and never get this fat.

QUESTION: I wanted to ask Dr. Rank what is the caloric intake of patients who fail to lose weight adequately.

DR. RANK

I cannot tell you in calories, but I can tell you in quantities. The measuring device that we use mentally is in terms of eggshells of food. People can relate to an eggshell. We calculate how many eggshells full of well-chewed food it takes to fill the patient.
QUESTION: Is that an ostrich egg?

DR. RANK

No, this is a good old Texas white leghorn egg. The person who for the first three months eats more than one egg in capacity at one time of well-chewed food will be in trouble. At the end of six months the person ideally will be eating in the vicinity of two eggs of food. The first six months seem to be the most critical in terms of establishing the weight loss pattern. Even the people that weigh 500 lb are well on their way at six months. If a patient is eating about two eggshells full and losing weight, he should continue to do quite well with little or no management. In regard to calories, what must be excluded permanently from the diet are sweets and highly refined carbohydrates.

When you talk about formulas and calorie expenditure, there are several factors involved. I think that if a person consumes refined carbohydrates or sugar, no matter what they do in an exercise program, his gas guage shows full. The patient will not burn fat in the presence of high-circulating levels of glucose or other modalities or insulin. I do not know what the markers are. I suspect, as does everyone else, that it is insulin. I do not think they burn fat. I think the body says you cannot burn fat because your gas tank is full. It is difficult to speak in terms of so many calories and so much work. The body can conserve in ways that we do not understand. It is constantly altering this process. You can get out and run and not burn fat. If you drink a Coke and go out and run, you are wasting your time. It is not just a matter of calories, but what calories. If they are carbohydrate calories, you are in trouble, no matter how many there are.

Dr. Drenick has pointed out, I believe, that it is not within our capacity to eat ourselves into morbid obesity. It is a defect in the storage phenomenon of fat. As we reach 25 or even 50 percent overweight, those of us who do not have that tendency toward morbid obesity begin to see our organs failing to function at the capacity necessary to carry out a viable life. We then force ourselves to restrict our dietary program. I think the fat is deposited in areas that are incompatible with health, whether it is around the heart, the brain, the lungs, or wherever. People that have the capacity to store large amounts are unique individuals. When we try to compare on the basis of basal metabolic rates, oxygen consumption rates or calorie counting rates those different individuals who hoard and store fat with people who do not, things do not match up.

Dr. Drenick has spoken of their interesting study in which they brought many people into a sheltered environment and forced them to lose weight until they reached at or near physiologic weight. They then allowed them to return to society and all but 2% or 3% regained their weight. I believe that the success of 2% or 3% represents a metabolically normal group of people. I just do not think that the rest have enough bad habits to make up for a 97% failure rate. There must be other differences, be they genetic, hereditary, brown fat or whatever, between the people who are morbidly obese and those who are not.
POUCH VOLUME MEASUREMENT

Boyd E. Terry, M.D.

Pouch volume has to do with the predictability of results. Anyone dealing with the morbidly obese patient knows that there is a significant problem in patient predictability. If we do not do something that is predictable from our end we are likely to blame the patient for our error.

There is considerable evidence for a relationship between pouch volume and weight loss, the presence of ulcers and possibly esophageal dysfunction. Recently I have heard the statement that it is not possible to make the pouch too small. This worries me because I am concerned that this could lead to an imprecise and uncontrolled procedure. It suggests that the stomach pouch may have unlimited adaptation. If this is true, we should worry about the rationale of our own present procedure as it relates to long-term weight loss. I postulate that there is an optimum volume and pouch size which will work the best, but the only way we are going to be able to prove that is through pouch volume measurement.

An example of why we should take accurate measurements can be found in the problem of the stretching pouch. A postoperative patient came in weighing 208 kg for a ventral hernia repair. At the original operation the patient had been given a 45 cc pouch and a 10 ml stoma. Because I knew what the pouch size had been, I was able to surmise that I was dealing with an uncooperative patient. Without measurement, I could not have been sure.

The present method of measuring the pouch volume is precise enough to give us a repeatedly accurate volume measurement. Measurement can be undertaken in several ways. One way employs the Levin's tube. A Pott's clamp lightly occludes the esophagus at the esophagogastric junction. A technical point that I would like to stress is the importance of knowing where the esophagogastric junction is. I find the simplest way to determine this is not to completely skeletonize the esophagus. I intussuscept the fundus into the esophagogastric junction. The narrow point, but not the crus of the lumen, is what I take as the esophagogastric junction. I mark it with a dental rubber band on the Levin's tube which I can feel with my finger. This assures me that I am not going to include the esophagus in my volume measurement. The same applies to the lesser curvature side. The TA90 is placed across the stomach. Prior to firing it, the anesthesiologist injects saline in 10 cc increments until a pressure of 30 cc of saline is reached. The pressure is determined on a manometer placed through the stomach wall. Occasionally we have to adjust the stapler up and down slightly until we get just the size we want.

Another variation involves pulling the nasogastric tube back into the esophagus. After lightly clamping below the nasogastric tube and with the TA90 in position I inflate the pouch through a syringe from the operative side. I find that this may be an even more accurate method. In addition, it is simple and does not involve the anesthesiologist.
As yet there are a lot of questions. The true "stretchability" of the stomach, for example, is not known. Studies employing the basic animal model are probably going to be necessary to illuminate this area.

My original method of pouch calibration involved measuring 5 cm along the lesser curvature and 12 cm along the greater curvature. I constructed the pouch according to those parametric measurements. I began wondering, however, just how big that pouch really was. It turned out that we did not know and could not predict it. I set my criterion for success as being a loss of one-third of initial weight in one year. Some of the early patients were not meeting the criterion. We decided to make the pouches smaller, and some of these were in the 50 to 100 cc size (these patients did not have a controlled stoma). Many still did not reach the desired weight loss. Based on this information I have gone for the last couple of years to a 30 cc pouch. With this, the success rate has improved greatly and is statistically significant. I feel that this has demonstrated the value of critical pouch volume measurement.

In conclusion then, the pouch volume is easily measured and is predictive of weight loss performance. Failure to lose may be due to the pouch or to patient compliance. Stomal size is also very important and will be addressed by other speakers.
POUCH VOLUME, WEIGHT LOSS AND MARGINAL ULCERS

Kenneth J. Printen, M.D.

I would like to begin by addressing the problem of revising these operations. We must remember what it really means when we tell a patient that in fact we have to make his pouch a little bit smaller. We must remember the potential suffering that this may inflict upon the individual patient. At the same time revision is often necessary if the patient is to end up close to normal weight. The only way to do that, as Dr. Terry has already suggested, is to make sure that you have in fact an adequately measured pouch volume. I would like to emphasize that there is no substitute for actual measurement. The method of "eyeballing it" can never be as effective or accurate.

In our first group of patients, operated on during the 1966 to 1970 period, we were concerned but not critically aware of the real problems involved in making small pouches and stomas. We found that we had to revise 36% of those initial patients for inadequate weight loss. Fortunately, this was a small group of patients. There were only about 63 patients in that initial series. As we progressed and became aware of what was happening, we changed our approach to the operation. We started to make the pouches smaller and we made the stomas narrower and narrower. We found that as far as gastric bypasses were concerned, we were able to produce a predictable weight loss with a revision rate that continually dropped. The best and latest figures that we have, come from our group of patients operated upon during 1975 to 1979. These were patients who had not only measured stomas but also very carefully measured pouches.

An interesting thing to note is that when you must revise one of the more recent patients, he will tend not to lose as much weight as the earlier group of patients who simply had a large pouch. This may have to do with patient compliance as Dr. Terry mentioned earlier. Some patients have had two and even three revisions of their initial operation and still do not lose weight. I think in such cases poor patient compliance must be considered. In addition to the operative procedure, some type of behavioral modification really becomes a necessity to control obesity in that particular group of patients.

With regard to the technical aspects, revisions can consist of a reduction in stomal size, pouch size or both. This will probably get the patient losing again, however, you must consider the increased risk of morbidity and mortality with revision. This is another reason why the pouch should be adequately measured in the first place. In our experience, the mortality rate for revision of the gastric bypass has been twice that of the initial operation. The morbidity rate from leak and from wound infections varies from two to four times the incidence with the initial operative procedure.

If this stoma is of normal caliber, part of the proximal pouch can be resected. The operative procedure that we use involves resecting all that we have done to the stomach which usually includes the fundus. The fundus will dilate in some of these patients to tremendous size. What
is usually done then is to resect the fundus and give the patients what one of my residents called "a pea-shooter operation." This means that their stomach is perhaps about as long and as big around as half of a cigar. We put the 32F Hurst dilator down through the anastomosis to calibrate the stoma and to make sure that it is not, in fact, large. We use the TA90 stapler or the GIA to resect the redundant stomach to the greater curvature side of the anastomosis. This then can either be oversewn with silk or just cauterized and left alone. Unfortunately, as I mentioned earlier, in our experience this procedure carries a three times normal leak rate. Although I can conjecture, there is no hard and fast evidence as to what in fact really does cause this unusually high leak rate.

Most of the leaks occur in the stapled and resected area. For this reason, whenever we perform a revision we feel that it is mandatory to leave some large drains in that area.

In addition to poor weight loss, there are other complications that can arise from creating a pouch that is too large. When you leave a rather large pouch above the constricted outlet of gastric bypass, you are setting up a situation that will lead to an increased incidence of marginal ulcer.

Before we started measuring our pouch sizes in a fastidious manner, the marginal ulcer rate among our gastric bypass patients was 4.2%. Quite frankly, that is unacceptable. Since we began measuring gastric pouches and making sure that it was no larger than 50 cc, the marginal ulcer rate has dropped to 0.9%. Our earlier rate of marginal ulcer of 4.2% was similar to the 5% rate that was seen following 75% gastric resection for the treatment of duodenal ulcer disease. And, of course, this procedure was abandoned precisely because of the high marginal ulcer rate.

When the upper pouch is made adequately small, the high marginal ulcer rate disappears. There are two simple reasons for this. First of all, the upper remnant is not large enough to secrete much acid on its own. The second reason is that there is enough acid-secreting mucosa left in the distal stomach to control the antrum.

Recognition of the possibility of a marginal ulcer can often be difficult. This is because one must differentiate among a triad of symptoms which are common not only to the patient with marginal ulcers but also to patients who have some type of dietary indiscretion or personal problem with the gastric bypass operation. This triad of symptoms consists basically of persistent vomiting, epigastric pain, and lassitude. In most patients these are not serious problems and they usually subside with time and encouragement. However, the patient who has lassitude may in fact be suffering from chronic blood loss. The tiredness is caused by anemia. Anybody who presents with that kind of symptomatology deserves at least a stool guaiac as a screening for possible chronic gastrointestinal tract bleeding. A CBC should also be taken. The patient who has persistent vomiting for more than two months after gastric bypass or a gastroplasty definitely has something wrong. Again, however, early postoperative vomiting is common. We see it particularly
when folks are starting to learn how to eat. I am sure you have all had the same problem. The first couple of chickens with feathers that they try to eat get them upset, and they vomit a little bit. But after a while they learn approximately what their pouch size is. They will then learn how to eat and to take their time, and they get along fairly well. It is only when vomiting is persistent and particularly when it begins more than two months after operation that you should think again about marginal ulcer.

The final symptom, upper gastric pain, is again, extremely common. Usually patients get relief from antacids or soda pop which causes belching and consequent release of pressure.

All these symptom complexes must be evaluated, preferably in two ways. Perhaps the best method of evaluation is gastroscopy. Among the 14 marginal ulcer patients in whom we used gastroscopy, we were able to see the ulcer in every patient. The use of upper GI roentgenograms may not give you a diagnosis in a 100% of the cases. Nevertheless, they are certainly a better diagnostic tool following gastric bypass than they are in people with gastric resections. This is probably simply a matter of technique. Not as much barium is needed in the stomach of these patients to outline the ulcers. The upper GI series is also an important aid in the determination of therapy. We usually try these patients on cimetidine or antacids.

If the patient's symptoms do not resolve, you must, of course, do something. It may be that your operation is what has caused the patient's marginal ulcer. This is when it becomes important to know whether the stomach pouch is too big or too small, because it will influence your operative intervention. We have found that if the stomach pouch is small, vagotomy alone is perhaps what is needed. It seems to have worked in our limited experience. If the stomach pouch is big, we have gone to vagotomy and resection of part of that large proximal remnant. Another procedure which, as yet, we have never tried is a complete proximal resection.

In short, the problem of marginal ulcer is another complication of an overly large pouch. It should be avoidable through careful pouch volume measurement during the initial procedure. So far, we have not seen any marginal ulcers among our gastroplasty patients. Notwithstanding, I suspect that it certainly is a possibility if you disregard the measurement and create a large upper pouch. My message, then, is basically simple. Large pouches are indeed bad because they lead to several sets of dilemmas or treatment modalities which again expose the patient to added risk, either from revision because of inadequate weight loss or from operations for medically nontreatable marginal ulcers.
Recent reports on the second and third generation of gastric bypass procedures show an alarming incidence of failure. This is related to dehiscence of the staple line which has been an integral part of these modifications. Dr. Mason's original operation, as you recall, called for a high division of the stomach and a concomitant gastrojejunostomy. This, as you know, is technically difficult, time consuming, and has a 2.5 to 4% incidence of leaks. The second generation modification, consisting of a completely stapled stomach and either a loop or a Roux-en-Y gastrojejunostomy, markedly decreased the operative time, but still had the problem of gastrojejunostomy leaks. The third generation, and most recent variation, attempts to solve this problem by incompletely partitioning the stomach leaving a channel either along the greater curvature as advocated by Mason and Gomez or in the center as advocated by Pace.

In 1978, we independently began working on ways to simplify the procedure. Our thoughts were similar to those of Mason and Gomez in regard to a greater curvature channel and limiting its dilatation with nonabsorbable sutures. In the beginning, we approached this experimentally in the laboratory. Eleven dogs were divided into two groups. Group A consisted of six dogs. They were stabilized on an unlimited diet. Daily food consumption, and a weekly weight were recorded. Finally we operated upon these dogs and gave them fundic pouches of 60 to 150 cc capacity by mobilizing the stomach and the esophagus and incompletely stapling across the fundus. We used a single double row of staples, that is, a single cartridge of 4.8 mm staples inserted with the TA90. The channel was maintained around the greater curvature by first removing from the cartridge three staples adjacent to the pinhole. The stapler was positioned through an opening made between the left gastric vessels and the lesser curvature wall with the opened end of the stapler at the greater curvature. The pouch capacity was determined, as Dr. Terry mentioned, by putting a manometer in the line and measuring the amount of fluid that was put in through a nasogastric tube at a pressure of 30 to 35 cm of water. The pouch size could be changed, as Dr. Printen mentioned, by repositioning the stapler prior to firing. The staple lines were carefully inspected to make sure that they had all closed completely and properly.

To limit the expansion, the nasogastric tube was then removed and a 12 mm bougie was inserted transorally through the greater curvature channel. A double row of either 2-0 silk or Prolene was placed around it as a seromuscular basting stitch that was superficially anchored at the last staples. These animals were placed on an unlimited diet and again, daily food consumption, weight and vomiting were measured.

In Group B, consisting of five animals, we used a TA55 and the pouch was calibrated between 60 and 75 ml. The staple line was reinforced by applying the stapler twice so that there were four closely adjacent rows. The channel was further narrowed by removing only two staples.
from the end of the cartridge adjacent to the pinhole. The ends of the staple line were reinforced with silk transgastric sutures that were then continued around the greater curvature to limit the channel expansion just as we did in Group A. The postoperative feedings in this group, however, were limited to liquids. Feedings consisted of double strength Vivance® with two calories per cubic centimeter. The animals were given up to 100 cc per hour for one month, plus an additional 120 gm of solid food three times a day for an additional month, after which they were again put on an unlimited diet.

In Group A, all animals vomited for the first five weeks postoperatively. They decreased food consumption and experienced a 10 to 25% weight loss. Food intake then gradually improved and weight stabilized. Finally, at 10 weeks, they all began to regain their lost weight. Between nine to 18 weeks, five of the dogs underwent gastroscopy and it was discovered that the staple line division could no longer be seen. Three of the animals had a GI series during which the barium was seen to empty from the entire stomach immediately. This suggests staple line dehiscence. One animal died 16 weeks postoperatively of unrelated causes, and at autopsy the staple line had completely broken down and the channel was found to have completely opened. There was serosal scarring at the site of stapling but no signs of peritonitis. The scar line indicated that the fundic pouch had dilated two to three times normal size. Some of the staples had pulled through intact and some had opened. The other dogs were all reexplored between nine and 18 weeks and all were discovered to have similar staple line dehiscence and channel destruction.

In Group B, none of the animals vomited their restricted feedings. They all lost weight precipitously which we attributed to their limited caloric intake rather than stapling. Between the third and fourth postoperative weeks all the dogs underwent gastroscopy and in all the staple line appeared intact. The fundic pouches were small and the greater curvature channel had not dilated. One animal died of unknown causes between the fourth and fifth postoperative weeks. At autopsy the staple line and channel were intact and the fundic pouch had not dilated. Another animal, sacrificed at 11 weeks because of extreme malnutrition, also had similar findings.

The remaining three dogs had their diets progressively increased. Their behavior patterns differed from Group A in that they did not consume all food offered and they did not vomit. Upper GI roentgenograms demonstrated that their staple line, stomach pouches and channels were intact. At three months after operation they were put on unlimited diets. One animal died one week later of unknown causes, and the other two were sacrificed after two months. In all three the staple lines had dehisced except for a 1 to 2 cm segment alongside the channel where the trans-gastric sutures had been placed. The channels were intact and had not dilated.

In dogs, at least, attempts to simplify gastric bypass by partitioning the stomach with either one or two double rows of staples were not uniformly successful because of dehiscence of the staple line. The partition lasted longer when two double rows were placed rather than a
single one. A single double row of staples broke down in 100% of cases. By placement of two double rows and restriction of oral intake was successful in maintaining the partition in 40% of the animals. The dehiscence of the partition was probably caused by overdistension of the fundic pouch from overeating rather than to primary failure of the staples. The inert qualities of the stainless steel fail to attract sufficient tissue reaction to insure strong fibrous union. The only area which resisted separation was where nonobservable transgastric sutures had been placed to anchor the channel limiting suture in Group B. Limiting oral intake immediately after surgery, as suggested by Pace and Carey, appears to have salutary effects on preventing disruption. Total or partial staple line dehiscence may explain some of the clinical failures where stapling has been used as an integral part of the procedure. Cascading of barium in postoperative GI studies indicates possible disruption. Total or partial disruption may explain the wide variations in weight loss that have been reported. It may also explain the patient who regains weight after an initially satisfactory weight loss.

It is important to follow up patients with upper GI studies at specific intervals to determine the staple line status. No preparation is needed and no detailed studies are required. It takes only a few minutes and pays high dividends in the form of reassurance that the staple line is still intact and the channel has not dilated. Our data base for future follow-up information is not secure without such statistics and studies. Gastric partitioning by stapling is technically easier to do than the standard gastric bypass and reduces the risk for infection or stomal leaks. However, the stability of the staple line is not as secure as when the stomach is surgically transected. We need something like transgastric sutures, as suggested by LaFave and Alden, to buttress the staple line and stimulate increased tissue reaction thereby promoting a strong fibrogastric union. Further studies are needed to solve this important problem of staple line dehiscence.
PATHOLOGY OF STAPLING

Kenneth J. Printen, M.D.

In addition to studying the staple lines, we tried to determine the optimum distance between the double row applications of the TA90 stapler. This was undertaken because of our unfortunate experience and that of other surgeons in which some patients with double rows of staples (two side-by-side applications of the stapling instrument thus leaving four individual rows of staples) had suffered necrosis of the area in between the staple line applications.

We performed a standard gastroplasty in three groups of animals taking out three staples nearest to the pinhole on the first application and five staples from the second application. We placed the staple lines alternately 5, 10, and 20 mm apart. Our animal experiment was very similar to what Dr. Fischer has described but with some important modifications. For the first three days following gastroplasty we did not feed our dogs. They were maintained on intravenous fluids, and therefore, not allowed to distend their pouch.

The dogs were sacrificed on the third postoperative day. We were hoping to find secure staple lines. However, just as with Dr. Fischer's dogs, that is not what happened. Even in this short three day period and in dogs that had not been allowed to eat at all, we found that the staples already were beginning to migrate. There were little gaps in the area of the double staple row already appearing at 72 hours after the initial application of the staples. Obviously, the staples, in fact, do migrate. Knowing this, I believe we must advocate a double application of the stapler. Otherwise we are going to have great numbers of patients returning for revision because of failed staple lines.

The staple lines tend to unzip. Interestingly, they do not unzip just from the channel on out. Approximately 25% of the staples in these applications will, in fact, become dislodged, just in a three-day period of time. Although stainless steel does not produce a vigorous tissue reaction, it does lead to at least some inflammation that can be seen microscopically. This inflammation progresses and forms little micro-abscesses which basically become free perforations from the inside to the outside of the stomach. They, in turn, lead to the development of localized peritonitis. The process probably accounts for much of the unzipping of the single staple line applications.

In looking at how far apart to place the staples in order to guarantee that the stomach does not necrose between the staple applications, we found a uniform picture in the 5 and 10 mm placements. With these widths tissue death occurred at the mucosal level. Although it was spotty and certainly not a total full thickness death, there was disruption and obvious necrosis of tissue in between the staple lines. In one of the dogs in which there was a 5 mm separation, total necrosis occurred between the staple lines.
We found that in our dogs that had a 20 mm separation there was no evidence of any kind of tissue death in between the staple lines. Therefore, at least from an experimental standpoint, we feel that the probable optimum distance between the staple applications should be 20 mm. It should be kept in mind, however, that we do not know if, in fact, the human stomach undergoes the same kind of microscopic necrosis that we found in the experimental animals. Furthermore, even if it does, we must ask whether it is important in these patients. This is something that has not yet been answered. Certainly many surgeons have done a lot of double row applications of staples at a variety of distances apart, and have had no difficulty with any of that stomach in between the staple lines. Therefore, I must stress that much study is yet to be undertaken before definite conclusions can be drawn.
VERTICALLY STAPLED GASTROPLASTY

Gifford V. Eckhout, M.D.

I began doing gastric bypasses according to Dr. Alden's technique which is a modification of Dr. Mason's technique. Because of the problems that we have heard discussed today regarding gastric bypass, least of which in my experience was staple line failure (I had a 15% rate of staple line failure in my cases), last summer I began to look for a different operation that would give better results. I decided to try a series of vertically stapled gastroplasties, which were described at this conference last year by Dr. Daniel Fabito of St. Louis.

With this procedure a small pouch is created along the lesser curvature. A double TA90 staple line is placed parallel to the lesser curvature, and the channel is constructed in the same manner as Dr. Gomez constructs the channel on the greater curvature. First a window is made in the lesser omentum by thrusting the finger through an avascular area just over the caudal lobe of the liver, and then the fingers are put into the lesser sac. It is very important to get into the lesser sac in order to establish the channel posteriorly to the stomach and to introduce the stapler. We make a small window on the lesser curvature of the stomach using a tonsile instrument. It is made right on the gastric wall and it is the size of a finger. We often get a bleeder there, but it is never a problem. We simply put in a silk stitch for control. This is a very small window through which we will later introduce the TA90 stapler.

Another window is made at the greater curvature of the stomach just to the left of the esophagus also in an avascular area. In the 77 cases that we have done so far we have not had a single bleeder in this area. In fact, we have not had a single significant bleeder during the operation.

We have done only one splenectomy in 77 cases. We do not see the spleen in this operation and I cannot explain what happened. By the end of the procedure, it was bleeding profusely so it was removed.

The next step involves passing the fingers through this larger opening in the lesser omentum. It is important to be sure that the fingers are in the lesser sac. Sometimes the two layers are fused back there and it is a little difficult to get into the lesser sac. But you must be in the lesser sac if you are going to introduce the TA90 behind the stomach. Otherwise, you are going to go right through the esophagus. After placing your fingers in the lesser sac, you turn them upward and bring them out just above the greater curvature about 1 cm to the left of the esophagus. At the same time you bring your right hand over and by manipulating the fingers, you can bluntly dissect this opening where, as I said, there has been no difficulty with bleeding.

The next step is to attach the toe of the TA90 to a #18 ureteral catheter which can then be passed behind the stomach through the channel mentioned above. By simply pulling on the catheter, it guides the TA90 in this posterior position behind the stomach. It is very important to grasp the lesser curvature wall with a large Allis clamp to pull the
stomach against the heel of the TA90 since previously we have removed four staples from the instrument. If you do not pull the stomach down, it will be completely stapled off and the channel will not be in the correct position. We have a #30 Maloney dilator in position when we place the TA90 stapler. Through the opening in the lesser sac, you can grasp the dilator and the pouch and you can feel it at all times while you are placing the TA90. In this way, you have a very good idea of the size of this pouch because there is a 30 dilator lying in it and you can feel with your fingers how close the TA90 is to the dilator.

The TA90 is applied twice in approximately the same position. I make no effort to separate the TA90 staple line. It is rather easy to put the TA90 in the second time and fire along approximately the same line as before. After the first firing, I put the catheter back on the toe of the TA90. As the TA90 is pulled out, the catheter will then be repositioned so that it can aid in guiding the TA90 in again for the second firing of staples. After the TA90 is fired, the pouch, which is unmeasured, should be somewhere between the size of an index finger and the little finger.

After putting in the two rows of staples, I place my finger through the same holes. The left hand index finger goes behind the staple line, and I completely oversew the TA90 staple line with through-and-through running 2-0 Prolene sutures starting right at the top at the greater curvature. The only way that I could tell whether I would get the back wall of the stomach was to stick my finger with a needle as it would come through. Therefore, I have devised a little way to keep from sticking the finger each time. I put an aluminum finger splint on my index finger. I use two pairs of gloves and put the aluminum splint between them. This way I no longer stick my finger but I do catch the anterior and posterior gastric wall.

At this point, a #1 chromic suture is passed directly through the stomach and is tied around a #30 Maloney dilator which the anesthesiologist has passed through the channel. This #1 chromic suture is tied snugly around the dilator. Often when we tell the anesthetist to remove the dilator, he will tell us that we have sewed it in. It does pull the stomach a little as the dilator is removed. But that has not caused any problem. It is very important to put the #1 chromic suture down the channel. Dr. Fabito left this off of five patients when he first started doing the operation and those patients later dilated their channel and had to be revised.

QUESTION: You said chromic one time and Prolene the other. Which is it?

DR. ECKHOUT

It is a #1 chromic suture that is placed around the channel. A 2-0 running Prolene suture is used along the staple line. I pass the 2-0 Prolene suture through both walls of the stomach to the back wall. The assistant grasps the #30 dilator in the lesser curvature of the stomach and rotates it to the left so that we can see the back side of the
stomach and run the 2-0 Prolene suture all the way around the channel. This is similar to what Gomez does on the greater curvature. Next I come back up the TA90 staple line about 2 or 3 cm. This way I make sure that we catch both of the TA90 staple lines again to anchor that 2-0 Prolene to the staple lines. This hopefully will prevent later pull out of the 2-0 Prolene. Then a layer of 3-0 silk is placed completely around the channel, starting on the back side again with the assistant holding the lesser curvature and the dilator. Interrupted 3-0 silks are placed all the way around. We turn in the lesser curvature gastric wall and form a pseudopylorus of the lesser curvature.

A Levine's tube is left in the channel. The anesthesiologist, of course, pulls out the dilator at the completion of the operation, and we always put the Levine's tube in the pouch and we do test the pouch. With an Asepto syringe we force 60 cc of saline as fast as we can into this pouch, while grasping the cardia and pinching the channel. That is done for two reasons: to get an idea of the size of the pouch, and also to prevent leaks. On a couple of occasions when we did that, a little saline seemed to pass out through the suture lines. This creates no problem at all, you merely put in another 3-0 silk in that area.

There have been no leaks, no fistulas, no abscesses, and no perforation in the 77 cases. The most disturbing thing for me was the staple line failure rate. Among our 83 total patients we had 12 staple line failures. These all required reoperation and there was inadequate weight loss in six patients. We have one or two gastric dilatations, and one patient had a massive gastric hemorrhage which required an emergency 90% gastric resection. The average preoperative weight for our gastric bypass patients was 251 lb. A three month weight loss was 46 lb. By 12 months, it reached 81 lb. The average hospital stay was 7.6 days.

Among the 77 vertically stapled gastroplasties, we had one splenectomy no leaks, no fistulas, no abscesses. To date three patients have been rehospitalized for excessive vomiting. None of these patients has required reoperation or dilation of the channel. Each of these three patients responded to conservative management with IV hydration. Two of them were hypokalemic and we gave them antacids and Prostigmin, and in a matter of about four days, they were able to go home and continue on their diets. There have not yet been any staple line failures. The average preoperative weight was 276 lb. The three months weight loss in this series was 57 lb compared to 46 lb with the gastric bypass. However, the preoperative weight in these patients was less, and this may explain why there is better weight loss with the gastroplasty patients. Fortunately, we have had no deaths. The average postoperative stay is six days in the gastroplasty group. Many of the patients ask to go home on the fourth or fifth day and I have let a number of them go home on the fifth day. Perhaps in the future we will change it to the fifth day instead of the sixth day.

Incidentally, I put a sump and Penrose drain in all of my patients because I believe in good drainage. I feel that if a leak does occur, the drain will have it controlled and perhaps reoperation can be avoided. I merely treat them with antibiotics and they should be all right.
VERTICAL STAPLING UPDATED

Lawrence L. Tretbar, M.D.

Last year at this meeting we introduced the concept of vertical stapling. When compared with other types of gastroplasties, the difference that is quite obvious is that we do not create either a pouch or a stoma. The tubular conduit created by vertical stapling, in effect, becomes both the pouch and the stoma. It is my thesis that there may be something unique about tubular structures created within the stomach, and if so, that this may be applicable to other forms of gastric procedures for obesity.

My associate in Kansas City, Dr. Sikes, and I, have operated on 36 patients over a period of three years. We call this operation fundal exclusion because it excludes the fundus. Dr. Mason calls it vertical stapling. I expect that if this operation becomes a thundering success it will be continued to be called vertical stapling. If it's a failure, we'll call it fundal exclusion. Be that as it may, I thought I would review briefly the technical aspects of the procedure, give you the results of a three-year period of this modest group of patients, and then make some speculations about the possible advantages of tubular gastric structures and what that may mean for the types of procedures that we are performing otherwise.

Essentially, the procedure begins by creating an opening at the gastroesophageal junction by putting a finger through the lesser sac into the angle of His and making a small opening. A 32 or 34 gauge tube is placed and is pressed down along the lesser curvature to straighten out the stomach. The TA90 is applied along the lesser curvature. We place a second application of staples from below. We make a small rent in the gastrohepatic ligament, pass the stapler up along the tube leaving a 3 cm gap along the greater curvature to allow egress of contents from the excluded fundus. The pinhole in the middle is oversewn both anteriorly and posteriorly. Of course, if we had the Gomez C-clamp, we would not have required the pinholes which would be an advantage. However, the holes are very easily sutured and do not cause a problem.

Over time we have made smaller and smaller conduits, which seem to be the progress of most of these gastric operations.

We have had one interesting complication. In one patient the entire stomach filled with air. That patient leaked some of that air and fluid and required reoperation. The actual area of leak was not demonstrated. A gastrostomy tube was placed and the opening was enlarged. Interestingly enough, the 2.5 to 3 cm opening was still patent. Apparently the gastric mucosal fold acted as a one-way valve, permitting the air to be caught into the fundus and preventing its egress. We therefore made an even larger opening. Now my associate is placing only the upper line of staples from the angle of His, so that the staple line is 90 mm in length. It is noteworthy that the effects are very similar whether there are two lines of staples (180 mm) or whether there is only a single line (90 mm).
The patients have the same feeling of satiety as with any of the other
gastric procedures. They find it difficult to swallow more than two
eggs full of well-chewed food, and have the same general responses as
those reported for other types of procedures.

We have had two patients who had an incontinent lower esophageal sphincter
with gastroesophageal reflux and esophagitis. In an obese patient who
needs an antireflux procedure we place the double line of staples and
then add a traditional Nissen fundoplication around the esophagus. Such
patients are not included in our data but they have been before. Within
the first six postoperative weeks the reflux symptoms are eliminated and
so far our patients have responded in the usual fashion as far as the
stapling procedure itself is concerned. We were pleased to be able to
do this and so far we are happy and the patients are happy. Long-
term results, of course, will have to be awaited.

We determine the weight loss as percent of the excess weight. We have
two patients who have lost 100% of their excess weight. Two other
patients have been excluded from our figures. One was a teenage 400-
lb boy whom I reported last year as an incorrigible eater. Another is
a woman who did not return for follow-up but her neighbor said she is
larger than ever. What is interesting to me is that the first two
patients have in fact continued to lose modest amounts of weight whereas
the two other excluded patients lost no weight at all. We have two
patients with two to three year follow-up information. One had a more
dramatic weight loss. The other continues to lose weight slowly.
Patients at 24 months show some grouping. Some had lost weight and then
gained weight. Two of these patients were doing very well until they
both went to a Weight Watchers group and met some nice boys. I guess
the boyfriends took them out to dinner too many times and they felt that
they had to clean their plates. On the other hand some of these people
have continued rather dramatically.

Patients who underwent operations more recently have had smaller con-
duits. The problem of calibration, of course, is one that we are dis-
ussing today. We calibrate it as an entire tubular conduit, which
means that the entire structure is calibrated along the tube placed at
the time of surgery. Stretching, of course, is one factor that is
difficult to evaluate. This is true of the calibration of pouch volume
unless the pressure itself is included. I draw your attention to two
laws that Dr. Alden mentioned last year. The first is LaPlace’s Law,
which says that the smaller the radius of the vessel, the less the wall
tension needed to support any particular pressure. In other words, the
smaller the diameter of either a tube or the pouch, the greater is the
intrinsic tensil strenth of that tissue. I think this helps explain why
the smaller the pouch the stronger it is and the more resistant to
stretching. The second law states that the velocity of flow in the tube
is proportional to the cross-sectional area of the tube. This says
again that the smaller the stoma, the less the flow. Also it is related
to length of a tubular structure so that inserting a tube into the
process further decreases the flow through that stoma. If you con-
ceptualize a tube as a series of stomas, you realize that a narrow, thin
stoma extended into a tube has greater resistance than a single stoma in
the surface of the mucosa. I would like to suggest the possibility combining a tubular outflow with both mid-suture line and greater curvature outlets.
SYMPOSIUM: POUCH VOLUME AND STAPLING -- KENNETH J. PRINTEN, MODERATOR

DR. BUCKWALTER

I believe the TA55 is both easier to use and provides a smaller pouch.

DR. TERRY

Have you measured the pouch? How big is it?

DR. BUCKWALTER

We have not measured it.

DR. TERRY

I would be curious as to how small the pouch is. We are using a lot of judgment. The only way we can strengthen that judgment is to have measurements. It may not be important but if the pouch is too small and there is esophageal decompensation or some other problem related to an overly small pouch, only with measurement will you know that it should not be used.

DR. MARTIN

We no longer use the TA55 at Columbus, Ohio.

DR. ALDEN

The longer the staple line, the more the tissues are flattened out. When the tissue rebounds there are more staples if a TA90 is used when compared with a TA55. You should always use the longest staple line that the tissue will accept in order to have the maximum number of staples.

DR. FISCHER

I have used the TA55 a few times and it tends to bunch the tissue. I agree with Dr. Alden that the more staples placed across the stomach the better off you are.

DR. TRETHER

I agree with the bunching theory and use a long staple line which is not bunched.

DR. LEWIS

We use the TA90. The tendency for staples to pull through is exaggerated in the dog's stomach because it is so thick.
QUESTION: Does crushing of the mucosa by the stapling instrument pose a problem?

DR. TERRY

I make a point not to tighten the stapling instrument completely. I then look at the staple line in front and back and then distend the stomach to see that there are no leaks and that the staples are going to hold. I use two sets of staples.

DR. O'LEARY

We studied 20 dogs with staple lines at varying distances apart. The dogs were divided equally into four groups. The first group had only one set of staples. The second group had a double set of staples placed very closely together. The remaining two groups also had double sets of staples placed at 1 and 2 cm apart respectively. We studied the blood flow to the area using microspheres and we also looked at the histology.

There was an area of compromised blood supply in the 1 cm group. In the group with superimposed staples there was minimal blood flow but the area was completely sealed. In the 1 cm group there was an area in the middle that had very seriously compromised blood flow. The 2 cm distance is just like placing two sets of staples in different parts of the stomach. I would recommend that if two sets of staples are to be used they should be nearly superimposed.

There is tissue crushing in our animal studies. The crushed mucosa is replaced by a fibrous adhesion and then scarring. There was no mucosa under the staple line in these 20 animals.

In animals we place the staples immediately adjacent to each another. Because I have had a death, I am using only one application of staples in humans. I do not take down any blood vessels. The staple line is nearly vertical in humans. The aperture is on the lesser curvature.

QUESTION: What method is used to reinforce the staple line?

DR. FISCHER

I think you need some through-and-through transgastric suture material. We talk about humans acting like humans and dogs acting like dogs but the humans that break down their staple lines are the humans that act like dogs. When I was keeping the dogs in the laboratory they did not break down their staple lines but when I had to send them to the farm there was no control over the food intake and they were eating whatever they could get. They would vomit and eat again. That was when they broke down the staple line. I think that is what happens to the human. Those who saw Carey and Pace's recent paper noticed that they think breakdown starts at the channel. I do not think it starts at the channel at all. I think it starts just because of pressure from the side. The staples pull through slowly. Usually they do not rip out suddenly and, therefore, there is usually no leak into the peritoneal
cavity. You need something to start a fibrous tissue reaction. You do not get that when you transect the stomach.

DR. MARTIN

Dr. Ellison has done our laboratory work. We are no longer using a single application of staples. We now use two applications as closely together as possible. We tried reinforcement with various suture materials and they do not hold. The disruptions usually started at the stoma and worked outward. The dog is not like the human because it licks its hair and therefore gets hair balls. It cannot be put on a liquid diet.

DR. ELLISON

Failures occur with either the TA55 or TA90. You must have two applications. We have not seen the migration of staples that Dr. Printen talked about. Our staple lines ripped starting at the channel. With the advent of double stapling the major problem was in lining up the two holes. We designed a stapling instrument that would fire two sets of staples simultaneously. The distance between sets is exactly 1 cm. We sacrificed and performed autopsies on 12 dogs, some at four weeks and the others at eight weeks. We have another group that is still alive now at three months. There is no evidence of necrosis of the intervening tissue. There is a thick scar of amazing strength between the two staple lines. I find it very difficult to believe that that scar could be broken apart.

DR. FISCHER

Did you put the transgastric sutures through all layers of the stomach as mattress sutures?

DR. ELLISON

Those were used by Dr. Carey in patients and were through-and-through sutures.

DR. FISCHER

In the dog the only place where the staple line did not breakdown was where the mattress sutures were placed.

DR. ALDEN

I think we are missing the point. Mark Ravitch wrote me that in the dog the staple line breaks down much more often than in humans. I think the fundus dilates a great deal and this may be unrecognized. It is essential that pressures be prevented from building up. All stomachs should have a Witzell gastrostomy to prevent distention during the early days before healing occurs. I use a single application of 4.8 mm staples and a routine gastrostomy with a 16F Malecot catheter. The gastrostomy is left to straight drainage and removed after ten days. A Levine tube is used during the first night.
QUESTION: How long do you use the gastrostomy?

DR. ALDEN

I like to leave it for ten postoperative days but if the patient lives at some distance, I sometimes take the tube out on the sixth or seventh day.

QUESTION: Do you use suction on the gastrostomy?

DR. ALDEN

No.

QUESTION: Do you use a nasogastric tube also?

DR. ALDEN

Yes, but I take it out at eight o'clock the morning after the operation.

QUESTION: What size catheter do you use?

DR. ALDEN

I use a size 16 catheter. Dr. Mason told me this over the phone. He was the first to tell me. One should not use a Foley catheter because the bag on the end may be drawn by peristalsis into the pylorus and create an obstruction.

QUESTION: I have uses 3.5-mm staples. On one occasion I used one 3.5-mm row and one 4.8-mm row. What do most others use?

ANSWER

Everybody uses the 4.8 mm staples.

DR. TERRY

It concerns me that there are a lot of things being suggested by a variety of people who have used common sense, I suppose, and have gotten themselves out of a problem, or solved the problem one way. I would make a plea for being very conservative about how we use the staples. We tend to do too many things and I am very concerned about the variety of ills I can anticipate as a result.

DR. PRINTEN

Most of what we do now represents a variation on a theme. The only problem is we are not all reading off the same sheet of music and nobody knows really what the theme is. I would agree with Dr. Terry's admonition to keep the operations simple.
DR. RANK

I would like to ask the panelists whether or not they divide the stomach. If you are not dividing the stomach, is this out of convenience to yourself or out of fear of increasing morbidity? Are you trying to make an easier operation? I divide the stomach and consequently staple disruption never becomes a problem.

ANSWER

I do not divide the stomach. First of all, I am not convinced that staple line disruption has been too much of a problem at least in my patients. I think may failures are more due to stretching of the stoma which occurs at the end of the staple line.

QUESTION: Are you talking about gastric bypass or gastroplasty?

DR. RANK

Either.

QUESTION: Can you divide the stomach and still do a gastroplasty?

DR. PRINTEN

Yes. You can do it so it would apply to either one.

COMMENT

We do not divide the stomach but we do keep the patient on a liquid diet for the first eight weeks.

COMMENT

I am concerned about the need for a liquid diet for the first three months or so. I think this encourages the patients to develop eating habit patterns that are just the opposite of what I am trying to have them learn.

DR. FISCHER

Although some individual series may have mortality and morbidity rates that are lower than others, I believe that overall there will be 4% to 5% mortality rate from leaks if you divide the stomach. I, frankly, can not psychologically and morally offer a 5% estimated mortality to a patient on a procedure which, in my opinion, is totally elective.

COMMENT

As we make the pouches smaller we increase the natural tensile strength of the stomach wall and it has only a couple of ways to respond. If it decompensates, it stretches and it loses its elasticity. If it is given time to hypertrophy, it increases the tensile strength even further.
That increases the tension and the pull on the staple line. It comes
down to a sort of tit for tat as to what you want to get out of this.
Whether you get increased tensile strength at the price of dehiscence is
perhaps what we are addressing.

COMMENT

When we do many operations for hernia, for example, we accept a certain
recurrence rate. Overkill is a real problem and we are talking about a
lot of overkill today and cutting through a stomach when you do not have
to may be overkill. To subject another group of the population to
increased operating time and to longer suture lines that can possibly
fail and cause death just to avoid staple line disruptions is ques­tionable. We must remember we are operating on young people who look
healthy to their neighbors even though they do not to us. We must be
very careful about adding these unknown dimensions willy-nilly. I hope
we do not all go off in every different direction trying out a new
gadget in 18 or 20 patients. You are not going to find your troubles in
18 to 20 patients. You are going to find your troubles in a thousand
patients. So let's not have overkill.
I would like to talk to you about a procedure that I call proximal gastric exclusion (PGE) with anterior gastrogastrostomy. The reason I have named it so is because the proximal portion of the stomach has been excluded and the continuity has been reestablished by the anterior gastrogastrostomy. Actually I first performed this procedure while trying to revise a gastroplasty. There was no way to do it. What I ended up doing was to continue across the rest of the stomach to the greater curvature with the staples and then do an anterior gastrogastrostomy. By December, 1979, I had done 257 such operations. The distribution of men and women is one to nine. The ages ranged between 13 and 63 years and the mean age was 33.3 years.

Earlier in my experience I started with gastric bypass and I did 36 cases. I had two deaths; one from peritonitis caused by disruption of the staple line, and one from an embolism. I did 63 gastroplasties before I started doing the PEGs. I had one death among the gastroplasties and so far no deaths with this procedure.

The variety and rate of complications is about the same in all three procedures. However, the one outstanding difference is the revision rate. Among gastric bypass patients it is 13.1%, but among gastroplasty patients it is an amazing 34.5%. This is the reason why I converted to the PEGs which up to now, carry a revision rate of 5.7%. The weight loss is a little over a 100 lb in 12 months which is comparable.

In regard to technique, I always mobilize the greater curvature to the gastroesophageal junction because I do not think you can construct a small pouch unless you mobilize the entire greater curvature. The very first gastric vessel is the key to the whole procedure because that is where the retractors should be applied. I never use Babcocks or Alice because I feel that sometimes perforations are caused by the clamping of the Alice or Babcocks.

The opening on the lesser curvature is also important. You must preserve a semibranch of the left gastric artery. This is very important because you devascularize the greater curvature and you need this vessel to keep the blood supply on the proximal paths. At this point the TA90 is applied. At first, I used to measure the capacity of this pouch at not more than 50 cc, but by now I do not even need that. It is always 50 cc. I used to leave 10%, now I leave 8% of the stomach in the food stream.

I use two double rows of staples. Up to December, 1979, all I was doing was putting a continuous 3-0 nylon suture in between the staple lines through-and-through the anterior wall of the stomach. But even this is not as good, so I tried to modify this procedure somewhat.

Next I make two openings on the anterior wall of the stomach for the anterior gastrogastrostomy. I decided to use a short narrow strip of
Mersaline for reinforcement. I tried Prolene mesh but it was too rigid. I also tried a piece of fascia but I discovered that this had died. At that point, I turned to a narrow strip of Mersaline mesh. It is very pliable and very nice. I keep it in place with through-and-through 4-0 Ethiflex sutures. To complete the gastrogastrostomy, a Levine's tube is passed through it for 6 cm into the distal gastric segment. It is secured in this position. This has to be done under direct vision because it is impossible to pass a nasogastric tube through a gastrogastrostomy otherwise. The tube is left there for one day and then it is removed. Following placement of the nasogastric tube, I cover the gastrogastrostomy with a piece of omentum for further security. The opening of the gastrogastrostomy is always done the same way. It measures 1.4 cm and after completion of anastomosis it is 1.2 cm. It has been checked with gastroscopy and it has been found that it remains the same for years.

The one problem is that these patients do disrupt their suture lines and that is why I resorted to applying the strip of Mersaline mesh. I think it will work but of course this remains to be seen. So far I have only 25 to 30 patients with this procedure. I started in January, 1980, and, of course, it remains to be seen how things will hold out.
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GASTRIC STAPLING WITH GASTROGASTROSTOMY

Charles E. Yale, M.D.

I would say that our procedure is basically identical to Dr. Alexander's procedure. We make a long finger-like projection from the greater curvature. We mobilize the greater curvature all the way up to the gastroesophageal junction. We apply the TA90 all the way across. We initially used to applications but now we are using only a single application of the TA90 across the fundus of the stomach. The anastomosis is placed near the side and not in the center. It is calibrated to about 1.2 cm in diameter. Prior to the making of the anastomosis, the gastric pouch is dilated with normal saline through a Levine's tube. Rather than measuring pressure, I have had my anesthesiologist inject from a 60 cc syringe as rapidly as possibly and look for maximal dilatation. Maximal dilatation in our group always occurred at about 20 to 25 cc of normal saline. We make the pouch approximately the size of an index finger.

The gastrogastrostomy is then done in the distal area. We use an interrupted single layer of 3-0 silk sutures. Initially we did some posteriorly. We now favor the anterior position. I think it is a little bit easier to do.

Initially I said that we were using two applications of the TA90. We had a series of some gastrogastrostomy stenosis that I will further emphasize below. We think that that perhaps was related to the action of the double application of the staple line and the gastrogastrostomy stoma. We made a couple of changes at that point, and dropped back to a single application of a TA90. We moved some tissue over the staple line prior to obstructing the gastrogastrostomy stoma. This subsequently decreased the stenosis rate, or at least, the reoperation rate to only one in the last 70 patients.

Prior to the time the abdomen is closed, the nasogastric tube is passed through the stoma and then retracted into the proximal pouch. The distal end of the 18 Levine's tube remains in a position approximately 1.5 to 2 cm above the gastrogastrostomy. That tube is left in for three postoperative days. On the third postoperative day (this is an arbitrary decision) the tube is removed and the patient is begun on a clear liquid diet. Two days later the diet is advanced to full liquids. On the seventh day a soft diet is introduced, followed on the eight day by a regular diet. These patients are all discharged on regular diets.

I do not believe that these patients follow dietary instructions any better postoperatively than they did preoperatively. I tell them if they can count to three and remember two things they will have some chance of success. I tell them that basically they should remember to not overload with high calorie liquids. Therefore I would like them not to take more than three glasses of liquid that contain calories in any 24-hour period on the average. The second thing I would like them to remember is to eat three meals a day. I would prefer those meals
consist of solid food. All these people are observed in order to corroborate that they are able to eat a variety of solid food all the way from pies to salads and meat and potatoes prior to the time they leave the hospital.

One hundred and twenty-five patients were operated on at the University of Wisconsin Medical Center between June, 1979, and May, 1980. There were seven males, 118 females and ages ranged from 16 to 67 years. Preoperative heights and weights were similar to what others have reported. The average weight was 287 lb (131 kg), with a wide range of 206 to 530 lb. The immediate complications after gastroplasty in these 125 patients included one death. This is the only death in over 350 patients that have had obesity operations at the University of Wisconsin. The patient was a 500-lb man that was sitting in the hallway the first day after the operation. He fainted, and fell to the floor. The only thing we can believe is that he obstructed his trachea. On postmortem examination we found absolutely nothing other than a slightly enlarged heart. So we presume the patient became anoxic fainted, and then suffocated.

We had four splenectomies; only one in the past 50 patients. This is too many. I do not think we should have that many. We have had two perforations of the proximal gastric pouch, none of the distal pouch. These were pistol shot perforations that were not at the line of the gastrogastrostomy, but were in a proximal position to it, usually, about 1 to 2 cm apart. They appeared to be pea-sized. We know that an nasogastric tube probably caused one of these perforations. The other one may have been caused by an Allis clamp that left a rough area which later resulted in the perforation. These two perforations led to our most serious complications. They led to two of the subphrenic abscesses, two of the serious wound infections, and two of the three dehiscences. The third dehiscence was very minor. We have seen a few seromas.

There have been practically no lung problems. We had one superficial thrombophlebitis, one deep thrombophlebitis that was fairly spectacular about 15 days after surgery. The patients had been discharged by the time of these complications.

We have three-month follow-up on at least 95 of these patients at this time. Fifty-two of the 95 showed some significant nausea and vomiting during the first three months. However, there is only one patient that is continuing to have this beyond three months. We have seen some alopecia. This has been addressed more fully in an earlier discussion. It has always been transient and always disappears usually by the ninth postoperative month.

We have had seven stenotic gastrogastrostomy stomas. Six were among the first 70 patients who we had revised by dropping the double application of the TA90 staples and moving tissue between the staple line and the gastrogastrostomy. We have seen only one stenotic stoma since that time. All such patients required reoperation. In these cases, our endoscopist was not able to help us at all. In our previous experience
with gastric bypasses, the endoscopist was always able to help us except in a single case. He not only dilated the stomas but he used the electrocautery. He made incisions at about 150 degrees circumferentially and solved all of our problems with stenosis. But, as Dr. Lewis has already pointed out, endoscopy is not always as effective with gastroplasty as far as the gastric bypass patients were concerned.

The vertical incisions do produce some hernias. More recently we have switched to bilateral subcostal incisions and can do them perfectly well. It takes a little longer to close but we certainly do not have the high hernia rate.

We had one staple line disruption. There has been no dumping or gastric hemorrhage. Weight loss among 125 patients was 131 kg. This is measured in percent of the original weight. At three months, 95 patients lost 16% and at six months, 47 patients lost 21% of original weight. By nine months, 38 had been followed and they had lost 22%. However, there was a fairly large range, from 0.7 to 45% of original weight. The person who only lost 0.7% was the patient who had the staple line disruption. Our weight loss statistics are improving with experience. If we look at our patients sequentially we see that by nine months the first 12 lost an average of 17%. The next 13 patients lost 21% and the last group lost 27%.

We compared our gastrogastrotomies with our other kinds of operations. Between 1972 and 1977, we did 60 jejunoileal bypasses. Between 1977 and 1979, we did 133 gastric bypasses. I am reporting on the 125 gastroplastics (gastrogastrotomies) today. Average weight and height were about the same. Distributions of age and sex, etc., were also about the same. The jejunoileal bypass patients lost 45% of original weight at 18 months. We have not come close to that with any of the other procedures. The gastric bypass figures look very good. Those patients lost 32% of original weight by 18 months. The gastroplasty patients lost about the same at three months, but somewhat less at six months. We are concerned about that. Upon closer inspection, we found that at three months, nine of 95 gastroplasty patients (9.5%) had what we considered poor weight loss (less than 10% of original weight at three months after operation and 15% at nine months). These are arbitrary definitions as we all know. By six months 28% of patients had poor weight loss. This increased slightly to 29% at nine months.

If we look at the cause of poor weight loss we see that there are obviously patients who abuse the liquid rule. One of our patients was clearly doing that. We certainly had our orange juice losers and also our snackers. When you get people on the chip and dip circuit, I do not care what you do, they are not going to lose. We classified three patients into that group. We feel we do have vicious eaters among some of these patients. This type of eating, regardless of how technically sound we are, probably is going to result in an enlarged gastrogastrotomy stoma, an enlarged pouch and perhaps staple line disruption. In a group of 11 patients who have failed to lose, we have had seven that could either be patient or technically and nutritionally related problems. However, I feel that four were clearly caused by the patient.
In summary, gastric stapling with gastrogastrostomy can be done with few early or late complications. It produces a satisfactory weight loss in at least 70% of these patients. It should be cautioned, however, that these are early results as far as we are concerned. I think it may well prove to be a better operation for morbid obesity than a gastric bypass. The principal reason that we were interested in this approach was that we felt we had such very good results and weight control with the same type of anastomosis between the stomach and the jejunum (a side-to-side gastrojejunostomy) that we adapted exactly the same single layer interrupted silk technique to this gastrogastrostomy. We are following a group of patients very closely. We hope that the scar that forms from the opening of the two gastric pouches is going to help inhibit stretching of the stoma...
IMPORTANCE OF THE NASOGASTRIC TUBE

E. Christopher Ellison, M.D.

Last year there was quite a bit of discussion about the management and the importance of an nasogastric (NG) tube in patients who undergo gastric partitioning. It is important to identify which operation people are doing today. Gastric partitioning is the operation during which we remove the fifth and sixth staples from the proximal row, and the fifth staple from the distal row, and then do a double partition. I am going to discuss the management of the NG tube in these patients as well as the purpose, its correct position, how long to leave it in, and the management of obstruction.

One of the purposes of the NG tube, at least theoretically, is to provide comfort and relief from swallowed air. I doubt, however, that the patient would agree with us. In addition the NG provides access for fluids and medications and could negate the need for an intravenous line. It may also act as a stomal stent.

The NG tube, at least in a single row gastric partitioning operation, should be positioned so that some of the holes are in the proximal pouch with the rest in the distal pouch. The question that arises is how long the NG tube should be left in the patient. Last summer, Cathy Mojzisik and I designed a study in which we looked at 22 patients, 11 from one surgical service and 11 from another surgical service, who had a variety of different operations. We studied the results of the partitioning operation in comparison with the amount of instruction that they had received. The NG tube was either removed within 48 hours of the operation or 72 or more hours after operation.

In light of observations made by others here today, what we found was somewhat different and surprising. We indeed had a high obstruction rate, usually occurring within one month in patients who had the NG tube removed within the first 48 hours. However, we had no obstructions in the patients who had NG tubes removed 72 or more hours after gastric partitioning. These patients have been followed up now for approximately six months. There were eight patients who had obstructive stomas. Dilatation by the same techniques that Dr. Lewis described was successful in these patients. Reoperation to redo the gastrogastrostomy was necessary in two of the patients.

Briefly, I want to go over our approach to stomal obstruction. Initially we looked at a dilatation technique that uses a Brunswick catheter. I heard someone earlier today in discussion suggest a Foley catheter which may also be a possibility. The Brunsick catheter has a balloon on the end that will dilate up to approximately nine millimeters. It also has a device that can be moved laterally and vertically.

We have a roentgenogram that shows the catheter positioned through the obstructed stoma and dilating it in a hydrostatic manner. However, this method did not work very well. The radiologist really could not get it into the stoma as frequently as we would have liked. Therefore, we went
to endoscopic dilatation using exactly the same technique that Dr. Lewis described. Descriptions are available in the literature but not for this particular problem. The guidewire and Peustow dilators are used. We started off with a smaller guidewire which is initially passed through a GIF P 2 endoscope. The GIF P 2 endoscope is then removed, and a small NG tube is passed over the guidewire. Then a second guidewire for the dilator is passed over that and through the lumen. This is done with fluoroscopic assistance. Next we dilate with progressively larger dilators, usually up to a #27 (approximately equal to a 9 mm olive dilator).

Overall, we have had 20 obstructions in approximately 400 patients that have had a variety of different operations. These include redos of gastric partitioning, gastrogastrostomies and double row gastric partitionings. Medical therapy with watchful waiting, hydration, and liquids, has been uniformly unsuccessful in treating these obstructions. Using the endoscopic dilatation technique, we have been successful in 14 of 16 patients. Six patients required reoperation, two of those having failed with dilatation techniques.

In summarizing the management of the NG tube, we would conclude that the holes should be above and below the staple line to provide drainage of both the proximal and the distal pouch. This may provide fluid access and negate the necessity for prolonged intravenous fluids. We believe that the tube should be kept for at least 72 hours and that this will help to avoid some of the problems that result in obstructions of the stoma.
ENDOSCOPY

Jeffrey W. Lewis, M.D.

The availability of endoscopy is necessary for anybody involved in the surgery of the upper gastrointestinal tract, whether you do it yourself or have somebody do this for you. This is especially true for gastric operations for obesity. Such operations create an unnatural configuration for the stomach and there are many potential problems which can arise. Endoscopy allows a precise diagnosis in most instances and a chance to treat some of these problems in a few instances. Although upper GIs are useful, endoscopy provides a more precise diagnosis and analysis of some of these patients' problems.

The main reason that we have performed endoscopy has been to analyze failure to lose weight. In these cases we need to evaluate the stoma. Either the stoma has enlarged or the staples have pulled out. Another reason for endoscopy is to evaluate the occasional patient who has obstruction of the gastric outlet.

It is very hard to truly evaluate the size of the stoma from an upper GI series. When patients present with obstruction we usually do obtain an upper GI and then go to endoscopy.

We usually use a pediatric scope for evaluating these patients. It is quite a bit more maneuverable because the tip of the scope is much more flexible, and in addition, the tip is also somewhat smaller. It measures about 8.5 mm across compared to the adult scope which is about 13 mm.

If obstruction is confirmed, we attempt to dilate the stoma. We use the Peustow dilators that are equipped with an interchangeable olive tip. This is primarily intended for use in the esophagus. A guide wire is passed through the biopsy channel of the endoscope. The dilators will go through both the pediatric and the adult-sized scope. Once the wire has been advanced to the partially obstructed stoma, the endoscope is then brought back over the wire. The wire remains in place and the dilators are passed down over the guide wire in progressively larger sizes. Usually, as when dilating esophageal strictures, for instance, we do not visualize the actual procedure. But in the stomach, it can be difficult to guide the dilator through the stoma. Therefore, the ability to visualize the procedure becomes necessary. I did two of these patients last year. Both of them have remained completely asymptomatic as far as any evidence of stricturing after just one series of dilations.

The above experience has been with gastric bypass patients. Unfortunately, it does not necessarily apply to those with gastroplasty. Gastroplasty patients are much more difficult to endoscope. Part of the problem is that the stoma is way over on the greater curvature. The stomach tends to be flattened as the scope is passed and it is hard to get the tip maneuvered through the channel. When a patient is obstructed, it is even more difficult to find the channel. Once you do visualize the stoma, it is very difficult to get the wire through and it is even more
difficult to get the dilator over the wire because of the same problem. There is a bend which impedes the passage of the dilator over the wires.

We have had eight patients who have become obstructed after gastroplasty and whom I have attempted to dilate. I was able to dilate the stoma in only two of these patients. In one of those, I eventually had to do a gastrogastrostomy. She still did not tolerate food very well. The other ones remained quite well. Now I generally endoscope patients who are obstructed after gastroplasty to be sure of the diagnosis and to rule out any possible technical error that could explain the symptoms. I usually reoperate and perform a gastrogastrostomy rather than attempt to dilate these patients. It reduces hospitalization and makes more sense to do an operative procedure.

The other problem which requires endoscopic evaluation is failure to lose weight. Sometimes we obtain an upper GI series which shows a normal-sized pouch, but you can not tell, unless the stoma or the staple line is completely disrupted, exactly how large the stoma is. To determine the size, a measuring device can be passed down to the biopsy channel. It has 2 mm graduations. You can lay it right next to the stoma and see exactly how large it is. Sometimes a patient's stoma is too large and this explains weight loss failure. However, we did have one patient who was gaining weight after gastroplasty. The pouch was normal-sized so we performed endoscopy to see how large the stoma was. It was about 8 mm. Consequently, I think this patient's problem is not a technical failure. Rather, she was basically eating a high caloric liquid type diet.

Dr. Printen talked about marginal ulceration this morning. While upper GI series are quite good at diagnosing this problem, you still need to do an endoscopy to confirm the fact that an ulcer exists, and also in patients in whom you suspect ulceration but even though a roentgenogram does not show it. Esophagitis also needs endoscopy for diagnosis. These patients always show reflux on upper GI series. I do not think that reflux alone is enough evidence for the diagnosis of esophagitis. I think you need to do endoscopy and biopsy. Along with esophagitis, bile gastritis is often seen.

After any gastrojejunostomy the inside of the stomach can look quite red, especially around the stoma. It is important to be sure of the diagnosis. Perhaps you will see bile-laden macrophages in the submucosa to help with the diagnosis.

Dr. Printen had a patient to whom he recommended an enriched diet, so she swallowed a quarter and it became lodged in the pouch. Most anything you can swallow will go through the GI tract. However, this is not true for gastric bariatric surgery in which an obstruction is created in the stomach. The quarter as well as other objects can be removed quite easily with the fiberoptic endoscope. We have special alligator forceps which are precisely made for coins and it is simply a matter of grasping and removing it.
In another patient who came in obstructed, at endoscopy I found three large hemoclips impacted in the stoma. These are placed, of course, on the outside of the stomach, and had eroded into the lumen and had become lodged in the stoma. This would be hard to see on a roentgenogram, obviously, because there are clips everywhere. In this instance we merely pulled these clips out to relieve the obstruction.

QUESTION: Does the side view help much?

DR. LEWIS

The problem with that is that it is so difficult to maneuver. Also you cannot see where you are going very well with the side view of the scope. When you are in such a small area it is very difficult to get the scope in position. Any oblique scope is hard to maneuver into position in a very small stomach.

QUESTION: Some surgeons who do gastric bypass are concerned about the distal pouch that is excluded. I do endoscopy and on occasion have been able to look back up into the antrum finding that it is perfectly normal. Have you found that to be true?

DR. LEWIS

Yes. As a matter of fact, I always try to visualize that area. I do not know if it is possible for an ulcer to develop there, but if a patient comes in with anemia, I always check for it. As yet, I have never found one in that area.
DISTAL GASTROSTOMY AND OUTLET OBSTRUCTION

Luigi M. De Lucia, M.D.

Up until 8:30 this morning, successful gastric operations for obesity depended upon two technical sine qua non: small fundic pouch, and a nonexpanding, and adequately narrow outlet. But, this morning at 8:30 Dr. Mason made what I consider an historical addition to these two sine qua nons, and that is the unyielding partition line. When these, now three, technical criteria, are strictly adhered to, profound changes in eating and drinking behavior are suddenly thrust upon the patient. A few patients will master these changes with dexterity, but a great majority, as you know, will go through the turbulence of such drastic transition. Furthermore, in most major surgical operations, the normal catabolic response of the body to injury is usually promptly offset by the early resumption of oral alimentation. But in gastric operations for obesity, the oral route, at least in my experience, is not certainly a route that you can always rely upon. Thus, effective control of surgically induced metabolic changes, as well as maintenance of adequate body hydration, not uncommonly run into difficulties with these operations.

There is no easy solution to this problem. Obviously, the IV route, with its potential complications, can only offer limited and temporary solutions. I believe that the practical and physiological approach is the temporary utilization of the distal stomach, that greater portion of the stomach which has been either anatomically or functionally bypassed. This can be easily done at the time of the gastric bypass by simply adding a tube gastrostomy to the procedure. The removal of the catheter or tube during the postoperative period should take place only when there is satisfactory evidence, both clinically and radiologically, that the patient can handle adequate amounts of fluid by mouth.

Prior to September, 1978, I did 45 gastroplasties without gastrostomies. But in September, 1978, and December, 1979, I did 80 Stamm gastrostomies in conjunction with the gastroplasty procedure. Since then I have done an additional 30 gastrostomies. In 110 so far, there has been no leaks or pyloric obstructions. A few patients complained of pain, and in some of these, the pain was due to the migration of the balloon into the pyloric canal. However, there were no obstructions and it was very simple to correct the problem.

In less than half of these patients, the Foley catheter was removed 20 to 60 days after the operation. In more than half, it was removed at an average of four months and 27 days. During the first four or five postoperative days the gastrostomy was used for decompression of the distal stomach. After that, it was used to control thirst and for postoperative alimentation. Control of thirst, in my experience, is extremely important in preventing fundic blowout because these patients have no better control over their drinking habits than they have over their eating habits.

Postoperative alimentation, which is begun at 3000 calories per day, has several advantages. It prevents the protein caloric malnutrition state
with the related immunodeficiencies, improves in healing, cuts down the
incidence of wound infection, promotes early return to a functional GI
tract, and also prevents the breakdown of lean body tissue in rapid
weight losses.

The most important role for these patients is to maintain strict NPO
status for a minimum of four weeks, and longer if possible. I found it
to be very helpful. For one thing, the healing of the partition line
is not hampered by the transit of food or by the probable overstretching
that would be caused by early overeating attempts. Second, the frequent
repetitious vomiting is not seen when you instruct the patients not to
take anything by mouth. The third advantage is that a period of total
abstinence seems to be somewhat helpful in promoting early modifications
of eating behavior in these patients and that is what gastric bypass
should be all about.

Salvage of gastric bypass applies to isolated gastrostomies done later
on during the postoperative course. So far this has been applied
successfully in one patient in whom the total lack of behavioral modi-
fication six or seven months after the gastric bypass would otherwise
have necessitated either take down of the bypass or revision. The
problem could be handled with a gastrostomy. The two most important
applications of distal gastrostomy, however, are the nonsurgical treat-
ment of outlet obstructions and the interim treatment of intractable
outlet obstructions.

I differentiate between early obstructions that begin or the first
postoperative day and late obstructions which appear well after dis-
charge. In a series of 150 gastroplasties I have had 25 (16.7%) early
postoperative obstructions. Sixty-two of these 150 patients were
followed up for one year or more, and so far I have not yet seen a late
obstruction. Of the 150 gastroplasties, 103 were done with outlets on
the greater curvature and 33 with outlets on the lesser curvature.
There was no difference in the instance of obstruction on the greater or
lesser curvature. However, in looking at the cases which eventually
required second surgical procedures, I discovered that these were all on
the greater curvature. All of the gastroplasties on the lesser curva-
ture were handled without the need for reoperation.

Two basic concepts which derive from my personal experience are that the
incidence of complications including fundic blowout in these operations,
is directly proportional with the degree of aggressiveness in partition-
ing the stomach. The other concept is that the weight loss failure rate
is inversely proportional to the complication rate.

Although there are differences in technique such as gastric suturing
versus transectioning, for practical purposes we can put these four
different partitioning procedures into two groups: stapled and nonstapled.
In the stapled group, there were no obstructions in a total of 39 cases.
On the other hand, in the nonstapled group (transgastric suturing or
transsection) the instance of obstructions was high (30% and 25% respectively).
On the other hand, the weight loss failure rate with one double row of
4.8 mm staples was 88%. It may even be higher now. The most successful
patient among the remaining 12% who had not yet failed by two and a half years after gastroplasty, lost 200 lb by the middle of the third postoperative year. She recently had GI series that revealed a normal stomach. Therefore, she too must be classified as an operative failure.

The incidence of weight loss failure among patients with a double row of staples is 40%. Again, I am sure this figure will eventually be higher, but even now it is a nonacceptable figure. When we look at the transgastric suturing and the transsection techniques, the rates drop to 14% and 0.0% respectively.

Routine distal gastrostomy in gastric bypass has proved to be highly effective in the early postoperative period, especially in avoiding and controlling dehydration, protein caloric malnutrition, electrolyte imbalance and vitamin deficiency. With unyielding partition lines and with adequately narrow and nonexpanding outlets, distal gastrostomy has become a necessary adjunctive procedure to obviate the need for reoperation in cases of early postoperative obstructions which are more often than not limited in nature and of relatively short duration.
MATTRESS SUTURES FOR STOMA

Joel B. Freeman, M.D.

I feel somewhat like Elizabeth Taylor's fifth husband on the evening of the honeymoon. I know what has to be done but it's awfully difficult to make it interesting for you.

I learned our basic operative technique from Dr. Mason. The point I would like to make is that we remove the fat pad routinely. The stapling instrument is positioned about two fingers from the gastroesophageal junction. In my experience the need for volume measurement can be eliminated with this technique.

Most of us at one time or another have tried to do noninvasive things. The points made in the last talk with respect to this were excellent. Recently I reviewed a very interesting case. It involved a woman in whom we had done a typical gastroplasty with a seromuscular inverting suture reinforcement of the channel. Interestingly enough, early postoperative roentgenograms proved that she indeed had a very small pouch and a very narrow channel. However, she failed to lose weight, and six months later we found massive dilatation of the stoma. I hesitate to add that as I look at more and more patients who are successful, we find more and more who have had a similar enlargement of the stoma. Therefore, we must now begin to separate clinical from radiologic failures.

Turning to the technical aspects of the operation, I personally find it somewhat difficult to use the TA90. I have operated on 150 patients and in 90% I have used the TA55. I use the TA55 stapling instrument because it must be at right angles to the wall of the stomach. I find that the TA90 is very difficult to maneuver especially in the narrow, hostile margins of patients who are very heavy. On the other hand I can manipulate the TA55 so that it sits not coming across the stomach but actually at an angle. I also find it necessary to divide the short gastric vessels. It is not necessary to use the pin. You just clamp down the two ends as if you were making your own C-clamp. Two applications of the stapling instrument that high in the stomach do not crunch it.

We put mattress sutures through-and-through the gastric wall so that one set comes out anteriorly and one posteriorly. I often put a little clip on these because they are Prolene sutures and tend to have loose knots as many of you know. Not only does this create a very narrow gastro-gastrostomy, but it is a long, narrow gastrogastrostomy or tube. An important point that has yet to be mentioned with respect to leaks regardless of the technique or procedure used is whether or not this artery is divided. Whether you use the TA90 or the TA55, there is a temptation to tape this variable branch as you mobilize the greater curvature of the stomach. It looks sometimes like a band of fascia and I think it is very important not to interrupt it. I think in many instances where we have leaks with one row of staples or two rows of staples or whatever we attribute the leak to, it is actually caused by dividing this branch.
I treat every patient as if they were a potential leak. Using the distal stomach I do what, for all practical purposes, can be called a Nissen wrap-around of the proximal stomach. I have done 50 of these in the past six months without a single complication. There have been none of the treacherous leaks and our wound infection rate remains only 1%. In regard to postoperative management, I do not use a distal gastrostomy. In each of our 150 patients we have used a feeding jejunostomy. It solves any postoperative nutritional problems that might arise. We no longer put subclavian catheters in these patients. We begin feeding the patients on the first day in the recovery room. We keep the patients NPO for six to eight weeks. Before discharge we teach them how to use the feeding tube and to give themselves 400 to 500 cc per day through it. This eliminates any of the problems of having to teach the patient to take a liquid diet. It also eliminates the problem of having them eat and vomit in the early postoperative period. This is important because I believe this is precisely what leads to staple line disruption.

The wish to lose weight and the desire and commitment to change one's eating patterns are separate issues. A two-hour operation does not change a patient's lifestyle and this is essentially what the problem is with these people. Anyone can eat themselves out of any operation. I feel strongly that it is important to select the best candidate preoperatively and not on the operating table where complications are related to surgical aggressiveness.

Stomal dysfunction occurs in only about 8% of our patients. I think this relatively low rate can be attributed to the use of the TA55. It does not crush the stoma, which is in contrast to the TA90 stapler. However, we still have problems with dilatation of the pouch. Another more dangerous problem that occurs with these mattress sutures is that if one of them ever pulls out, it can create a leak. We had four of these leaks in our first 85 patients. This renewed my concern about surgical aggressiveness.

Weight loss among these patients compared to a standard gastric bypass is somewhat inferior. It averages 70 lb or 26% of initial body weight. The corresponding figures for gastric bypass are 82 lb or 32% of initial body weight at 12 to 18 months after operation. The figures appear to be improving somewhat as more and more patients from the gastroplasty series reach the 18th postoperative month. My program is only two years old. At the present time, I would say the gastric bypass and our gastroplasty with mattress sutures for the stoma are roughly equal and it remains to be seen as to how much more weight loss is going to increase. As yet it is too soon to predict the early staple line disruption rate. I think it is very important to recognize that all the benefits I accrue to placing these multiple mattress sutures really seem to be mimicked by simply sewing the stomach over itself, and this is a far safer operation.

In summary, success depends on pouch size, stomal diameter and more importantly, on patient selection, paying particular attention to how well they may comply to follow-up eating habits and their ability to participate in an exercise program. Based on this profile, some patients
should possibly be turned down. Careful selection with compliancy checks are very important. Patients who are over 40 years of age preoperatively, in my experience, do not do well. Drs. Printen and Mason have shown us that patients over 50 do not do well. I am somewhat surprised by the number of slides I have seen with patients who were 50 and even 60 years old. I believe that at the present state of our art, we ought to operate on the youngest, best and the healthiest patients, and not push our luck on those older patients.
MARLEX® MESH AROUND THE CHANNEL

John M. Kroyer, M.D.

I would like to talk about the development, with special emphasis on the histology, of what I tend to call the gastric partition and pexy, which is just a minor variant of Dr. Mason's gastroplasty. The simplest model of a gastric partition is a single staple line. Despite some statistics to the contrary, I think you will find that when this kind of patient is sent home and is allowed to eat at will, it will not be uncommon for the patient to come back and say, "Doctor, one day I vomited, and the next day I found I could eat almost as much as I always could. Furthermore, I'm not losing any more weight." If you get a barium swallow on such a patient, you will find disruption of the staple line. Such a situation is obviously unsatisfactory.

If we look at the staple line histologically, we notice that the scar produced by the single staple line is barely 1-mm wide. Some of us are not used to thinking in terms of millimeters. If we take a sharp lead pencil and dull it ever so little, that is what 1 mm is. In other words, it is very thin. If that pouch is distended with food, and there is a violent reaction of the diaphragm descending against strong abdominal muscles, it is not inconceivable that the intragastric pressure in that upper pouch will exceed the resistance offered by a scar that is about 7 or 8-mm long and only 1-mm wide.

The next stage then would obviously be to add another staple line. There is an area of incontinuity between the staple lines. We have preserved normal gastric mucosa. We have two 1-mm staple lines. That should be twice as good as one, but the upper staple line, as a matter of fact, may even disrupt a little more readily than a single staple line because we still have functioning gastric mucosa. It tends to distend the area rather than collapsing the distal stomach. There may be even greater tendency for this proximal line to disrupt whereupon you are back down to one staple line again. So that is not any good either.

Before seeking another solution, we have to think in terms of what the U.S. Surgical Company tells us about the TA90 stapler. They claim that these are noncrushing staples. Assuming then that these staples do not crush, let's take the two staple lines and put a through-and-through stitch at the open end of the staple line. That stitch is put in tightly enough just to occlude the lumen of the stomach, and to isolate the portion of the stomach between the two staple lines. If we look at that 10 or 11 weeks later we find that we can still see the muscularis layer of the stomach that lies peripherally to the area of the scar. We have not damaged the wall of the stomach at all between the two staple lines and the stitch. The source of blood supply is the lesser curvature, the greater curvature end being tied off with sutures. If we could not get blood supply through the staple lines, we would have 100% necrosis in the middle, but fortunately this is not the case. We now have a scar that is just as wide as the two staple lines. We still have a perfectly normal wall of stomach outside of the layer of the muscularis mucosa.
In spite of solving the staple line problem, we still have patients that start out doing nicely and then in a couple of months they come back and say, "Doctor, I'm not losing like I used to. Also, I find out that I can't eat any more than I have been eating but I am hungry in an hour, and I eat again." If we look at these patients gastroscopically, we will find that the little 12 or 14-mm channel has now dilated to 18 to 25 mm and big pieces of beefsteak can fall through it. That is a problem.

The next step would be then to do something which keeps that channel from stretching. Utilizing the stitch that was put both in the front and in back of the stomach to occlude the area between the staple lines, a piece of mesh, perhaps three-sixteenths to one-quarter of an inch wide is sutured through the mesh posteriorly and tied anteriorly. It is laid passively on the surface of the stomach without any compression. Some people believe that Marlex mesh infiltrates into the stomach wall and forms a scar all the way through the wall. That is not so. Fibrous tissue becomes woven in the interstices of the mesh with a nice layer of serosa on the outside. The muscular layer of the stomach is totally unaffected.

What have we done, then? We have created an unyielding ring around the channel. Now we feel we are ready to go out and do 595 operations without any complications whatsoever. So ten operations and four obstructions later, something is wrong. When we would reoperate such patients we usually would find that the Marlex mesh had fallen posteriorly and had become stuck with a fibrinous exudate to the diaphragm posteriorly. As the proximal pouch dilated with nowhere to go but anteriorly, it fell over the staple line. The more the pouch distended and fell over the staple line, the more the circular channel became a slit until it was finally nothing at all. By simply mobilizing the stomach and bringing it down to what more or less is the standard appearance of an anatomic stomach, one could then pass the same dilator through that channel as was done at the time of surgery. Therefore, I thought perhaps we ought to do something during the initial operation to keep the stomach down where it belongs. This requires three sutures along the greater curvature of the stomach attached to the parietal wall of the peritoneum, just to hold the stomach in this configuration. That is what I call the pexy and that is why this procedure is called the gastric partitioning pexy.

Incidentally, in two different patients I found that the left lobe of the liver was too large for me to move out of the way with a retractor in order to do the operation I wanted to do.

Of the first 100 gastric partition and pexy operations that I did, 77 had no complications. Ten had what I considered to be significant complications. There was one death. I would be interested to know if that has happened to anyone else. Another 16% of patients had what I would call more or less unimportant complications.

There was one staple line obstruction. I think it happened because at first, when I started using the double staple line, I did not make
enough effort to separate the staple lines in the lesser curvature ends. They tend to fall together very easily if you do not make a point of keeping them separated. Ever since this happened and I realized that I should separate them, there have been no more staple line disruptions.

There have been no infections. I would like to stress the point that if the wall of the stomach between the staple lines were to perforate or become necrotic, or ischemic, I would have to have some interperitoneal abscesses. There were none. Furthermore, there were no wound infections. My message is that we should continue to make the operation simpler because it should be safer regardless of what our statistics show.
EXTERNALLY BANDED GASTROPLASTY

Edward E. Mason, M.D.

You recall that in 1971 we began doing what we called gastroplasties because we thought that gastric bypass was too complicated. By the end of the year we had operated on 56 patients. It was apparent that gastroplasty was not producing the weight loss of gastric bypass. Therefore, most of those patients were converted to gastric bypass. Interestingly, as you will see later as we look at some of the follow-up information from our patients, the weight loss was really no better after we converted them to gastric bypass. The reason for this was that we did not understand what we were doing. We thought that gastric bypass had some magic but we did not know why. What we should have done would have been to measure and reduce the size of the upper segment and calibrate and reinforce the channel.

At any rate, we returned to the gastric bypass. Some years later I talked to Cesar Gomez. Gomez was excited because he had resurrected gastroplasty and made it better and it was working very well. I talked to him several times and after a while I decided that if this were really working so well, there would be no point in continuing with the more complicated gastric bypass. Therefore, we started doing gastroplasties after the fashion of Gomez with his reinforcement of the channel.

I was concerned about the width of the staple line and about trying to fold up so much stomach over four lines of staples. The solution to that seemed to be to take more staples out of one cartridge than the other so that at the point where the channel started we would only have a narrow area that had to be covered.

We continued with this and we tried to make the opening smaller. However, we would get it too small and we would have an obstruction. Then we would make it a little bit bigger and it seemed as though the weight loss would not be quite as good. As Dr. Lewis told you, when we would perform endoscopy in these patients, the channel would often be wider than it was meant to be. We decided that the seromuscular suture was, at times, through the muscularis mucosa. When this happened, it would set up a reaction and migrate into the lumen. This migration is something that Halsted described quite some time ago. Everything eventually migrates into the lumen, even the hemoclips. In fact, the hemoclips will migrate even when they are not put on the stomach.

For these reasons the question came up as to how to reinforce this channel without penetrating the wall of the stomach. Another problem was that you had to anchor the reinforcing suture either in front or in back, or else you had to penetrate the wall of the stomach and tie it to itself. You had to do something with it. Therefore, even if you did not penetrate the lumen in the course of going around the channel, you did have a penetration at the tie point. If a reaction set it, you not only occasionally would lose a suture but you would lose some of the staples along with it. Consequently, some of the patients we reoperated on had huge stomas.
I decided to divide the stomach again. I did this between two sets of staples using the GIA or the TA90 twice. The question arose as to how you get the TA90 in from the lesser curvature. Ordinarily you cannot. It is necessary to make a window with hand sutures and put the instrument in through that window and staple over towards the greater curvature cutting between the staples. That adds to the complexity of the procedure. The next problem was how to cover the corner at the greater curvature end? This allows you to calibrate the stoma very accurately, but if you put an in-and-out Lembert suture in front and then around in the back side and tie that down, it is either going to narrow the lumen or if it is too tight, it will rip out of the wall of the stomach and cause a leak. If you make it too loose, the lumen will be too big. For these reasons, I decided I would use a communicating Lembert which was put in at right angles to the greater curvature on the upper segment of the stomach and then back on the lower segment. When this is tied down it folds over the staple line on the upper pouch and the lower pouch and also covers the corner. If you are not satisfied that the corner is completely covered, you can then put an additional stitch in front and on the back wall in the same way, to make sure that that corner will not leak freely. Finally the reinforcement is put around that first suture and the channel, and the rest of the staple line is covered with interrupted sutures of silk or whatever you want to use. Every other one is a communicating suture, and it is tagged, so that when you finish you can tie those and pull the stomach back together.

If a Prolene tie is used for reinforcement of the channel, you can put the stomach back together as described above. However, if you decide to use a band of Marlex, which has a little width, when the stomach is pulled back together, it will cause pressure necrosis where it folds down on the Marlex. Therefore, I recommend that you leave a window next to the channel, so that you do not have pressure on this area.

I have developed some rules of thumb and one of them is that when you are trying something new you should wear both belt and suspenders. So to be safe, I am putting in a gastrostomy in the lower pouch. Actually I am making use of it for several reasons. During the operation I pass it into the upper pouch through the channel, to calibrate the stoma. I use a 30F Malecot catheter. I leave it in the upper pouch while I put in the reinforcement of the channel. After calibrating the channel, I pull the catheter back and make it into a Witzel gastrostomy. Then it can be used for feeding.

If one wishes to be truly aggressive about making the pouches small and getting good results, then Dr. De Lucia's program of feeding the patient exclusively through the gastrostomy for six months can be adopted. I have not done that yet, but it is an interesting thought. I think it tells us something about gastroplasties. They do not do the job unless we make it obstructive, and that is a problem.

In regard to what to use for a wraparound material, I tried Prolene. I was afraid of the Prolene because it seemed to me it was going to cut through the wall. I had not seen this but it just seemed like it ought
to cut through. Then I talked to Dr. Kral and he told me that he was using fascia from the rectus sheath and that sounded great. So I tried fascia, but it was not very satisfactory. It seemed to stretch and was not reliable. Then I tried taking fascia from linea alba right below the xiphoid. But then one of my patients developed a leak. If you get a leak with any of these substances it is necessary to take the wrap-around out because it is a foreign body that is going to cause trouble. Drainage alone is insufficient. I talked to Dr. Bookwalter, of Brattleboro, Vermont. He suggested that I use Dacron reinforced silastic, and make an external helvetius sling around the angle of His and down a short distance on the lesser curvature and simply tie this down like an Angelchick prosthesis. These operations can be conceived of as a combination of variables. Gastric bypass, for example, is a combination of the variables of volume, stomal size, and bypass. Gastroplasty, gastro-gastrostomy and partitioning are two variable procedures that include volume and stomal. Bookwalter has developed a one variable procedure. He is simply putting a cormorant ring around the esophagus.

I have been so discouraged with banded gastroplasty, that I wished I had never put it on the program. And then, I talked to John Kroyer, and he told me he had 100 cases in which he put Marlex mesh around the channel. I am trying that now. As yet I have no follow-up data. As of now, I would not recommend that anybody take it up although I think it probably is a good idea.
SYMPOSIUM: STOMA -- EDWARD E. MASON, MODERATOR

DR. RANK

Why don't you divide the stomach completely and make a gastrogastrostomy?

DR. MASON

I tried that in 1971 and I could not control it. The stomas were either too small or too big. Furthermore, I think there is just too much going on in that area. If you put that TA90 across, it will crush the mucosa and that could cause a lot of trouble. With all those staples coming up to the channel, the sutures, the crushed mucosa and the seromuscular suture all the way around which is anchored in front and back or going through, there are bound to be some problems with loss of blood supply. The stomach is not infinitely vascular.

DR. GOMEZ

I guess I would have to call the operation that I have been doing, a gastroplasty with a greater curvature stoma supported with a seromuscular suture. There are some things that we should discuss. One of them is blood supply. We have been fashioning smaller and smaller pouches and when that is done the blood supply gets smaller and smaller. If you continue to mobilize the greater curvature to the esophagus, and expect that in 100% of the cases the small vessel on the lesser curvature is going to supply your gastric pouch, you may be wrong. Many of you have seen the pouch change and become cyanotic and pale as you place those staples and mobilize it. I think that when that happens, it causes a chain reaction. First of all, the ischemic tissue loses the neuromuscular activities. Perhaps the pouches that Dr. Terry described that would become flaccid after he dilated them, may represent an interference of this particular mechanism. The perforations are part of this mechanism as well.

I no longer mobilize the greater curvature all the way to the esophagus. It is not necessary. I maintain the normal anatomy of support. Another potential problem that goes with mobilization of the greater curvature is that the pouches may tend to flop over and they can mechanically obstruct the stoma after operation. During endoscopy, the stomas appear open, but they do not empty because they flop forward. I have corrected the problem merely by tacking back the greater curvature to the undersurface of the diaphragm. Then I divided the second, third or fourth short gastric vessel if necessary. This posterior vessel is almost 100% constant. It is very close to the third short gastric vessel. I also leave that intact. This staple line is placed in such a way that you do not leave any space in between. At least, I do not. I position it just as if one instrument had been used to place all four rows of staples. I start anchoring the Prolene suture at about 2 to 3 cm from the end of the staple line and go through-and-through and then pass it posteriorly. Then I put in the chromic catgut which I thought was a great idea because it facilitates the insertion of the seromuscular suture by creating a trough. It is placed at the end of the staple line, and tied on the bougie.
I invert the tissue. You have to have tissue available for inversion. Some people have the bougie already on the gastric wall under tension before they place the seromuscular suture. I think that is wrong. You have to have room and wall to invert.

QUESTION: What are the basic preoperative evaluations that the panel feels should be mandatory? Laboratory work, roentgenograms, pulmonary function, whatever?

DR. MASON

I think that every patient ought to have a chief complaint, present illness, past history, systemic review, physical examination, a urine and a CBC and so forth. And beyond that, it depends on what your problem list tells you is needed.

DR. GOMEZ

I basically agree. At the beginning of the study when I started doing gastric bypasses, we were doing extensive workups including endocrine studies, psychiatric interviews, everything, but we have decreased the workup because we were not getting anything out of it. For example, I never found one endocrine tumor. Now we do just the basic studies. I do glucose, metabolism and pulmonary function studies, and sometimes an upper GI.

DR. ALEXANDER

I agree with Dr. Gomez.

DR. ELLISON

I too would agree with what has been said. I would add that I think that the patient should have a nutritional profile taken preoperatively. This should include the serum albumin, total iron binding capacity, serum iron, and a total lymphocyte count, just as a basic baseline to examine whether or not we are actually going to have patients who develop nutritional alopecia and other nutritional problems later on during the postoperative course.

DR. MASON

Do you do that even though you have a history of high protein diet without alcohol, and with all the correct things that people are supposed to eat?

DR. ELLISON

I would still do it, yes.
DR. DE LUCIA

Essentially I would add gallbladder roentgenograms anytime that the gallbladder cannot be felt or is difficult to compress. It is a lot easier to feel small stones during operation.

DR. MASON

You would get a preoperative oral cholecystogram?

DR. DE LUCIA

Yes.

DR. MASON

I do not. I think I can feel it, but there are some gallbladders that do not have stones that are diseased.

DR. KROYER

For the last six months or so I have been checking arterial blood gases the day before and then comparing them with the arterial blood gases drawn the day after the surgery. Dr. Mason addressed the problem of sudden unexpected death about two years ago. I believe that a possible explanation may be an acute hypoxic episode in the immediate postoperative period such as occurs when the patient walks to the bathroom, for example. If I find much change, especially in $P_{O_2}$ in the postoperative series, I will give oxygen by nasal $O_2$ prongs. We have fashioned extensions so that the $O_2$ can go right to the bathroom with the patient. They receive $O_2$ continuously until their blood gases improve.

DR. MASON

I would never operate on one of these patients if I even remotely thought they might have obese hypoventilation syndrome. I think they ought to have a normal resting $P_{CO_2}$ before you do the operation. Those huge people ought to be in the hospital on supervised weight reduction until their $P_{CO_2}$ is normal and until they have gotten rid of their heart failure and edema. Their hematocrits should also be back to normal. If there is any question about the airway and breathing, you need a little preparation.

COMMENT

I agree, but I do not think obese hypoventilation syndrome should be used as a contraindication because those are the very patients who need weight reduction most.

DR. MASON

They are emergency admissions. Those people can die suddenly, even in the hospital. They need to be watched very closely. Some of them even
have to be intubated and put on a respirator for several months if they are having enough trouble.

DR. BUCKWALTER

I think the patient should have, in addition to what you indicated, an ECG, a chest film and a SMA 6/60. The rest of these examinations which we discussed should be indicated by the particular problems presented by the patients. I do not think that every patient should have or needs an arterial blood gas, a pulmonary function test, or an x-ray film of the GI tract. I think that this should be tailored to the patients' condition and findings.

DR. POWELL

The point I want to make is that we should pay a little more attention to the gallbladder. In my experience, the incidence of cholelithiasis after gastric bypass is about 10%. It occurs in patients in whom I did not feel any stones at the time of operation. To decide whether or not there are stones I take a 30 cc syringe and aspirate all the bile out of the gallbladder. Only by emptying the gallbladder can you really feel, particularly the small stones. In addition, I send the bile to the pathologists and ask them to look for cholesterol crystals, bilirubin granules, and microsperolit.

The other point I want to bring up again is cholesterosis. Cholesterosis is known to cause problems. It can cause typical biliary colic. Cholesterosis is the deposition of cholesterol in the submucosa. If there are cholesterol crystals, I take the gallbladder out. But cholesterol crystals in the bile are not related to the cholesterosis in the mucosa. I have several cases now where I can visibly see this right through the wall. They do not have stones and typically they do not have symptoms, but the problem is caused by lithogenic bile. I think this is something that calls for cholecystectomy. If you review the literature, you will find numerous cases reported of patients having typical biliary colic. There is a yellow pattern which was originally described as a "strawberry gallbladder," but actually it is more a pattern of yellowness running through the gallbladder. The deposition of cholesterol esters in the lamina propria can be seen microscopically. It appears that these deposits become big enough that they break off and cause symptoms of gallbladder disease.

QUESTION: How often do you take the gallbladder out when you do a gastric bypass?

DR. POWELL

About 50% of the time.

DR. FREEMAN

I would delete the upper GI and oral cholecystogram, not because I can evaluate it any better than the rest of you but they are simply not cost
effective for the few times you find something and it takes too much time. Similarly, roentgenograms of the skull to look for cranial tumors are not only unrewarding but are a real hold up because often these people have fat around the pituitary and it is interpreted as a solid tumor and then you are into two weeks of investigation for a tumor that is not there. I would always look for the patient who smokes and insist that he or she stop two weeks preoperatively. I often forget to do that, and it has now become part of the routine. I would always get lipids and triglycerides, especially high density lipoproteins, and I would always carefully document the blood pressure with a large cuff. In addition I would also get antacid and two-hour postcibal blood sugars tests because I think we have to show people that we really are doing good for the patient in exchange for these high mortality and morbidity statistics. Finally, I would not operate until we had gone through a reasonable compliancy profile in the office at three or four visits and a dietary and exercise history. Although the patients will not lose weight for you, I think it is important to pick up the really bad habits, such as five bottles of family size Coke a day. You have to distinguish family size from regular size, by the way. I would see if the patient will at least stop the habits that I call atrocious. If they will not quit something that simple, then I would not operate.

DR. YALE

All of our patients at the University of Wisconsin are screened by the same surgeon, internist, and psychiatrist. It has been a longstanding program that has gone on for more than six years. If we feel that these patients are satisfactory candidates for surgery, then we do many of the tests that you suggested. Those over 40 years of age with poor pulmonary functions or suggestions of hypoventilation problems are, of course, studied carefully. We try to get patients to stop smoking. But what about the patient who comes in weighing 350 lb and even after you preach to them until you are blue in the face, they continued to smoke like a chimney, what do you do? Do we operate? We have operated and we have been very careful postoperatively in regard to oxygen support. We do get a lower GI series and a sigmoidoscopy on these patients. They all get constipated or at least they think they are constipated postoperatively. We have not picked up a great deal of pathology, I must say, as a relation to that. We gave up on the oral cholangiogram. We did not think it was worthwhile.

DR. LEWIS

The tests that I do are essentially the ones that you described. I would see them in the clinic and schedule an admission and surgery for the next day and not have any pulmonary or x-rays studies other than a chest film, an EKG and routine blood tests unless there were some indication for those other tests.

DR. MASON

This does not mean that you should not do special studies. We should be doing special studies. We should be learning all we can from these patients. But that does not mean that the tests all have to be routines.
DR. O'LEARY

I have to disagree with the entire panel. I believe that we are in a formative phase of an approach to a disease process that is presently in the hand of internists. I think that we have to know what we are doing, good or bad, for the patient. I think that as a minimum, the changes in glucose metabolism are significant. Everybody that comes to us and has an abnormal glucose tolerance test does not have diabetes mellitus. It took us 15 years with jejunoileal bypasses to figure that out. I think that we are a little bit further advanced than we were with jejunoileal bypass in 1965. But some of the answers that I have heard in regard to what kinds of tests should be routine, disturb me. The same kinds of criteria might have been used or suggested for jejunoileal bypass and yet now we know that jejunoileal bypass has a lot of things wrong with it. For example, sudden death. Why is that? Is it more common to have hemorrhagic pancreatitis in a patient who has had gastric partitioning than in somebody who has had any other operation or just walked in off the streets? What about the neuropathy we see? Some patients have a significant neuropathy. What about vitamin A deficiency? What about those iron changes that we are just now beginning to identify? Do they occur in morbidly obese after gastric partitioning? The answer is, we do not know. If we do not keep looking for the kinds of problems that may occur, then I think we are doing a disservice to those physicians who come after us ten or 15 years from now.

DR. MASON

I agree 100% but I think we ought to do this with a prospective approach and we should state a hypothesis and state how we are going to test it and have a protocol to collect the information. What I am opposed to is just wasting money getting every test under the sun on every patient and then later on finding out that we do not know what to do with the data.

DR. O'LEARY

I agree. Everybody here, regardless of what community hospital or University center they may be in, has the capability of doing just what you suggested. Each individual does not have to take on the whole problem of obesity. But if someone is interested in a particular facet or has an unusual case, perhaps in time he can collect significant data.

DR. MASON

This afternoon we have said a lot about a variety of different procedures. I would like to ask the panel, if they have any cautions about the variety of operations that we are seeing without controls. What happens to the controlled trials in this sort of context? I am confused about the variety of procedures. We are using a lot of data here with historic controls which I think are rather unsatisfactory. I think most of us noticed that as we do the procedure we get better at it, and that the results later on are also going to get better. If we then go back and compare a new procedure with data collected during a period when we
were novices, it can lead to spurious information. What happens to the controlled trial?

I have thought about this a great deal, and I feel very uneasy about the way we are progressing. But I think it is probably the only way we can go. I think we are at the stage of a dog hunting for a bone. We are searching because we are dissatisfied. We see a way to change and make things better, so we try it. I think the time will come when we will see that there are two ways of doing certain things. We will then be in a position to test the null hypothesis and set up a prospective randomized study. I have designed a number of such studies in the past, but I cannot get them started because before I can do anything about the study, I have decided something I wanted to do is unsafe, or somebody else already has 100 cases and they say not to do it. So, we have to have a lot of experience before we get to the point where we have two procedures and have to decide which is best. At that point we will be able to do a prospective randomized study.

QUESTION: At this present junction, Dr. Mason, would you canvas the panel very briefly in regard to what would be the procedure of choice in the usual 40-year-old, 350 lb woman, with no complications?

DR. YALE

We are working with the gastroplasty with gastrogastrostomy. We are comparing that with our experience with the gastric bypass which we consider the standard of the industry, so to speak.

DR. MASON

What would you tell somebody who wants to get started?

DR. YALE

I would tell him to do the gastric bypass, and build up an experience in that area. I certainly would not tell them to do the intestinal bypass. My experience with gastric bypass has been very very good particularly in regard to weight loss.

DR. MASON

Would you do it with a loop or a Roux-en-Y?

DR. YALE

A Roux-en-Y.

DR. MASON

Would you reinforce the channel?

DR. YALE

No.
DR. MASON

Would you divide the stomach or staple it in continuity?

DR. YALE

I would staple it in continuity. Our staple line disruption rate has only been 1 or 2%.

DR. MASON

What pouch size?

DR. YALE

30 to 50 cc.

DR. MASON

Stoma size?

DR. YALE

12 mm.

DR. LEWIS

I would recommend the same operation.

DR. BUCKWALTER

I would recommend a gastrogastrostomy with a 25 to 40 cc pouch and a stoma size of 8 to 10 mm. The midstomach reinforced channel gastroplasty is the operation that I currently regard as the operation of choice. Seven of 47 patients with a Gomez type gastroplasty had problems with obstruction. One typical patient had a good weight loss. However, he had to be readmitted on several occasions to a local hospital as well as to our hospital for hyperalimentation and intense dietary consultation. He also had repeated endoscopies and upper GI series that were normal. Finally, we admitted him with a plan to operate upon him. But when we saw that he again had a normal upper GI series and that I could easily pass the scope through the opening, we decided to repeat hyperalimentation. Two months later he returned once more with another substantial weight loss. So finally, in spite of the normal upper GI series and the obviously open stoma, we reoperated on him. The results were dramatic. Within 24 hours he said, "Doc, I don't know what you did. But you did something good, because that pressure, that discomfort which I had ever since the first operation is now gone." Within two months he gained 20 lb and he was a new man.

We had 15.5% reoperation rate in our Gomez type gastroplasty group and about 4.8% in the group of patients with the midstomach, reinforced channel gastroplasty. The important point here has to do with obstruction.
They certainly get good weight loss. Our early results indicate that the gastrogastrostomy as we were originally doing it was not as good as it should have been. I suggest that the technique of removing staples and placing the cartridges across the stomach may damage the mucosa in the wall of the stomach. We confirmed this as others have in dogs. If you use the C-clamp or if you use the TA 90 and put the pin through the stomach, or if you take off the end of the cartridges with a rongeur, you of course avoid this problem. But we have seen the same problem in the patient in whom we used the C-clamp. It is my explanation that what we are really doing is reducing the relative blood supply along the greater curvature. When we operated upon our patient he had the typical atonic pouch which you have heard so much about in the last 24 hours.

DR. FREEMAN

I would recommend a gastroplasty with a reinforced greater curvature channel and with the proviso that the physician be prepared to completely follow up his own patients.

DR. KROYER

So far we have all said that we would do what we are doing, and that is what I would do also. I think what I am doing I like best, and until I find out that it is not the best, I intend to keep on doing it. But the one thing I feel is important is follow-up data of our own patients. Time will tell. I think we have a wonderful laboratory here with diverse opinions that have an opportunity to come together once a year. I do not know how we can do much better. I think that we want to avoid the notion of adopting one idea coming out of one institution. We should avoid becoming so inbred that we think there is only one operation. At this point that is obviously not the case.

DR. DE LUCIA

I personally am still with the gastroplasty. I make a 50 to 60 ml pouch and about a 6 mm outlet. I divide the stomach incompletely between two rows of staples. I place the seromuscular ring and the serosal patching which I wrap around the channel instead of Marlex. Then I reconstruct the stomach as has been previously mentioned.

DR. ELLISON

I think gastric partitioning or gastroplasty with suturing a portion of the stoma.

DR. MASON

Do you let the patient decide?

DR. ELLISON

No. I would recommend that the surgeon use whichever procedure he was most comfortable with.
DR. ALEXANDER

I would just apply two double rows of staples across the stomach and do a gastrogastrosomy by hand and reinforce the staple lines.

DR. MASON

With the Marlex?

DR. ALEXANDER

No, with a Mersaline mesh. It is softer, more pliable and easy to work with.

COMMENT

I am impressed with what has been demonstrated so far but, when we come to the bottom line, almost invariably, the results are compared to gastric bypass, and in virtually every case, the results are not as good. Almost everyone has higher mortality and morbidity rates than are found with gastric bypass.
This case report business reminds me of a story that was told about the speaker. He said that one case is an experience, two cases are a series and three cases are time after time after time. With that in mind, I would like to tell you about a lady weighing 275 lb, five feet two inches tall, who was referred to me. She was aspirating food because of achalasia. This patient refused to have anything done about her achalasia unless we also fixed her so she could lose weight. She was a very manipulative patient, and finally we conceded.

I told a thoracic surgeon and colleague about my plan and he said we were getting ready to produce "the world's premier epiphrenic diverticulum." In other words, he thought that we would obstruct the stomach by doing a gastroplasty on this woman and open the muscle of the esophagus to the extent that it would balloon and fill the chest with esophageal mucosa which in turn would be full with food.

We did this operation through an incision in the thorax. That is the way we usually do our achalasia patients. We opened the left chest through the sixth rib bed to avoid the diaphragm. Then, we opened the crura and brought the cardia of the stomach through the crus of the diaphragm. A Penrose drain was placed around the esophagus. We used the TA90 stapling instrument and measured the volume by inserting saline through a needle in the stomach wall. We wondered if we could get the TA90 in the thorax. At times it can be a very clumsy instrument. But it went very well across the stomach and, of course, the other part of the stomach is below this. Following this, we opened the muscle of the esophagus down on the stomach the way you always do in a patient with achalasia, to a point as high as the inferior pulmonary vein.

We now have six months of follow-up data on this patient. She weighs 175 lb which is 87 lb below her preoperative weight or a loss of almost a third of her weight in just six months. The esophagus is still dilated and the esophageal gastric junction is open. During gastroscopy we were able to confirm that the channel we made is wide open.

I wondered how anybody with that much achalasia could ever get to weight 275 lb. Apparently, she ate all the time. I thought that this operation would absolutely fail because if she could eat through the achalasia, why could she not eat through what we did to her? She claims that she was hungry all the time when she could not empty her esophagus. But now, she is satiated. We have heard about this before. Putting some food in any part of the stomach tends to give a feeling of satiety. One of my patients asked me why all that empty stomach doesn't make her hungry. I would like somebody to answer that question before I leave here today.
ESOPHAGITIS MANAGEMENT

Jeffrey W. Lewis, M.D.

I would like to address a problem which, fortunately, we have not seen too frequently: reflex esophagitis associated with either gastric bypass or gastroplasty. If you consider the procedures, it is a miracle that more of these people do not develop reflux esophagitis. The way we do it, at least the way I do it, is to take down all the short gastric vessels up into the gastroesophageal junction. The stomach may herniate through the hiatus. If you do an upper GI series on these people you see marked reflux, especially immediately after surgery and less so later on after they have recovered from surgery.

Apparently the operation allows gastric acid contents into the esophagus. This situation is made more complex in gastric bypass by the loop of small bowel used for the anastomosis which also introduces bile to within two or three inches of the esophagus. Bile and acid together are probably the most virulent causes of reflux esophagitis.

I have reviewed the patients that we have treated in the last 12 years, both those who presented with esophagitis and those who developed esophagitis after the operation. We have had a total of 21 patients. These patients presented with such classic symptoms of esophagitis as water brash, postprandial substernal burning especially when in the recumbent position and nocturnal regurgitation. Early in our series some of the diagnoses were made in a haphazard manner based on upper GIs and on symptoms. But now we tend to do endoscopy on all these people to make a definitive diagnosis. I think this is important because we have had several patients whose biopsies have been negative for esophagitis, even though they had clinical symptoms and marked reflux on roentgenograms. They had antireflux procedures and continue with their symptoms so I suspect their symptoms were something else.

During endoscopy you can see the linear erosions in the esophagus. It is very important, of course, to biopsy the erosion to get the diagnosis. I recently saw a woman who had a gastric bypass with a straight loop gastrojejunostomy four years ago. She has symptoms of esophagitis. The pouch was felt to be too large so she then had reduction of the size of the pouch. Nevertheless, she has continued with symptoms of esophagitis which are poorly controlled with medical management but not felt to be severe enough to require an operation. The distal esophagus is now lined with columnar epithelium. The esophageal mucosa has been replaced with gastric mucosa. The woman now has what appears to be Barrett's esophagus. Whether she has an increased risk to develop carcinoma of the esophagus later on, as patients with Barrett's esophagus are prone to do, I do not know.

Barrett's esophagus may be one of the long-term complications of these procedures. We may be creating a carcinogenic preparation in the esophagus in addition to the possible carcinogenesis that we are perhaps creating in the stomach. I think this is a good reason why these patients do need some remedial correction of the esophagitis.
Of the patients I reviewed, seven presented with esophagitis prior to any operation. They were overweight and had the symptoms of esophagitis. Of these patients four were women and three were men, and the mean age was 36 years, a little bit older than our average patient. The diagnoses in these patients was first of all made on history and confirmed with an upper GI series which showed a reflux caused hiatal hernia in six of the patients. More recently, of course, we do endoscopy on these patients to be more accurate in the diagnosis. Three of the patients underwent endoscopy. Unfortunately, we did not perform biopsies in any of these three patients. This was a mistake on our part. The diagnosis was based simply on the erosion seen in the esophagus.

These seven patients underwent one of four different procedures. Two underwent gastroplasty, of whom one became asymptomatic. The other patient remained symptomatic after the operation, but this patient had a pyloroplasty in addition to the gastroplasty. I am not sure of the exact reason for doing that but it was done. She continued with esophagitis and then underwent a Roux-en-Y gastric bypass and became asymptomatic. One patient underwent Roux-en-Y gastric bypass and was asymptomatic as far as the esophagitis was concerned and also lost weight. Two patients had gastric bypasses with a loop gastrojejunostomy and a crural repair. Both these patients remained symptomatic after surgery. One has never returned for follow-up examination and one underwent a Nissen fundoplication which took care of her symptoms. The last two patients with esophagitis presented last year and we did simple gastroplasty. Both these patients became asymptomatic. I performed endoscopy in one of them and the esophagitis had cleared up after operation.

There were 14 patients who developed esophagitis after operation. All these patients underwent gastric bypass with a straight loop gastrojejunostomy. Most of these were women as is the case in our overall series. The average age at operation was 43 years which is certainly older than the overall average age of obesity patients. This may have some bearing on the development of esophagitis. The diagnosis was made exclusively by upper GI in seven of these patients. Endoscopy and biopsy were used in the other seven patients.

In regard to treatment, one patient was converted to a gastrogastrostomy and did well and became asymptomatic. Three patients had Nissen fundoplications, which is a formidable operation. One of these patients became asymptomatic; the other two continued to be just as symptomatic after the operation as they were before operation. They still had loop gastric bypasses. Six patients underwent Roux-en-Y gastrojejunostomy, five of these became asymptomatic, one continued to be symptomatic. Two patients had reduction in the size of the pouch. Obviously, these patients also were not having satisfactory weight loss. They remained symptomatic. One patient had a crural repair which failed and symptoms continued after operation. One patient has not had any therapy, at least at our institution. I would not be surprised to learn that this patient had gone someplace else.

The important message to get out of this is that first of all gastroplasty seems to be a very reasonable operation, at least in our experience,
in taking care of both the reflux esophagitis and the obesity problem. Secondly, it is important to divert the bile from the esophagus. Esophagitis may be more related to bile getting into the esophagus than acid. We did have the one patient with the gastroplasty who developed esophagitis but that patient also had a pyloroplasty. Our current approach with the few patients who have preoperative esophagitis and obesity is to simply do a gastroplasty.
About five years ago when we published our first early results with gastric bypass, we made a recommendation not based on data but rather on the concept that was espoused here this morning. That is, if there is any incompetence of the GE junction, a gastric bypass which causes obstructed outflow from the stomach would make that much worse. We recommended that in any patient with a hiatal hernia demonstrated on roentgenogram, a gastric bypass procedure should not be done. Looking over our results since then, I notice that we violated our own recommendation several times. I thought it might be of interest to start this discussion by taking a poll of the audience to see who is doing what. In the first place, how many of you are obtaining preoperative upper GI films in patients routinely regardless of whether or not they are symptomatic? (show of hands) It appears that more are obtaining upper GIs than not.

If a hiatal hernia is discovered on the preoperative upper GI in an asymptomatic patient, how many of you will go ahead with surgery? (show of hands) It appears that there is only one that would not proceed with the operation. All the rest felt that they would.

In such a situation who would do some kind of hiatal hernia repair in addition to doing the bypass operation? (show of hands) I see very few would do anything.

In regard to symptomatic hernias with documented esophagitis, who would now do something about these? (show of hands) That seems to change everything. A lot of people would do some type of repair.

In such a situation who would simply repair the crura or do, in effect, an Allison repair? Who would anchor down the GE junction by doing something like a Hill repair? (show of hands) Lots would do that.

Who would do a Nissen or some sort of fundoplication? (show of hands) Fewer. So most would either repair the crura or would actually in fact do a fundoplication.

QUESTION: How many people would operate at all on patients with morbid obesity and documented severe reflux esophagitis? (show of hands)

DR. JEWELL

It appears that just about everybody would.

QUESTION: Has anyone done manometric studies in the esophagus?

DR. LEWIS

We have not done those. However, at least initially after surgery, I am sure they are very poor because there is marked reflux. If you obtain
an early postoperative roentgenogram you will notice that it just goes up and down. Later on it is less but owing to the very marked reflux seen early, I am sure lower esophageal sphincter pressure is decreased.

DR. JEWELL

Does anyone have any data before we leave that point?

ANSWER 1

Yes, in three to four patients manometric studies were done preoperatively and at three weeks postoperatively. There was no change from the preoperative measurements. I do not have any studies in patients with proven hiatal hernia, however. My patients were normal in that respect.

ANSWER 2

We have studies in 25 patients. It is interesting to note that preoperative sphincter pressures in obese people are high to high normal. Postoperatively after approximating a 100 lb weight loss the pressures drop to low normal. This casts an interesting light on the problem of esophagitis in these patients and whether it makes them more susceptible later.

DR. JEWELL

Are you saying that the pressure suggests that the sphincter is less competent after weight loss?

ANSWER

Right. This may be truly a quirk of the obesity preoperatively. The weight on the fat man increases the pressure so to speak. We have seen drops of as much as 20 mm of pressure after a 100 lb weight loss.

DR. JEWELL

Yes, but is it still in the normal range then?

ANSWER

Yes.

DR. JEWELL

Then perhaps the preoperative values were spurious due to the obesity which makes the pressure go higher.

QUESTION (to Dr. Lewis): You had a patient with esophagitis after a Roux-en-Y gastric bypass. Do you know the length of the limb of the Roux-Y?

DR. LEWIS

It was 40 cm.
DR. JEWELL

You think the esophagitis was caused by bile reflux?

DR. LEWIS

I certainly do. The limb was the usual size that we use and the patient continued to have bile gastritis and reflux esophagitis.

QUESTION: Did you see bile in the stomach?

DR. LEWIS

Definitely, yes.

QUESTION: An the Roux-Y was in the right direction?

DR. LEWIS

Yes.

COMMENT:

One well-known surgeon and endoscopist says that 40 cm in many patients is not enough.

DR. LEWIS

His statement was true for this patient.

COMMENT

If you check patients with Roux-en-Ys of about 15 inches you will find that about 40% of them will have bile in their stomach. If the length is doubled to 30 inches there will be very little bile in the stomach. At 45 inches there will be none.

DR. JEWELL

How long do you think a Roux-en-Y arm ought to be?

ANSWER

It ought to be a minimum of 65 to 70 cm.

QUESTION: How does gastroplasty help esophagitis?

DR. LEWIS

During operation a number of nerve fibers are divided. The angle is straightened out. In addition, the entire remainder of the stomach is partitioned. Basically this serves to remove the acid. I do not have
the studies necessary to prove this, but I think this is the key. Acid is removed, there may be reflux but it will not be the material that erodes the esophagus. That is my explanation.

DR. JEWELL

In an otherwise normal gastric bypass patient, what do you think is the most important feature governing reflux? Is it the positioning of the GE junction, the angle or what?

DR. LEWIS

I think it has to do with the angle and how the muscle functions and how it is allowed to be closed. The angulation is more important than the GE junction.

DR. JEWELL

Are you taking the angle down?

DR. LEWIS

Yes. We are removing it. As I say, I feel it has to do with division of several nerve fibers that come through there.

DR. JEWELL

It seems to me, regarding hiatal hernia in general, that the one point which shines through all the current literature is that if you can keep the GE junction down in the abdomen regardless of what the angle is, you can prevent reflux.

COMMENT

We have left the pH probe in the proximal pouch in 14 gastroplasty patients who had the same type of procedure that Lewis describes. Nine of those 14 had no pH readings below four over a 12 hr period postoperatively. The other five had some fall in pH but for a relatively short period of time. We monitored those same patients preoperatively and found acid in 13 or 14 of them. Therefore, we think that there is probably a mixed reaction going on. Just as Lewis mentioned, acid is being produced in the distal stomach but it is probably not getting back into the proximal pouch.

QUESTION: How would one do a Nissen repair on a gastroplasty patient?

DR. LEWIS

If you do it, you obviously have to create a larger pouch than you intended to. Otherwise there will not be enough stomach to wrap around the esophagus. In 1960, Cocco and Brannigan wrote a paper to which Dr. Mason often refers. What they propose is to isolate the proximal part of the stomach from the remainder of the stomach in an effort to prevent
the esophagitis-causing materials from entering the esophagus. Un-
fortunately, I think this is flawed because they do a pyloroplasty or a
gastrojejunostomy which opens the stomach up to a new erosive agent
which is bile. I do not think it caught on very well.

DR. MASON

The interesting thing about this to me is that Cocco and Brannigen have
done what is essentially a gastroplasty. Maybe they added some things
they should not have, but it looks as though they are thinking along the
lines that a gastroplasty-type procedure would help. Dr. Lewis has
found it, indeed, does help in our patients.

DR. LEWIS

If the gastroplasty is not functioning correctly and these patients
develop obstruction and can only tolerate liquids, they may develop
esophagitis. This can be corrected by simply correcting the operation.

COMMENT

We have seen three people with esophagitis whose symptoms disappeared
after gastroplasty.

QUESTION: Were these new patients?

ANSWER

Yes. They just happened to have esophagitis as well as being over-
weight. We did gastroplasty and their symptoms got better. I do not
know what happened to the esophagitis because we have not performed
esophagoscopy in them again.

DR. MEREDITH

I would like to ask Dr. Lewis whether or not he would do a gastroplasty
in someone who had esophagitis but was not heavy enough to be qualified
for a bariatric operation. Would you do a gastroplasty on a 50-year-old
180-lb woman, for example?

DR. LEWIS

No. I would do a standard fundoplication.

DR. JEWELL

Has anyone else done any patients with achalasia or is this a unique
patient? Dr. Rank, you have?

DR. RANK

Yes, I did one. It has been almost four years and she had the conven-
tional type of gastric bypass with dependent intramesocolic gastro-
jejunostomy. I discussed her several times with Dr. Mason. She did
extremely well for a period of a year and a half or two years until she developed an atonic pouch. When I reoperated, the question was whether or not I should do a Roux-en-Y. She did not develop any reflux until she had bile come back up in her pouch. Therefore, I did a simple but radical pouch reduction. I resected the fundus and made it long and narrow like a tube. She had a gigantic esophagus which then went back to normal. She, in fact, had a better result than any other patient that I ever did for achalasia.

QUESTION: Did you cut the muscle?

DR. RANK

Yes. I did a standard Heller procedure.

DR. MEREDITH

An interesting thing came along like this. One of our residents who enjoys the thorax and the appendages attached there too, suggested that we do all our gastroplasties through the chest.

DR. JEWELL

Have you followed that.

DR. MEREDITH

I have never done another one that way but I would if I had a patient who had an abdominal wall with a lot of herniation, for example, or some other reason not to get into the belly. It is easy to do through the chest. Furthermore, the blood supply problem is diminished because you do not cut into the blood supply of the stomach.

DR. JEWELL

Richard Sweet did all of his esophagogastrectomies through the left chest and the exposure is excellent. It would appear to be a reasonable approach to gastroplasty. Dr. Mason, do you have another comment?

DR. MASON

Is anybody using Anglechick appliances in conjunction with any obesity operation?

DR. JEWELL

What is it?

ANSWER

An Anglechick is an appliance to correct esophageal reflux. It is similar to a mammary prosthesis. It is a collar with silicon jelly inside.
DR. MASON

I am unfamiliar with these and therefore cannot recommend them. However, Carl Randall knows about them.

DR. RANDALL

I have been tempted to use one under these circumstances but I have always been concerned because I cannot see what will keep it from sliding down the stomach, especially if you clear the bronchial area of the curve as I do. That would be similar to a slipped Nissen.

COMMENT

It can be taken back through the diaphragm and tied right to the anterior cervical stomach at the GE junction. That is not a problem. The problem is whether or not the patient will be able to vomit.

COMMENT

It is contraindicated to suture those tie straps to anything. There have been several instances of herniation of the stomach as a result. The prosthesis is suspended on the stomach by ligaments because there is no dissection on the greater or lesser curvature.

QUESTION: Returning to the question, has anyone used this Anglechick in conjunction with an operation for morbid obesity?

ANSWER

I used it once and the patient had a lot of intra-abdominal problems and I had to reoperate.

DR. JEWELL

Were the problems due to the appliance?

ANSWER

No, they were due to other things. But I know for a fact that it does correct the reflux although it is not as good as a Nissen. I do not think it has any real advantage to gastric stapling. Once you have your retractor in, you can place the stitches for a Hill repair or whatever you want to do almost entirely around the esophagus.

DR. JEWELL

How much does it cost?

ANSWER

Three hundred and fifty dollars.
DR. MASON

What happens with reflux if you do a gastroplasty with the opening on the lesser curvature or in the middle? We talked about greater curvature stomas and Dr. Lewis has given an explanation of a baffle there. What if the opening is right under the esophagus?

DR. O'LEARY

We have done about 40 or 50 of those now. We have done several patients with symptomatic reflux esophagitis. We have no evidence of esophagitis in the postoperative period. The symptoms went away but I have not performed endoscopy on the patients so we do not know for sure if they are better. If we put the vertical suture line in and leave the hole on the lesser curvature as we do with this particular procedure, the angle of His is maintained. The intra-abdominal LES is maintained. It seems, at least in our very preliminary experience, that these people will have less problems.

DR. MASON

How about the patients with preoperative esophagitis?

DR. O'LEARY

In this group we do not have any. Some patients have symptoms and mild erythema but we have not had a patient with a real rip-roaring, erythematous, bleeding problems.

DR. MASON

But you do have some that have had symptoms who you thought were having preoperative mild esophagitis and they were better.

DR. O'LEARY

We performed endoscopy in these patients preoperatively and we found mild esophagitis. Biopsies were taken of squamous metaplasia or other early signs. They have become symptom-free in the early postoperative period but as yet we do not have one-year follow-up data.

QUESTION: Are the Nissen and Hill procedures as effective in the morbidly obese as they are in nonobese patients for whom they were designed?

ANSWER

I would think that it probably is not as effective, but I have no data.

DR. MASON

Having tried it and gotten into considerable difficulty, I feel rather strong about this. You should not do a Nissen with an obesity operation.
I think the two operations are antithetical. The obesity operation requires a small obstructive pouch. The Nissen fundoplication requires a big well-emptying pouch. You can not put these things together. With the gastroplasty working as well as it does and with the generalization that if you have to make a choice between equals, you ought to do the simpler procedure, I would say you ought to do a gastroplasty instead of doing a combination of a Nissen fundoplication and some other procedure. You are really asking for trouble if you put those two things together because you may end up with a closed segment.

DR. JEWELL

It seems to me that any real extensive dissection at the gastroesophageal junction might be fraught with hazards with any of these procedures. I think one would be better off to avoid them.

DR. MASON

In regard to the Hill repair, it can be done without devascularizing the lesser curvature. But I really feel reluctant to dissect along the lesser curvature since it is the source of the remaining blood supply to the upper segment of the stomach.

DR. JEWELL

Probably the sensible thing to do is simply a gastroplasty. If the esophagitis persists then a second operation could be considered.

QUESTION: Dr. Lewis, you presented 14 cases of esophagitis following gastric bypass. Could you tell us what percentage that was of your total patients? I would also like to know whether those were gastric bypasses?

DR. LEWIS

These 14 cases represent about 12.5%. They were mostly retrocolic gastric bypasses with very short limbs. However, there were a few antecolic procedures, maybe three or four. They were all looped.

QUESTION: I would like to ask Dr. Mason to follow through with the question you asked about the gastroplasty with the stoma on the lesser curvature side. Dr. Mason, do you think by doing that procedure you are excluding the acid secreting portion of the side around the esophagus?

DR. MASON

I simply do not know. It needs to be studied as Dr. O'Leary suggested. Manometric studies need to be undertaken.

QUESTION: Dr. Lewis, you do a localized vagotomy by cutting the nerves in that area. Don't you think that if we injure the vagus in that area we would be defeating our purpose in view of the fact that we need the motility and also the stretchability?
DR. LEWIS

It has not worked out that way but that is certainly a theoretical consideration. However, I must say, the x-ray studies, at least on my patients have not shown an atonic segment of the stoma in the proximal portion.
WOUND INFECTION, AGE, AND HERNIA

Edward E. Mason, M.D.

The first speaker in this session is known for the number of complications. There are a lot of you who never have any wound infections and a lot who have only a few wound infections. Then there are a few of us that have a lot of them. I am not sure what the difference is although I have got a lot of hypotheses. One is that there are too many people involved which leads to breaks and changes in technique and so forth. I am going to make a real effort to see if I cannot improve this in our experience. I thought I would talk to you a little about an interaction problem that we have studied. This is a follow-up plea to John Halverson and Pat O'Leary's pleas for the collection and study of data. It is also a restatement of my previous suggestion that you need to propose a hypothesis and think about how you can test it. There are a lot of little things that anybody can do and, in fact, ought to be doing. These are new procedures and, as Dr. O'Leary said, if you are going to do this kind of work, you have a real obligation to learn something from it and to be creative about it. This does not mean you need to go off on a tangent or do something that has not been adequately tested. It simply means that you should look carefully at your results.

We looked at wound infection and we have, I am ashamed to say, a 13.8% incidence of wound infection in about 900 patients. We divided those up into age groups, 15-19 years, 20-24, and so forth, eliminating the ones at the end where there were not enough cases. Thus we did a chi square analysis to see whether they did or did not have wound infection in relation to age. We found that there was no significant difference. It did not make any difference how old the patient was with regard to wound infection.

However, we found a highly significant relationship between the occurrence of wound infection and the later development of a hernia. Furthermore, we discovered an important relationship between age and the development of hernia. Looking at our total series of approximately 900 patients with either bypass or gastroplasty, we find the average operative age to be 36 years. The subgroup of patients who developed hernia are in an older group. Age does increase the risk of a hernia.

In addition to age, wound infection affects hernia production. Furthermore, delay in recognition of wound infection also seems to have an impact on hernia. If you detect an infection early and open the wound, there is no problem. But if you allow the wound to fester with pus digesting the fibrin, then you definitely will have a dehiscence; perhaps even an evisceration. Men appear to be more prone to hernia because their muscularity usually results in longer operative procedures. The important causative factors in the production of wound infection have not been isolated and tested. You may want to look at initial weight, time of recognition, preparations of the skin, the duration of the operation, whether or not the stomach was opened, whether foreign material was present and so forth. Those are some things that should be tested.
FUNDIC BLOWOUT

Luigi M. De Lucia, M.D.

I think we all agree that the mere construction of a small food receptacle per se will not generate a significant reduction of food intake without the provision for slowing down the emptying of this receptacle. This means that we must build an effective and lasting obstructive mechanism at the level of the outlet. Obviously this runs counter to basic surgical principles. Yet the incidence of complications deriving from this intentional violation of surgical rules is relatively low.

The purpose of the study is to analyze the causes and the consequences of what appears to be the most widely reported complication of the fundic pouch; the perforation or so-called blowout. Not included in this study are the leaks of the partition line. These leaks, like the leaks of a gastroenterostomy, have a different etiology and a more dramatic clinical picture. In the group of 150 gastroplasties, there were four high-risk patients. One had chronic renal failure incidental to a previous jejunoileal bypass. She was on dialysis. Another one was an azotemic patient who had had a left kidney removed and necrosclerosis of the remaining kidney was found during autopsy. She also had hypertension and severe diabetes. The third patient had severe coronary disease affecting three vessels. One vessel was completely occluded and the remaining two were 75 and 78% occluded. We learned that after the bypass. The fourth was a patient with congestive heart failure that was directly related to obesity. Because previous attempts at weight reduction by jaw wiring had been unsuccessful, the patient required operation to correct this poorly controlled situation.

There were two deaths in this group of 50 patients. Both occurred among the patients with renal impairment; the first and the second of the high risk patients mentioned above. Quite interestingly, both deaths were directly or indirectly related to a fundic blowout. It is also interesting that these two fundic blowouts were clinically asymptomatic. Thus the mortality rate is 1.3% for the group of 150 gastroplasties and 50% for the small group of high risk patients. There was a total of 14 blowouts in 150 gastroplasties, an incidence of 9.3%. The two deaths which I mentioned, give a mortality rate among blowouts of 14.3%.

One hundred and three of the 150 gastroplasties had a greater curvature outlet and 43 had a lesser curvature outlet. Contrary to what we have seen with obstruction, the incidence of blowout is significantly different between these two groups. It is 12% for those having a greater curvature outlet and 5% for the patients with the outlet on the lesser curvature.

I believe that the more aggressive we are with the partition line the more complications we will see. On the other hand, our failure rate is inversely proportional to our complication rate. Again with one double firing of the stapler there were no blowouts. With two firings, two double rows of 4.8 staples, the incidence went up to 11%. When I began
using transgastric sutures in a group of 50 patients, it rose to 16% and with resection it rose to 17%. The failure rate in regard to weight loss was 88% with one firing of staples. It went down to 40% with two firings. With reinforcement of the staples using a whole row of transgastric sutures it dropped to 14%, and to 0% with the transection.

The first symptom of fundic blowout appeared around the fifth postoperative day with a span of two to nine days. It consisted of pain usually in the left chest and left shoulder. In one patient the pain was located in the sternal area and in another it was in the left neck. In four cases the first symptoms consisted of fever and elevated white count around the fifth postoperative day. In two cases, the very first clinical manifestation was a sudden drainage of purulent foul-smelling material into the drainage tube which was applied routinely in 11 of the 14 blowouts. Two were asymptomatic. These were the two cases with renal impairment and they were the two cases who died.

The definitive diagnosis was made around the eighth postoperative day. In seven cases this was accomplished through an UGI series done with gastrografin and in five others using methylene blue. In one case, the blowout was strongly suspected but both the upper GI and the methylene blue tests were negative and the final diagnosis was made during reoperation. The diagnosis in the very first case was missed. The patient had only an elevated white count, some fever and simultaneously a very severe wound infection. Therefore, symptoms were attributed to the wound infection. As mentioned earlier, in three of the 14 blowouts I had not inserted a prophylactic drainage tube. I generally use a double lumen tube. All three patients required reoperation for drainage. In the other 11, I fortunately had a prophylactic tube and none of them required the surgical drainage procedure. The tube in the left subphrenic space was more than adequate for drainage. Four of these eventually had to be reoperated, not because of the drainage problems but because of the blowout on the greater curvature. These were all patients with greater curvature outlets. They ended up being completely obstructed. But more than half of the patients who had prophylactic tube drainage did not require any further treatment.

The increase in hospital stay for these patients was only 7 to 10 days, except in one case in which the patient had to stay almost three weeks. The hospital cost was relatively benign considering the circumstances. They all did well and had no sequellae or other consequences from the blowout. They were treated simply by hooking up the drainage tube to suction, and of course, systemic antibiotics. All perforations closed spontaneously. There was no need for reoperation.

The most important physiologic factor in fundic blowout in my opinion, is ischemia. I say this because, as we have seen before, the incidence of blowout has gone down from 12% on the greater curvature to 5% on the lesser curvature outlet. This is because I can do a lesser curvature outlet by taking only the first and sometimes the second short gastric vessels. I almost never have to take the third one. Hence, I am able to leave three to five short gastric vessels. I do not disturb any of the blood supply on the lesser curvature.
Adequate decompression of the fundic pouch is probably the second most important causative factor in fundic blowout. I think it is quite important to have nasal fixation of the NG tubes. This should be accomplished by use of a 2-0 silk suture placed through the membranous portion of the nasal septum. This stabilizes the tube tip and prevents the possibility of distal or proximal dislodgement. I have had experience with patients who drink too much. These patients must have their thirst quenched as soon as they complain about it, especially those who have diabetes. Otherwise they will outmaneuver any alert nursing personnel and they will swallow a gallon of water a day, and obviously, if the NG tube is not properly functioning or has been removed, these patients will blow their pouches even though the vascular supply is intact.

In conclusion I would like to point out that fundic blowout may be more common than recognized. The clinical manifestation may at times be totally aspecific and even lacking. The tests, such as methylene blue, and radiological investigations may well yield a false negative result. Fundic blowout is perhaps the most common fatality-causing complication of the gastric bypass surgery. The mortality appears to be announced by immune deficiencies and severe metabolic derangements. Fundic blowout may also be the most common cause of intractable outlet obstruction requiring later reoperation. This happens, in my experience, only when you have a greater curvature outlet. The incidence of blowout, of course, is inversely proportional to the yielding propensity of the partition line as well as the size and responsibility of the fundic outlet. The incidence may be significantly reduced by meticulously preserving blood supply during surgery and by maintaining effective and continuous decompression of the fundic pouch during the first ten critical postoperative days. The necessity for surgical drainage in fundic blowout can be obviated by the routine use of prophylactic drainage tubes placed in the left subphrenic space at the time of the gastric bypass procedure. Such tubes along with other adjunct measures such as distal gastrostomy and parenteral alimentation can also significantly reduce the morbidity as well as the length of hospital confinement.
POSTOPERATIVE ACID SECRETION

William W. Kridelbaugh, M.D.

Last year we presented gastric pouch acid measurements during the first 48 postoperative hours during which nasogastric suction was employed. Ward Griffen pointed out at that time that our measurement was of a mixed effluent because the nasogastric tube had been placed so that part of the holes drained the proximal pouch while the rest of the holes drained the distal pouch. This year, we devised a method of measuring the acid in the proximal pouch separately from that of the distal pouch. This was accomplished using a #8 pediatric feeding tube passed into the final hole of an AN 10 sump nasogastric tube. The pediatric feeding tube was then tied with a piece of chronic catgut around the AN 10 tube so that the anesthesiologist could insert these together with ease. The pediatric tube eventually attains a position in the proximal pouch while the AN 10 tube extends into the distal stomach.

The volume of the tube is exactly 2 cc. The nurses withdraw a sample through it on an hourly basis. Following extraction of the sample they inject 2 cc of air down the tube to clear it completely. In this way, they are assured that the next sample will be fresh proximal pouch effluent. At the time that the AN 10 tube is inserted, the operator simply feels through the wall of the stomach and grasps the pediatric tube, holding it in the proximal pouch and then places it there at the conclusion of the operation.

This year, we randomized our patients into a group that received cimetidine and those that did not receive cimetidine. We have used this AN 10 tube specifically because it is a very soft plastic which does not require boiling. This is highly preferable to the rigid nasogastric tube which can press against the wall of the stomach postoperatively.

Comparing two groups, those with cimetidine and those without, we found no significant difference in proximal and distal pouch pH measurements between groups. Consequently, we conclude that the acidity in the proximal pouch is so low that it does not represent an ulcerogenic factor. The perforations that occurred in our patients during our earlier experience were probably the result of mechanical pressure from the tip of the relatively rigid nasogastric tube against the wall of the stomach which led to erosion and perforation. In conclusion, we do not feel that cimetidine should be or needs to be used in these patients postoperatively. We have discontinued its use. This saves the patient approximately $15 for each dose. Dosage had been six times per day during the postoperative period.
ISCHEMIA

John H. Linner, M.D.

I have been doing, this type of surgery for a long time. Therefore, I will begin by giving you a brief background so that when I discuss ischemia you will be oriented to what I am doing. We started with the jejunooileal bypass (JIB) in 1953. We worked at the Veterans' Hospital with Dr. Arnold Kremen and myself and Dr. Charles Nelson, and since that time I have done 179 cases. There was a hiatus of ten or 12 years after our first case. It was not until after Payne and DeWind had presented their data that we began again. We did the end-to-side, 14 and four inches JIB and found reflux. Therefore, we stopped doing end-to-side JIBs. We now have 158 patients with various lengths of end-to-end JIBs. We had five deaths, one immediately postoperatively caused by pulmonary embolism, two liver deaths, one suicide and one MI. Our rate of serious complications is around 48.7%. Nevertheless, 50% of the patients in whom we have performed jejunooileal bypasses have done very well and would not have it reversed. We have reversed approximately 15% of our own as well as some other patients referred from other hospitals. I have reversed about 52 JIBs and converted most of them simultaneously to either a gastric bypass or a gastroplasty.

I am indebted to Dr. John Alden who some four years ago showed me how to do the first gastric bypass. He discontinued JIBs before I did. He showed me his technique and I really appreciate that. We did 53 loop gastric bypasses. Eleven of them were enterocenterostomies. I had a problem with reflux esophagitis in the cases with loops (six of 53). I discovered that adding an enterocenterostomy did not help the reflux esophagitis. The bile still goes up and around and simple enterocenterostomy does not help. I then converted those six patients to Roux-en-Ys and then felt that I might as well continue doing Roux-en-Ys. Although it does add another anastomosis it really does not add that much more to operating time.

I have discovered that the Roux-en-Y is an excellent operation for symptomatic hiatal hernia with reflux. Seven of these patients have been rendered absolutely asymptomatic with respect to the reflux. Therefore, I would recommend it for patients with hiatal hernia. We have had a few gastroplasties patients with symptomatic reflux who have continued to have reflux, although to a lesser degree postoperatively. In regard to my technique for gastroplasty, I am indebted to Cesar Gomez. I worked with him on three cases and consequently I do primarily the Gomez type of greater curvature channel. We did seven midstomach channels and, as yet, have not gotten into partial gastric transection.

We mobilize at least half of the greater curvature for our standard Roux-en-Y gastric bypass. We make the pouches about 50 cc in volume. We do not measure all of them. Our stomal size is 34 French. We now use a single 0-Prolene pursestring suture around the stoma for reinforcement. This is not a seromuscular suture. We simply tie it around and then use a few 3-0 silk sutures to bury it. We use a single staple line but we reinforce it with sutures. We started using 3-0 Prolene at
1 cm intervals making through-and-through interrupted stitches. We now use 2-0 silk. Since we began reinforcing our staple lines with sutures, we have had no staple line disruptions. We have had a total of four staple line disruptions in approximately 412 gastric bypasses or gastroplasties.

The other thing we do not use is a decompressing gastrostomy unless we use a loop. With loops, if a partial obstruction at the anastomosis occurs, there will be back-up into the afferent limb and into the stomach. This can cause acute dilatation. We have not had that problem. All of us get an upper GI series ahead of time to be sure that the pylorus empties well. If it does not, a gastrostomy is important. I think in reconstitutions it is extremely important that the patient be nutritionally stable. The feeding gastrostomy is an excellent idea.

In our gastroplasty technique we mobilize about one-third of the total greater curvature. We also use seromuscular running suture around the 3NF dilator. We thought that the gastroplasty would be the ideal operation simply because there would be no anastomosis. We thought that this would eliminate leaks.

In regard to complications, we had dilatation of the channel particularly in some of the early patients in whom we did not use pursestring reinforcement. We then began reinforcing the channel and we went from heavier suture to heavier and more and more knots and so forth. We had three stenoses of the channel. These all required reoperation.

To our amazement, we had five perforations among 212 gastroplasties over a two-year period. We anticipated that we would have no perforations with this operation. In the previous four-year period during which we performed 200 gastric bypasses with Roux-en-Y, we had only two perforations; one leak, and one perforation from an NG tube in a gastric bypass with an extensive mobilization. The five perforations in gastroplasty were all on the greater curvature, either above or immediately below the site where we had the purse-string suture tied. We managed to reoperate all of these in time and there were no deaths. We had heard about the use of prophylactic cimetidine. So after the first four leaks we began using it. But among 29 patients who received prophylactic cimetidine, there was still one leak which turned out to be one of the largest perforations we had. That was a shock to us. We discontinued the use of prophylactic cimetidine after the first 41 patients. We then changed our operative technique and began using a very limited mobilization. We would take one vasobrevia at the very most. We start at the esophagus and we dissect the peritoneal attachments on the left and then take one vessel at most and mobilize from behind. We now have 124 patients with this technique. We have had no perforations so far.

In regard to the weight loss we consider failures to be patients who lose less than 20% of initial weight by the end of the first postoperative year. We have had good results and few failures among our loop and Roux-en-Y type gastric bypass patients. Unfortunately, one-third of our gastroplasties have failed and our average weight losses have not been
as good. These include some of the early patients who did not have reinforcement of the channel, so, hopefully, our results will improve over time.

In conclusion, limiting the extent of mobilization in gastroplasty eliminated perforations. The extent of mobilization in gastric bypass did not seem to affect the incidence of perforation. Pressure from the purse-string suture around the channel in gastroplasty may result in an adjacent area of ischemia that is vulnerable to perforation. In such cases, cimetidine did not prevent perforation.
SYMPOSIUM: COMPLICATIONS -- EDWARD E. MASON, MODERATOR

DR. MASON

The first question is what do you do when you open the abdomen in a patient who has a leak and fibrinous peritonitis.

DR. LINNER

This is an acute situation. After making the diagnosis, you prepare to operate. You should always go through the old incision, take out the old stitches, and be sure you have got the fluids and plasma or whatever you need to insure the patient's good condition. You should also give prophylactic antibiotics.

Although we could see an area of irritation as well as stomach discharge around the stoma, we could not find the actual hole in two of our patients. In these instances we placed several drains brought out through separate left-sided three-inch long incisions. For example, we used two Penroses and an Argyle sump drain.

We have had a couple of perforations that looked like pistol-shot holes. In these cases we freshened the edges of the holes and closed them. These occurred within three days of operation. One was within 24 hours. In that situation we actually put in stitches. I think it is essential even in situations where things looks clean, to wash the entire area with saline and a dilute kanamycin solution. The abdomen must also be very well drained. You should not eschew drains just because you think you have closed it well. We also do bacteriological studies and place the patients on antibiotics.

QUESTION: Do you put in a feeding jejunostomy?

DR. LINNER

I do not, although I usually put in a feeding gastrostomy.

QUESTION: If you have a "pistol-shot" leak with a loop gastroenterostomy rather than a Roux-en-Y, would you close it with sutures? Any patient I have ever had like that always leaked.

DR. LINNER

That is true. One problem with the loop is that if it does leak it is a lot worse than a leak in a patient with a Roux-en-Y. This is because there is bile in addition to the gastric juice from the little pouch which irritates the area. Nevertheless, I would still put in a few stitches hopefully to slow down the drainage even though I would not expect it to stop completely.

QUESTION: Did you ever take any of those loops apart?
DR. LINNER

I do not do a loop anymore, so I have not taken any of those down. I had one posterior leak. I put two stitches in and drained it. The patient had drainage for about two or three weeks and then stopped. Nutrition has to be maintained, usually via the gastrostomy tube or through hyperalimentation.

DR. KRIDELBAUGH

If it is a small leak such as a perforation from the nasogastric tube, we would close it with sutures. I think the next time that I have a leak from a proximal pouch, I will try to bring up the jejunum and, without opening it, suture a jejunal patch across the hole as if I were trying to repair a traumatic blowout of the duodenum.

I had a gastroplasty patient who developed a long rent from gorging the proximal pouch. I tried to hook that up to a Roux-en-Y limb and it was an abysmal failure. It leaked just as though I had done nothing. Therefore, if I am ever so unfortunate as to be faced with such a situation again I believe I will use a jejunal patch.

DR. BUCKWALTER

I would explore the patient through the original incision. What you do has to be determined by what you find. For instance, in one patient two-thirds of the stomach had to be resected due to ischemia. We, of course, try to find the leak and if it is something that you can close, we try to do that. Obviously, it is important to obtain adequate drainage. If there is a subphrenic abscess you must insure adequate drainage through a subcostal incision. You also must provide the patient either with a Witzel jejunostomy or a tube jejunostomy for the purpose of maintaining adequate nutrition.

DR. MASON

Dr. De Lucia, they say you cannot drain the peritoneal cavity. Please review the prophylactic tube and tell us how you keep it from eroding into the spleen.

DR. DE LUCIA

The prophylactic tube is placed in the left subphrenic space between the spleen in the left diaphragm. I have placed tubes in at least a hundred patients and I have not had any complications from the tube itself. I have never seen an erosion into the spleen nor the diaphragm. The prophylactic tube has two advantages. In the first place, it allows you to make a very early diagnosis of leak. I believe that we really are dealing, on the greater curvature side, with many more leaks than we know. Quite a few of these leaks go unrecognized and they are diagnosed as pneumonia with left pleural effusion. Every time you have a left pleural effusion you should suspect a subphrenic collection. But if we do not have proof we are likely to look for causes of the elevated white
count and the fever which are more often than not the only two clinical signs. We are likely to look for pneumonia, infected atelectasis and those types of problems when in reality we have a limited leak which has been sealed off. All you have to do to find the leak is to give the patient 30 cc of mesaline blue through the NG tube and hook the drainage tube to suction at the same time. You will see the blue coming right through. This is a harmless procedure that can be repeated at any time and it obviates the need for x-ray films.

The second advantage is that if you establish a diagnosis of subphrenic abscess, you will not have to take the patients back to surgery and thereby avoid the need for a second operation. You merely hook the tube to the suction and, as you have seen in all cases where that was done, the drainage was adequate because the greater curvature perforations drain into the left subphrenic space. The partition line leaks may drain into the lesser sac. They have a different clinical picture. The patients develop a fast thready pulse, generalized peritonitis but problems in the left subphrenic space do not have that clinical feature. The course from then on is relatively benign. Appropriate antibiotics should be given. The perforations will close spontaneously.

I differ somewhat from the rest of the panel. If you have a small perforation and the patient is clinically stable, and has very little evidence of anything going on except an elevated white count and a low grade temperature I think you should be conservative. All that is necessary is to cover the patients with antibiotics and maintain or reestablish NG suction in the fundic pouch. These blowouts never seem to occur in the distal stomach. I have seen them always in the upper stomach. If you have a patient whose leak has gone unrecognized for a long time and therefore there is a purulent collection in the left subphrenic space, the very best approach is not through the front but through the back, through the bed of the left twelfth rib. It takes about fifteen minutes to drain that space. You do not go through the peritoneal cavity. It is a very short procedure and in my experience it works.
MANAGEMENT OF COMPLICATIONS

Otto L. Willbanks, M.D.

Prior to 1954, the treatment of massive obesity was limited to non-surgical means, some of which were intensive and innovative but none of which were really very effective. With Kremen's report, however, the field of bariatric surgery bloomed and mushroomed. Intestinal bypass as reported by Scott, Payne, DeWind, Buckwald, and many others, proved to be effective and relatively simple to perform. As we all know, however, the devastating side effects and metabolic complications soon begin to take their toll. Those of us who performed intestinal bypass can recall multiple examples of bizarre and complicated problems. It is important that everyone who treats obesity by any of the surgical modalities be familiar with the treatment of the complications of jejunoileal bypass. This is true even for those who do not do that operation because there are thousands of these patients around the United States. The procedure is still being done in large numbers and patients with complications are going to gravitate to those of us who do bariatric surgery. Therefore, I think it is important that we understand it. Intestinal bypass was not a bad operation for everybody. I have tallied in my report 41% with complications. The other side of the coin is that 59% of patients did quite well.

My personal series of 102 patients had about the usual distribution of sex, weight, and height. They all lost an average of 141 lb or about 43% of their initial weight. The majority of the ones that I did were Payne-type bypasses.

When you talk about the complications of intestinal bypass, it is a little difficult to understand what any one author is talking about because nobody wants to say they have 100% complications. But the fact of the matter is that all of the patients who had intestinal bypasses develop these side affects whether they are called complications or not. Severe diarrhea, for example, does not always go away with time. I see patients many years after intestinal bypass who are having as many as 25 bowel movements per day. Patients often report such complications as anorectal problems, nausea, and vomiting, fatigue, weakness, anorexia and thirst, especially during those periods of time when they were losing a lot of weight. They often respond to the thirst by drinking large amounts of water which simply makes all of this business get worse.

Diarrhea is sometimes easily controlled by simple means of all the drugs available. I found codeine to be the most effective and to my knowledge none of my patients ever developed a true addiction to it. Atropine is another drug that proved particularly helpful in cases where sometimes it seemed like we just could not make any other headway. Calcium carbonate and separation of solids and liquids also helps. In addition to the usual topical modalities, witch hazel was helpful in the treatment of perineal excoriation. Also, topical applications of Maalox sometimes helped although I got a lot of kidding from my gastroenterology friends for using it in that particular area of the anatomy.
As I stated before, 41% of my patients had significant additional complications. Most of them are pretty obvious. Eighteen percent had gallstones. Many had kidney stones, which, of course, were due to a hyperoxaluria. These patients needed to be placed on a low oxalate diet. Alopecia was almost always due to vitamin and protein deficiencies and was always reversible in my experience. Severe electrolyte abnormalities often were difficult to control and required rehospitalization. Approximately 20% of my patients had to go back into the hospital at least once to have their electrolyte complications treated. This often included other values in addition to potassium depletion. Sometimes it was calcium and frequently such deficiencies are not corrected unless the less obvious magnesium deficiency is corrected first. We used magnesium glucomate tablets for that.

There are a whole series of side effects that arise from bacterial overgrowth in the excluded segment and the absorption of antitoxins. The peculiar symmetrical polyarthritis that these people develop is very characteristic. Most of the liver failure is at least due in part to gram-negative overgrowth, pseudo-obstruction or gas bloat syndrome. In addition, steatorrhea and a peculiar kind of neuromuscular incoordination are common. All of these things need to be treated with systemic and occasionally parenteral antibiotics. Most of the time they will respond, although often only temporarily, to a combination of tetracycline and flagyl.

It is important to keep in mind that the liver failure is usually detected early, and is therefore reversible. However, if it is not treated immediately it frequently becomes irreversible. I recommend that patients have liver function tests at six-month intervals. At the first slight abnormality in liver function tests I recommend liver biopsy. Many people recommend routine liver biopsy every year even with normal liver function tests. When liver failure is diagnosed, it has to be treated with parenteral hyperalimentation. Obviously, the malabsorption is so great that it really cannot be handled by any other modality. High dosages of vitamins and triglyceride supplements are important. The medium chain triglyceride oil does not require saponification with bile salts. It is absorbed in the proximal jejunum. When antibiotics and other medical treatments fail, the patients need to have the bypass taken down. To treat the neuromyopathy that seems to be associated with steatorrhea and has been reported by Dr. Jewell and others, we added, in addition to antibiotics and vitamins, the medium chain triglycerides and vitamin B12. This seemed to help us to avoid reanastomosis from time to time.

We had one male patient who weighed 450 lb and was 53 years old. We did an intestinal bypass and within three months he had lost 100 lb and was developing all kinds of nutritional problems such as ketosis and hypoproteinemia. Because of his rapid deterioration, I took him back to surgery and put a jejunostomy in the proximal end of his excluded segment in order to be able to administer tube feedings and replace the missing nutrients. Unfortunately, within 24 hours he developed a disseminated intervascular coagulopathy and died. In retrospect, the
only explanation that I can postulate is that gram-negative overgrowth in the excluded segment combined with the reestablishment of continuity or perhaps the tube feedings caused bogus bacteriemia and this led to DIC. I think it is very important when one puts one of these patients back together again to use parenteral and oral antibiotics and even to put antibiotic solution right into the lumen of the bowel at the time of surgery. I know of one other case of a sudden unexplained death following reanastomosis, fortunately not in my own series, which was certainly compatible with DIC. The osteomalacia that has been recently reported may turn out to be one of the most devastating problems yet. Its treatment requires parenteral vitamin D. The damage to the kidney caused by hyperoxaluria and interstitial nephritis has been frequently permanent and it does seem to be arrested by dismantling the bypass.

Sometimes these patients refuse to let you put them back together for fear of regaining the lost weight. And, of course, all these patients will regain when you hook them back up again. But you can do a gastric pouch procedure simultaneously. I have done this 52 times. The important thing to remember is that both the failure and the complication rates are much higher than with a gastric stapling procedure alone. This, of course, must be pointed out to the patient.
BILIOPANCREATIC BYPASS

Nicola Scopinaro, M.D.

In biliopancreatic bypass a two-thirds distal gastrectomy is performed with closure of the duodenal stump and the gallbladder is removed. The small bowel is sectioned and the distal stump is used for the gastroenterostomy anastomosis while the proximal stump is joined to the side of the distal island. There is no blind loop and three intestinal tracts can be recognized. The alimentary tract from the gastroenteroanastomosis to the enteroenteroanastomosis, the biliopancreatic tract from the duodenum to the enteroenteroanastomosis, and the common tract from the enteroenteroanastomosis to the ileocecal valve. The new ileocolonic tract is long enough to allow a normal absorption of bile salts and the enterohepatic bile duct circulation is undisturbed. In the alimentary tract, the absorption is allowed only for the elements which do not need to be previously digested, that is, water, electrolytes, hydroscopic vitamins, and so on. This is tantamount to the creation of a malabsorption syndrome which results in a selective malabsorption syndrome.

Biliopancreatic bypass is now four years old, and 109 patients have undergone the procedure. There were 90 females and 19 males. They range in age from 16 to 56 years, with an average of 34 years. The average weight at the time of surgery was 114 kg and the average overweight was 99%. The minimum follow-up period was one month for 105 patients, four months for 99 subjects, one year for 83, two years for 61, three years for 28, and four years for two patients.

Eight types of the operation were successfully realized by varying the length of the three intestinal tracts mentioned above. Two of them are presently being performed. The first model is called partial biliopancreatic bypass. The small bowel is transected at its midpoint so that the alimentary tract and the biliopancreatic tract are of equal length and the common tract is 50 cm long. Forty subjects undergoing this operation have now a minimum follow-up period of 18 months and an average of two and a half years. The reduction of the preoperative excess weight in this group is 70% by the 18th month and it is not only maintained but even lightly increased in the subsequent follow-up period, reaching 78% by the end of the third month. Fourteen of these 40 cases or 38%, had a weight loss of more than 80% of excess weight, and this was considered an excellent result. Ten cases have reached and maintained their ideal weight. Another 38% of patients had good results with an average weight loss of from 60 to 80% of excess. Finally, 27% of cases had only fair results, having lost from 40 to 60% of their original excess weight. So far, none of these patients has had any significant weight regain.

In order to obtain a greater but overall more uniform weight loss, another type of operation called total biliopancreatic bypass was devised. With this procedure, the common tract no longer exists. The small bowel is divided into thirds. The proximal third is anastomosed end-to-end to the distal third while the middle third joins proximally to the gastric stump and distally to the ascending colon to become the
alimentary tract. The weight loss in these 37 patients is decidedly greater than after the partial bypass procedure. The patients lost 88% of excess weight by the 15th postoperative month. What is especially outstanding is the constancy of the weight loss. Ninety-three percent of patients had good or excellent results by the end of the first postoperative year.

The biliopancreatic bypass has proven to be a very well tolerated procedure with an operative mortality of less than 1% in our hands so far. The one fatality was caused by pulmonary embolism. The only other general immediate complications included one case of pneumonia and one case of thrombophlebitis. Local complications included two cases of wound dehiscence and four cases of wound infection. The only specific late complications in the 83 patients with a minimum follow-up period of one year were four cases of incisional hernia.

The recovery from the operation is generally rapid and uneventful and patients enjoyed complete well-being during the entire subsequent follow-up period. They had no diarrhea and consequently no electrolyte imbalance, no ischemia, and no loss of appetite. They all are on free diets and postoperative calorie intake is generally equal to or better than that prior to operation. Besides the expected organic, metabolic, and psychological benefits due to the weight loss, it is noteworthy that biliopancreatic bypass is followed by a sharp and permanent improvement of morphology and function. In addition, a permanent reduction in serum cholesterol is obtained (23% at one year, 23% at two years, and 29% at three years after the partial type bypass, and 33% one year after the total type bypass).

There were six cases of stomal ulcer, three after the total bypass and three after the partial bypass. They were diagnosed from the fourth to the sixth postoperative month. In four cases a residual gastric acid secretion was demonstrated. Four patients had antacid treatment with healing in all cases and reflux in one case. In two cases, no residual gastric acid secretion was detectable. Both patients were given antacids anyway. Healing occurred in one case six months later while in the other cases the ulcers are still persisting now 15 months after the diagnosis. Our endoscopist feels that these two ulcers are in some ways different from the other ones. Both patients have an antecolic gastro-enteral anastomosis. In our opinion these two lesions mark the recognized atrophic peptogenesis based on the ischemia due to the tension of the gastroenteral anastomosis caused by the distended pouch.

The protein absorption which is the most unaffected after the partial bypass is decidedly reduced after the total one. As a matter of fact, we did not have any problem with protein nutrition after the partial bypass while we had four cases of protein malnutrition after the total biliopancreatic bypass with more or less severe clinical patterns. Two of these patients had a permanent recovery with disappearance of symptoms by only increasing the dietary protein intake. Two others required intravenous amino acid supplementation. One of these last two patients had a permanent recovery with a single treatment but the other had
relapses requiring repeated treatment. After reaching her ideal weight this young lady was converted to a partial bypass and now she will probably maintain her weight without having any protein problems.

The only other patients who required medical treatment included nine who developed anemia from iron or iron and folate deficiencies. The incidence was about the same following the partial and the total types of bypass. There were four cases of vitamin A deficiency following the total bypass.

It can be concluded that the partial biliopancreatic bypass is a safe procedure which offers good results and minimal complications. Because weight loss is achieved in a condition of complete well-being and without any dietary restriction, patients are very satisfied with the procedure. The incidence of peptic ulcer can probably be reduced by performing in all cases a two-thirds distal gastrectomy with a retrocolic gastroenterostomy.

Of course, a longer follow-up period is needed for the assessment of the total biliopancreatic bypass. This operation seems to cause an excellent weight loss in all cases, but it entails in a limited number of cases the risk of protein malnutrition. This complication appears generally to be transient and easily controllable with medical treatment and, at worse, it can always be managed without renouncing the acquired weight loss by a very simple surgical correction. Our present policy is to perform the partial type of bypass in all the patients who are between 50 to 80% overweight and the total type of bypass in patients who exceed 80% of their ideal. Should we have other cases of recurrent protein malnutrition, we will try to manage them with medical treatment until weight loss is successfully reached. Then we will convert the operations into the partial biliopancreatic bypass.
SYMPOSIUM: INTESTINAL BYPASS -- J. PATRICK O'LEARY, MODERATOR

QUESTION: Do you do vagotomy?

DR. SCOPINARO

No, I never do vagotomy.

DR. O'LEARY

What was your incidence of marginal ulcer?

DR. SCOPINARO

It was about 7% but only four of them were peptic ulcers. In two of them, the BA0s were zero. Since there is no acid, there should not be any peptic ulcers.

DR. O'LEARY

Did the two ulcers that were not peptic ulcers by this definition occur in the total or the partial bypass?

DR. SCOPINARO

Both partial and total bypass had exactly the same incidence. However, I think this is false data because, as a matter of fact, in the first 44 cases we did not have any ulcers. Then we had three of them in ten subsequent patients, and then we had the other three in the subsequent 30 patients. Now we are not having any more ulcers. We were convinced that a simple antrectomy was a sufficient to protect the gastroenterostomy against the risk of peptic ulcer. For a certain period, we did a smaller gastrectomy, that is, we left more stomach behind. That is why we had a concentration of peptic ulcers in that period. Now we are aware of the fact that we have to resect at least two-thirds of the distal stomach and to make always a retrocolic gastroenterostomy. I am sure that we are going to have a greatly reduced incidence of ulcer now. There was an incidence of about 7% both after partial and total bypass but I do not think this is due to anything else but the fact that we were leaving too much stomach behind during that period.

DR. MASON

Regarding the other two achlorhydric ulcers, did they fall into the partial or total bypass group?

DR. SCOPINARO

There was one in each group.

DR. O'LEARY

This ought to make the gastric bypass people in the audience comfortable because, if this Mann-Williamson preparation has only a 7% incidence of marginal ulcer, the incidence must be much lower in the bypass.
QUESTION: Dr. Scopinaro, how many in your series have been followed up for four years?

DR. SCOPINARO

Only two.

DR. O'LEARY

And how many have been followed up for three years?

DR. SCOPINARO

Twenty-eight patients.

DR. O'LEARY

In which group were the ulcers?

DR. SCOPINARO

The ulcers were discovered in the second half of the second postoperative year among the 44th to the 54th cases.

DR. O'LEARY

Do your patients have diarrhea?

DR. SCOPINARO

No. Something should be made clear about diarrhea. To have four or five or even six bowel movements a day does not mean diarrhea. Diarrhea means an increase in the water content of the stools. The stools of our patients had a constant dry weight of 20% which is completely normal. Of course, they have an increased number of bowel movements per day, but the consistency of the stools is normal.

DR. O'LEARY

Have you studied the nitrogen and fat loss in the stools?

DR. SCOPINARO

Yes. This study has been fully accomplished in the partial bypass group. We find steatorrhea in nearly 100% of patients with the partial bypass. As a matter of fact, by the 12th postoperative month, if we give the patients a load of 100 gm of olive oil and keep them on a lipidic diet afterwards, the fat in the stools is 139% of the load. This means that there is a great increase in the endogenous fat excreted by the small bowel.

DR. O'LEARY

What about the nitrogen?
DR. SCOPINARO

We have not studied nitrogen.

QUESTION: Since the patients are putting out more than they are taking in, have there been any fatty acid deficiencies?

DR. SCOPINARO

What do you mean with that? What clinical signs? What should I look for in my patients from fatty acid deficiency?

ANSWER

Usually after about two weeks you the patient develops a characteristic skin rash.

DR. SCOPINARO

I have not had any problems with skin in my patients. The serum acid contents were not determined.

DR. KRIDELBAUGH

I have taken down 24 intestinal bypasses and converted them to gastric bypasses. I have been very impressed by the further weight loss in this group. Have others noticed the same thing?

DR. ALDEN

Some of my patients have had further weight loss and some have not. I have not been as impressed as I would like to be. We have done about 100 takedowns now and we reviewed about 55 a while back. We found an initial additional weight loss after the gastric bypass was done and the jejunoileal bypass was taken down. Then there was a slight weight gain afterward but this was not a great amount of weight; we are talking in the neighborhood of 20 lb or so. The really large patients remained fairly large.

DR. WILLBANKS

Many of my patients have lost more weight. However, I think it is important to realise that the failure rate for maintenance of weight loss in these patients is higher than the failure rate for the de novo gastric stapling procedure. Often the patients have been used to indulging themselves with everything they can swallow for years, and they are going to outeat the operation with Hershey bars and other such foods. They are much more likely to do this than people who have an initial gastric stapling. The only real albatrosses I have around my neck right now are patients in whom I have taken down an intestinal bypass and done a gastric stapling procedure. These people do not tolerate the stapling nearly as well as the people who have not had a previous obesity operation. These same patients are the only ones I have had who were unhappy with the decreased volume of food that they are able to consume.
QUESTION: When you take down an intestinal bypass and do a gastric procedure, do you do a gastroplasty or a gastric bypass?

DR. WILLBANKS

I have done both. I see no difference in the two insofar as this subject is concerned.

DR. O'LEARY

Dr. Scopinaro, do you have any experience with taking down an intestinal bypass?

DR. SCOPINARO

No.

DR. O'LEARY

We have about 55 patients in our series. I feel the results depend somewhat on how sick the patient was at the time we decided to take the bypass down. All of our bypasses have been taken down for a reason. If the patient has liver failure, very often the patient is quite sick, and will regain good health and a little weight with the partition. We have not seen the phenomenal weight regain with a partition, which is what I have been using, after the JIB was taken down.

DR. SCOPINARO

John Krall has done five conversions of jejunileal into biliopancreatic bypass with excellent results. They are losing more weight and they get rid of all the complications caused by the original small bowel bypass.

QUESTION: Where is the bowel divided in the partial type, biliopancreatic bypass?

ANSWER

The small bowel is divided at the midpoint. That means at half its length. You measure it and then you divide it at its midpoint. When I do the total bypass, I divide the bowel into thirds. Two-thirds are outside the food flow and one-third is in the flow.

DR. O'LEARY

So, one-third of the small intestine is attached to the stomach and empties into the right colon, and two-thirds of the intestine are used to transport the biliopancreatic secretions to the terminal and to the right colon.

DR. MASON

Could I just interject here that what Dr. Scopinaro is presenting is a Roux-en-Y gastric bypass. You might look at it or think about that while he is telling you about it.
The only difference is that the size of the stomach is large enough to allow a normal intake of food. My patients are normally eating much more than prior to the operation, or at least equal to what they ate before operation.

QUESTION: Have you measured the bile salt pool?

DR. SCOPINARO

The bile salt pool is unmeasurable in this manner. It could not be done without leaving a tube in the duct, but this cannot be justified merely on the basis of scientific study. What I did was to measure the bile acid fecal excretion. I did it in five cases only. The fecal excretion of bile salts was between 200 and 400 mg per day, which is completely normal. Next I studied jejunal variation of the serum bile acid and I found that the level was normal during fasting. This means that the patients have a normal intestinal input for bile acid, with some rises and peaks in serum bile acid which do not occur at the same time as meals. They are probably due to spontaneous gallbladder contraction. Of course, these studies were undertaken in patients from my early series who still had the gallbladder. This means that even in the condition of load, when the gallbladder contracts, the input is normal. These data plus the fact that the patients have no diarrhea should prove that the enterohepatic bile circulation is normal.

QUESTION: Why do you do cholecystectomies on all of your patients?

DR. SCOPINARO

Because there is a 90% incidence of gallstones.

DR. MASON

Another question that I have in regard to the bile salts is what happens to the calcium metabolism?

DR. SCOPINARO

Although this is a study which is not yet completed, I do have very interesting preliminary data. I have indirect data on about 50 patients at various postoperative times. They were compared with nine control subjects in whom all the measurements were taken preoperatively. The urinary excretion of hydroxyproline which has to do with bone catabolism was comparable to the controls. The same thing happened for the urinary excretion rates of calcium and phosphorus, and for the serum levels of calcium, phosphorous and magnesium. Parathyroid hormone values after the operation in these 50 patients were similar to or somewhat lower than preoperative values. The only direct data I have, and this is from a study I began very recently, are on the complete absorption, balance, and turnover of calcium. I have done these studies in only three patients so far. They all had the total type bypass. For two of the
patients, all the parameters related to the calcium turnover were normal. In one patient, I discovered an increase in the calcium turnover rate with a positive calcium balance and normal calcium utilization and absorption. I do not know how this data can be interpreted. I hope to be able to give an answer when I have some more of these complete studies.

QUESTION: It is not clear to me why these patients are losing weight. You described malabsorption. I get the feeling that they have no satiety, in fact, they are eating more. So it must be that they are wasting nutrients through their stool. Is that your conclusion?

DR. SCOPINARO

Yes. The only reason for losing weight is the malabsorption, the decreased absorption mainly for fat and for starches.

QUESTION: I wanted to ask, in view of Dr. Mason's question, if you think that removal of the stomach is important. If you just stapled the stomach and left it incontinuity, wouldn't you receive the same thing?

DR. SCOPINARO

I have discussed this in detail with Dr. Mason. Of course, leaving the stomach would be better because it would then be a reversible operation. But I am not sure the patient would have as much protection against peptic ulcer as a gastrectomy.

DR. O'LEARY

I would like to change the subject and ask Dr. Alden what the indications are for someone who has a JIB taken down?

DR. ALDEN

I would like to begin to answer that by saying that there is often a discrepancy between what the medical reports say and what the patient says. For example, only a few days ago a patient came into the office armed with her medical records asking to have her jejunoileal bypass taken down. I first read the letters from her surgeon who had written back to the referring doctor. He said that the operation had gone very well, and he was very proud of the results from the JIB. He claimed that the patient was doing well. The second letter said she was only having a few stools a day, all of her blood chemistries were normal, and the biopsy of her liver was normal. Again, he repeated that he was pleased with this wonderful result. The third letter was about the same. At that point the patient started to talk. She said, "I can't take it any more. I've had it. I just simply won't go on like this. My family doesn't want me in the house, when I pass gas, the whole house smells, when I try to go someplace I'm so tired I can't get there. I'm worse off than I've ever been before." Now, this is the difference between the doctor and the patient.
I think some of these things are really very obvious; liver disease and all can be forgotten. But it's quality of life that is of primary importance to most patients. The one thing I did not see on any charts was reference to the quality of life. We should ask such patients how tired they are and whether they have pain in their joints. We should ask them whether they can get along with people and if they are irritable all the time. I think one ought to sort of bypass some of the laboratory parameters and take a look at the quality of life. When a person is tired all the time, and not functioning as they are normally supposed to in the young age of their life, then we should take them down. All the other things are very obvious, but quality of life is easy to overlook.

DR. WILLBANKS

I could not agree more. The medical indications for a takedown can be set up on strict criteria, e.g., after the third kidney stone they ought to have their bypass taken down, and so forth. I have a few criteria like that, and most of them are so obvious that they do not even bear bringing out. But this quality of life problem really cannot be appreciated until you have sat down with one of these patients and spent about thirty minutes talking with them. I think this is an important point.

QUESTION: When do you do liver biopsies and at what point do you recommend a takedown?

DR. WILLBANKS

I have patients get liver function studies every six months. Of course, liver enzyme deterioration in the first few months after operation with recovery in about a year can be expected. If the liver function studies begin to deteriorate abnormally, I obtain a liver biopsy.

QUESTION: What do you look for in a liver biopsy to indicate takedown?

DR. WILLBANKS

I look for fibrosis and inflammation and signs of cirrhosis.

QUESTION: I am not a liver morphologist, and I cannot personally judge the severity of changes in the liver. But when my hepatologists begin to get concerned about the development of liver disease, then I take the bypass down.

DR. O'LEARY

There are three stages of fibrosis. Scattered minimal fibrosis is not a major problem and it is often encountered. Next you are likely to see bridging fibrosis, which is the stage immediately prior to blatant lobulation of the liver and cirrhosis. It was reported from the floor just recently that in 55 patients studied over 5 years with routine biopsies taken for no apparent reason, 15% of these had no abnormality in liver function after the first year, but later developed blatant cirrhosis.
QUESTION: Did those patients have liver biopsies?

DR. O'LEARY

Yes, they had liver biopsies at one year which showed relatively normal liver, still usually with some fat still in it. The patients were all brought back at five years, and some of them had intercedent liver biopsies also. In those patients, there was a disquieting incidence of cirrhosis without evidence of the change.

COMMENT

That should then kill the myth that if they are all right at 18 months, they are going to continue to be alright as far as the liver is concerned.

QUESTION: What percentage of the complications like arthritis go completely away after reversal?

DR. ALDEN

The symptoms of arthritis represent the one problem that can be relieved the most dramatically. I think the arthritis is gone within 48 hours in all patients. The relief of arthritis is absolutely dramatic. It is prompt and it is almost shockingly rapid. You can also sometimes improve symptoms a bit with flagyl, but I have not found it as successful as others.

QUESTION: If you have a patient with most of these problems who is relatively ill, wouldn't it be more wise to just take down the intestinal bypass and let the patient get well before undertaking some stomach procedure?

DR. WILLBANKS

I have done that, usually when the patient has had significant liver disease or when the nutritional assessment has shown that this patient was deficient in some way. I have also staged the operations in cases where the patient himself was reluctant to accept another procedure. All of these patients, in my experience, regain all of their lost weight quickly; so quickly, in fact, that you wonder how they can take in that many calories. Most such patients will be back in a few months wanting the surgery.

DR. ALDEN

I feel exactly the same. We do not tend to see the desperately sick patients as often. I think they come to the University Hospitals where they need a lot of preparation and are taken care of by Dr. Mason and his group. We usually see intermediate patients who are getting along but not very well.
DR. O'LEARY

My opinion is slightly different from the panel's. I would reverse their nutritional deprivation before I took them to any operation, and once I got them into that kind of a state, then I would probably operate on them and do both procedures.

QUESTION: In those patients who have regained their weight and become morbidly obese again, but who have no other symptoms at all, do you consider leaving the intestinal bypass and adding a gastric operation?

DR. WILLBANKS

No, sir. I would not.

DR. ALDEN

I have done it twice. The first one worked, and the second one did not. So I am not going to do it anymore.

I believe that a person with a JIB who maintains their weight and, in fact, is a little overweight, is absorbing food quite well and can handle nutritional problems. But then when you impose another deficit such as a gastric bypass on such a patient you will not be able to predict which ones will have adequate excess intake to compensate for the intestinal bypass. I think you get into a zone where you might add just a little too much of a nutritional deficit to these patients. The risk is probably too great.

QUESTION: How many intestinal bypasses are being done at the present time?

DR. O'LEARY

Dr. Scott feels that hyperlipidemia in the morbidly obese is an indication for jejunoileal bypass, especially the extreme cases. But I can tell you that we have done only two during the last 18 months. We have managed to do something else in most of the cases. But there are surgeons doing intestinal bypasses across the country, and I think in some special cases there probably are adequate reasons to do them. There is a large number of patients who do very well with the procedure.

QUESTION: I know a surgeon who was having trouble with the blind loop in previous intestinal bypass patients. He began resecting the blind loop. He has done this six times during a three year period with good results. I have been a little reluctant to do that myself, although it seems rational. I wonder if anybody else has had any experience with that or has any comments.

DR. O'LEARY

I think that the rationality of that depends on whether or not our concept of the overgrowth in the blind loop is really true, and since I
was one of the early proponents of that, I still feel very strongly that it is true. However, I do not think that my data would prove it.

DR. ALDEN

I do not like the idea of making the situation totally irreversible. What I like to do is to take the blind loop and bring it up to the stomach and make it the beginning of the Roux-en-Y. That makes a convenient way of using that bowel. Then I resect the boggy hypertrophied jejunum that has been functioning and make the complete Roux-en-Y as an end-to-side on that. Those patients, I think, do better than the ones in whom the small bowel is reconstructed with the hypertrophied bowel being brought up to the stomach for a gastric bypass. Using the de-functionalized limb of the jejunoileal bypass as the beginning of your Rouxen-Y works out well. I noticed that Buckwald felt it was an error to do this because the bowel is atrophic and may not function. On the contrary, I think it is a positive factor and a good thing to do.
I would like to preface my remarks by saying that documentation, as I see it, is more a benefit to the individual surgeon than anyone else, and he should pass that on to his patient. I think that if we explore the need for using weight control procedures, we must fortify our judgment regarding decisions. We must know when to apply these procedures and we must know what variation or procedure to use. The only way to do this effectively is through good documentation of our previous efforts. There are lots of ideas, and I would not want to advocate just one. I would say, however, that if you are going to do something, you should document it carefully so that you can rely upon what you have done.

Dr. Mason has instituted a registry, and there are about 30 surgeons who are participating in it very actively. The registry is a good idea because, if nothing else, it encourages us to keep a checklist. A checklist for whatever one does is vital. A checklist that is designed for your needs can be extremely useful and important. The type of construction is one of the first things that should be listed. We have gone through all kinds of procedures and variations, and we need to know what we are talking about if we want to tell someone else about it. Surgeons often make small variations, and they should be able to remember when they look back what they varied in a given patient and how they did it.

I strongly believe that measurement of pouch volume at a specific pressure is invaluable. The documentation of pouch volume and pressure is essential in order to properly evaluate such problems as esophageal dysfunction and protein malnutrition during the postoperative course. Some other typical steps that must be documented include stomal size and construction variations.

Without careful step by step documentation it becomes impossible to adequately evaluate the postoperative patient with problems. It is also impossible to analyze our data properly and thus, the effective learning process and scientific discovery are impeded if not arrested altogether. I reiterate, the registry might teach us to document our patients more efficiently. It is simple to be in the registry and it does not take a lot of time.
ACTUAL AND INDICATED REVISION RATE

Edward E. Mason, M.D.

The actual and indicated revision rate is something I wanted to discuss because I have had difficulty in trying to figure out what to do with the data of patients who have been revised. If you take them out of the series, the rest of your results will look very good. But, if you leave them in, obviously you are including patients whose original operation has been altered thus leading to the possibility of spurious information regarding the original procedure. The only thing that I can justify is to present the results of the revised patients and the unrevised patients separately. However, as you go along over time, you are taking patients out of one group and putting them in the other group. This creates a new data management problem.

The revisions that we have done over the years and still are doing consist primarily of pouch volume reductions. I suspect that in the future we will be revising less patients and when we do revisions, we will probably be revising stomas more than volumes. Revision does have an effect on the weight. Obviously, when you reduce the volume, you reduce the weight.

Over the years we have attempted different things and found that they often did not work. Our original group of patients had gastric bypass with a divided stomach. If we compare the weight loss curve over time of the revised patients with the unrevised patients, we would expect that eventually the revision group ought to come up even with the unrevised group. If we can follow our patients well enough and can persuade enough of them to be revised when they need it, we can test the hypothesis that there is a factor controlling weight loss that is not related to the operation. We can answer the question as to whether or not there are some patients that just do not do well, in spite of the operation.

Our second group consisted of patients with gastroplasty. These procedures were performed in 1971. The stoma was very small, and the pouch volume was not measured. When we started doing these, I decided that if we were not going to bypass the stomach, we would have to make the stoma small. We made it so small, in fact, that some of those patients became obstructed. At first I could not get them out of the hospital, but eventually the stomas dilated too much. This experience gives us a chance to look at a bad operation. Most of those patients were revised to a gastric bypass because we thought that probably the bypass was better than the gastroplasty. We did not measure the volume and we did not have satisfactory results in either the original gastroplasty or the revised group. Those patients, including the revised ones, represent our greatest failures because we simply cut across the channel and brought up the loop of bowel without doing anything to the pouch volume. It gave us a chance to see what happens if you have a really lousy operation.
I thought one of the reasons for doing gastroplasties in the first place was to try to make an easier operation. Our waiting list was getting bigger and bigger and we wanted to refer some of these people, but nobody would do the more complicated gastric bypass. They thought we were crazy to operate on the stomach in those fat people. With the failures of our early gastroplasty, we returned to bypass thinking that if we made the greater curvature long, maybe we could get it below the mesocolon more easily. This would lead to an easier anastomosis and, therefore, a simpler procedure to perform. But then we began to see that the volume was too big. Again we were confronted with a group of unrevised patients and revised patients. Nevertheless, we were fortunately beginning to see something that you would expect. Eventually the revised patients matched the unrevised patients in weight loss. We were correcting all our mistakes one by one.

Our next thought was if we have a way of correcting something, we should do it right in the first place. That brought us to the next variation, which consisted of a measured small pouch and outlet. Also we began using the Roux-en-Y which has produced some very much better results. The unrevised patients in this more recent period achieve weight loss in the range of 55% of excess weight. That is not as much as can be lost with the biliopancreatic bypass, but is better than can be expected with the gastroplasty. I would challenge all gastroplasty advocates to do as well with their two variable procedure as can be done with a three variable procedure.

Another area that needs study is the survivorship of the initial operation. I recommended the Berkson-Gage method of computing survivorship. It is fairly simple and it allows you to make use of all your data regardless of how long you may have followed up each patient. With this method you can compute the rate at which that operation has to be changed. After five years of follow-up observations in our first group, we had revised 34% of those operations. This is a statistic that all of you ought to be recording when you report your results. You ought to tell the weight loss for the revised and the unrevised groups as well as for the combined groups, and you ought to tell the survivorship of your initial operation. The worst operation that I have had any experience with was the 1971 gastroplasty. At five years, we had revised 50% of patients.

Of course, another problem is that some of the patients perhaps should have been revised but were not. Such patients obviously influence the overall results of the unrevised group. I am not sure yet what to do about this problem. For the present I would suggest that we follow up our patients closely and that, together with the patient, we make individual decisions. That way we avoid arbitrary manipulation of the data.

QUESTION: Do you distinguish between the revision for failure to lose weight and revision to correct an operative failure such as obstruction?
DR. MASON

We excluded early reoperations for obstruction or perforation or some similar reason.

I cannot adequately address the weight loss curves of the revised and unrevised patients from the other groups because we do not have sufficient follow-up data. A fairly long follow-up period is necessary to begin to see what is going to happen. At one time I thought we could predict at six months what the results would be later on. It is possible to make early prediction of failure such as we did for our 1971 group. But I can assure you that you can not predict at six months that you have a good operation. We should not publish and promote procedures with only a year or even less of data. It would perhaps be all right in a small group of specialists. However, there are a lot of physicians around the country who hear of something that seems easy, so they do it. Then they are surprised that it does not work any better for them than it did for the people who originated it. My concluding message is, then, that we need good and complete follow-up data.
The National Gastric Bariatric Surgery Registry is a little over five years old. During the first three years we had only a few participants, but over the last two years we have been receiving new patient abstracts at an ever increasing rate. We have over 60 surgeons in the registry, 21 of whom are currently active. The series of these 21 participants ranged from one to well over 200 patients. There were 1182 abstracts in the registry when this summary was prepared.

We divided the patients into two groups: those who had a concurrent jejunoileal bypass takedown with their gastric bariatric surgery, and those who did not. This division is necessary because those patients who had a previous jejunoileal bypass will not show the usual weight loss pattern after conversion. In fact, it is likely that they may gain a few kilograms.

Our next step was to divide the two main categories into three subgroups according to operative type: loop gastric bypass, Roux-en-Y gastric bypass and gastroplasty. Forty-five patients had a jejunoileal bypass takedown performed simultaneously with their gastric bariatric procedure. Of these 45, 26 had loop bypasses, five had Roux-en-Ys and 14 had gastroplasties. Of the remaining 1137 patients, 940 had gastric bypass with loops, 28 had Roux-en-Y bypasses, and 163 had gastroplasties. The remaining six patients had revisions and were, therefore, excluded from this summary. Because of the small number of cases, it was decided that we would look only at those patients who did not have a jejunoileal bypass takedown at the time of surgery.

In regard to the breakdown by sexes, the women far outnumber the men. The ratios range from four to eight women per man depending on operative type. The average age was 35 to 36 years, regardless of the operation performed. Ages ranged from 12 to 64 years. This is similar to our own experience.

The preoperative hospital stay for all three operations averaged three days. However, the averages diverged for the postoperative stay. The gastroplasty patients have been averaging eight days. The patients with loop gastric bypasses have been staying nine days, whereas the Roux-en-Y patients have been averaging 11 days. The initial excess weight for all three groups are roughly the same.

The duration of the operation shows the type of pattern that we would expect with the more technically demanding operation. The Roux-en-Y takes more time. It is also of interest to note that 7% of the gastric bypass patients have had blood transfused operatively whereas only 2% of the gastroplasties have received blood. Postoperatively, there is no clear difference between groups. The bypasses range from 2% for the loop to 4% of the Roux-en-Y. The gastroplasties have a 3% rate of need for transfusion. Very few patients required more than two units of blood.
The operations that were performed most often in conjunction with gastric bypass, were cholecystectomy, splenectomy and liver biopsy. Of the 940 patients who had a loop procedure, 195 had previously had their gallbladders removed. There were 130 cholecystectomies done in the remaining 735 patients, or 17% of the group. Among the Roux-en-Y patients there had been three previous cholecystectomies, leaving 25 at risk. Of those at risk, another three had their gallbladders removed later. In the gastroplasty group comprised of 163 patients, there were 28 who had previous cholecystectomy. Nineteen patients (14%) underwent cholecystectomy at the time of the gastroplasty. Many patients also had an initial liver biopsy.

Twelve operative deaths were reported among the nearly 1100 patients. (We define operative death as those deaths that occur either before discharge or within 30 days of the operation.) The major cause of death has been pulmonary problems. GI leaks and cardiac problems represent the second and third major causes of death. The Registry’s 1% death rate for loop gastric bypasses is less than our rate at The University of Iowa of 2% for the same type of operation.

Of all the complications that may appear in the immediate postoperative period, only four present with a frequency near or greater than 1% in all three groups. These four are gastrointestinal leaks, pulmonary emboli, wound infections and subphrenic abscesses. If we look at the rate for the GI leak, we see that in this study, it never climbs above 3.6%. This contrasts with our experience in which we have had a leak rate as high as 6%. Of the 24 leaks that occurred among patients with loop gastric bypasses, three (12%) were fatal. This compares with our rate of 1.5%. Of the other six leaks in the remaining two groups, none were fatal. The pulmonary emboli occurred at a rate of 0.9%. Only one of these pulmonary emboli was fatal. The rates for wound infection among the loop bypass and gastroplasty patients are under 2% and the rate in the Roux-en-Y group is 4%. This compares drastically with our reported incidence of 12% to 15% for wound infection. The rate for subphrenic abscesses mirrors that of the wound infections. There were numerous other complications but they never occurred at a rate of more than 0.6% in any group.

Postdischarge complications present a similar pattern. There were a variety of minor problems, but only two are worth mentioning at this time. Those two are hernias and death. The rate of hernias ranged from 1% for gastroplasty to 7% for Roux-en-Y. The related death rate is 0%, whereas the overall death rate is 0.2% for the loop bypass.

By the end of the first postoperative year, the mean diastolic blood pressure had been lowered. There has been a corresponding drop in body weight. In regard to weight loss data perhaps it should be noted that we take any follow-up data that we receive and plot it on our time-weight graph. Then we extrapolate to the nearest time: six weeks, six months, one year, two years, three years, five years, and ten years. It has been our experience that the best expression of weight loss is percent of excess weight lost. The percent of excess weight lost does not give a misleading picture of how a patient is doing whereas looking
only at the kilograms lost can. For example, there may be two people of
the same height and sex who lose the same amount of absolute weight.
However, if one were initially much heavier than the other, then the
amount of excess weight lost would be different.

By one year, all three variations of the operation are producing the
same percent of excess weight loss. It is of interest to note that the
Roux-en-Y group starts out much more slowly, but by the end of the first
year these patients catch up with the other groups. Iowa gastric bypass
patients, on the average, are losing a little more than the Registry
patients. This is especially noticeable in the Roux-en-Y groups by the
second postoperative year. The Iowa gastroplasty patients are losing a
little less than the Registry gastroplasty patients.

The potential value of the Registary is that we are provided with a
method of monitoring new variations in operative techniques and of
studying infrequent complications that may require large numbers that no
single series can achieve. The greatest value of the Registery is in
its potential for pointing out the discrepancies between a given sur-
geon's experience, and the experience of others. Both revision and
change have been important in producing better patient care at the
University of Iowa and should be applicable in other practices. By
looking into the operations and techniques used, it should be possible
to identify ways of continuing to improve results. Confidentiality is,
of course, closely guarded.
SYMPOSIUM: QUALITY CONTROL AND RESULTS -- EDWARD E. MASON, MODERATOR

DR. MASON

I would like to begin by making a comment about the interesting observation that the Roux-en-Y patients are initially slow to lose weight when compared with the gastroplasty patients, but later on they appear to catch up. This is perhaps because we are dealing with a two variable procedure in gastroplasty (pouch and stoma vs pouch, stoma and bypass) and therefore we are all concentrating very hard on the outlet. So much so, in fact, we are having obstruction. Consequently, the patients are losing weight faster than with any other kind of operation during the immediate postoperative period. But then later on, the two variable procedure is not as good as the three variable procedure and weight loss tends to equalize. When we get enough data we will probably find out that the Roux-en-Y procedure will be better.

QUESTION: How do you get into the National Bariatric Surgery Registry?

DR. MASON

Write to National Bariatric Surgery Registry, Attn. David Scott, University of Iowa, E139 G.H., Iowa City, Iowa 52242 and we will send you abstracts. There are two abstracts, one for the initial workup and one for the followup visits. There is a duplicate for your own record. You are given a code number for confidentiality purposes, both for yourself, and for the patient.

QUESTION: How do you measure excess weight?

MR. SCOTT

We take the ideal weight which is determined from the Metropolitan Life Insurance height-weight tables, and we subtract the ideal weight from the initial weight. This gives us the excess weight, and then percent of excess loss is just the loss in whatever time period divided by excess, times 100.

QUESTION: How do you determine whether the patient is smallboned, mediumboned or bigboned?

DR. MASON

We use the middle of the medium table, because we do not want to try to make that estimate.

QUESTION: Recent data from the Framingham study suggests that the height-weight charts are artificially low.

DR. MASON

Yes. I think most of the literature on obesity is not really germane to our interests. When you are dealing with morbid obesity, a few pounds one way or the other are not that important.
QUESTION: Is the surgical treatment of morbid obesity basically being done only in the United States or is it worldwide?

DR. MASON

It is worldwide. Any country that has enough food has obesity. I know of surgeons all over Europe and in Australia and New Zealand, who are treating obesity surgically.

DR. DRENICK

I think it would be of interest to us from an academic point of view, to know how many of these operations have been performed throughout the country. A code for these procedures should also be developed to assist in the collection and analysis of data across the country.

COMMENT

Blue Shield of California would like all these operations called gastric shunting procedures with one number and then in parentheses one could list his own variation.

COMMENT

I think the ICBA has said "high gastric bypass" and then in parentheses, gastroplasty type, such-and-such-a type and so on. That is a number that has been given in our region to us and the insurance people.

COMMENT

I am the director of Blue Cross Blue Shield in Georgia and I work with their medical director. They asked me to try to find out from this group about the code and also about some average charges across the country. Maybe money should not be mentioned but I have noticed different figures from $750 to $2500 for a gastric bypass, with probably the medium being around $1500. Blue Shield allows $1200 in Georgia, and $350 for a takedown.

COMMENT

Some of these patients can get into difficult and long procedures and a lot of complications requiring hospitalization for many weeks. Therefore, it is advisable not to be operating on somebody who does not have adequate insurance. Very often if a patient gets into a complicated situation and cannot pay for it, he will have to sue somebody and that will invariably be the surgeon.

MR. BLOMMERS

Often the surgeon in the university setting does not have to concern himself with insurance because it is taken care of by clerks or a business office. In such situations it is a good idea to suggest to the patients that they be sure and check with the business office of the
hospital or the insurance office to make sure before they come into the hospital that they are adequately covered.

DR. RANK

We have solved that problem by preparing a small booklet that is designed to explain gastric bypass surgery to the insurance company. It includes such patient data as information for the medical director of an insurance company, indications for surgery, height, weight, blood pressure, previous nonsurgical experience with weight control measures and the specific indications for the proposed operation and what variation it is. Then the patient takes the responsibility to submit it to the insurance company and to secure prior approval.

COMMENT

We do the same thing routinely. Many insurance companies in our area require prior authorization or they will not pay.

COMMENT

I started doing bypasses about 1966 and had experience with about 500 patients that included hernias, revisions, gallbladders, and so forth. I first started the gastric bypass three years ago before our consensus meeting at the National Institutes of Health. I was taking down too much of the lesser curvature and some of the vessels. I was also doing a loop at the time. On about the fifth postoperative day one patient started running a high fever and had a fast pulse and pain through the back and shoulders. I sent her for x-ray studies and she arrested while there. At autopsy we found that the whole stomach had gone behind the gastrojejunostomy. The stomach was bulging and becoming necrotic. Two weeks later we had a similar case, only we reoperated right away and found that the same thing had happened. At that point, we switched to the Roux-en-Y procedure. Now I am being sued over the first patient who died. Is there malpractice here?

COMMENT

A case was settled with no payment a few months ago in Toledo, Ohio, on a gastric bypass patient who was operated upon a few years ago. The patient went through splenectomy, leaks, and so on and so forth. But everybody took care of her properly in spite of all her complications. The patient died after about three operations.

DR. MASON

I think you have to expect some suits in the practice of surgery. You have to prepare yourself for this and not feel unduly upset about it. If you have a good record, have everything documented and there is nothing in the chart which would indicate that the patient has been neglected, and if you have done the same thing on that patient that you have done in other patients and that other reputable surgeons are doing, it seems to me you have got a very good case. I would stick with it, get an expert witness who has had some experience and fight the suit.
QUESTION: Is there an expert witness against you?

DR. X

No. They only have the records.

COMMENT

I believe you are in a lot better position if they do not have anyone who will say that what you did was wrong.

DR. ALDEN

I think in the case you described, probably the problem was that you devascularized the lesser curvature. There are two cases of malpractice in a similar situation that I have reviewed for the St. Paul insurance companies. I have reviewed many cases sent for potential malpractice, and some of these really are cases in which the patient has a reasonable complaint. This brings me to the question I have no answer to, but one that troubles me. Many of these patients who are suing for malpractice have been operated upon by people with little or no experience. They have read an article and then they have done the operation. They describe how they did the operation according to the article but when you read the operative report, there is little or no similarity between the description in the literature and the operation as performed. How can we or should we expect a different regulation on qualifications to do this operation over other operations? Should the hospital staffs and surgical departments give special permission to surgeons who do this operation, or should they not?

DR. MASON

This won't solve the problem or answer the question, but my personal feeling is that any surgeon who starts out to do this sort of work would be well advised to present it to his hospital and get their support in advance. The surgeon who actually enters into this sort of work under pressure from the nonsurgeons is really in a good position. You need to be sure that you have the necessary equipment, nursing support and facilities.

In regard to what to do about the situation where an unqualified or unprepared person decides to do these operations, I strongly believe that the staff of the hospital has a real responsibility to decide in such a case whether or not to approve it. Furthermore they should monitor it.

QUESTION: Do you think one way of handling this problem would be through some sort of organization which provides ongoing education. This is the direction that other groups have taken.

DR. TERRY

On the surface it seems like a solution, but there are not very many societies that can strictly give accreditation. The American Board of
Surgery does it and the State Licensure does it, but no other organizations can very well accredit. They may have a strong voice but just showing their interest does not have much weight.

DR. MASON

I think we ought to start very slowly on such things. It would seem to me that either as an informal a formal group, we could provide help. We could provide samples of criteria with sample information such as has been presented at this meeting. But I would be very leery of any national society at this time.

COMMENT

It is the responsibility of those who are trained surgeons or directors of training programs to teach residents that if they want to do some of these special procedures that they have not learned adequately, they then should take special steps to go to a bigger center where they could learn how to do the procedure.

DR. MASON

I think that is very good advice for anyone in training, but I am not quite sure what you do about the well-trained surgeon who decides that he wants to start doing the operation. Perhaps he should go and scrub with someone who has experience. But he still has to do his first case.

COMMENT

He ought to start out with a fairly easy case without getting involved with a complicated patient who has hypertension or some of these other complicated circumstances.

DR. LADER

I think this should rest with the individual hospital staff. It seems to me that it wouldn't be unreasonable if somehow through this meeting or elsewhere we could even write to the chiefs of staff in hospitals and suggest that if this operation is to be done, that the surgeon who wishes to do it should ask the surgical committee of his hospital or inform them of such. I think that this should be kept at a local level.

DR. WILLBANKS

Our hospital has special committees to decide such things.

QUESTION: What about new procedures? The State of Wisconsin for example, has put a three year moritorium on all bypass procedures right across the board. They stopped everything. Then after a lot of rigmarol they finally approved gastric bypass but not gastroplasty. I wonder if you have any advice for us or does this group have any advice? We certainly heard an awful lot of different operations described for us and we know that many of them do not have followup data. On the other hand quite a few do. What should we be telling our state boards?
All you can do is to lay the facts before them and give them all the arguments and tell them that you do not believe that lay people should be practicing medicine.

I believe that we do have some basic goals and criteria. It is difficult for me to see the difference between using silk and cotton, staples and stitches, vertical and transverse incisions and gastrogastrostomies and partition, etc. It seems to me that once you decide that an operation has been done enough and that it is working well enough, then there is a certain latitude. The minor differences should be played down as far as people are concerned who do not understand what is going on. If a particular operation is working for a particular surgeon, then that is what the surgeon should do.

QUESTION: What are your thoughts about gastroplasty being done across-the-country. It is ready for general use?

DR. MASON

I think it is an operation that is being used. It is being used so widely that it is acceptable.

Gastroplasty is ready to be done by people who have taken the responsibility to really study what they are doing and really follow up patients. But I do not think anybody has any business doing this unless they are prepared to carefully study what they are doing and follow up their patients and learn about it beforehand. I think we all agree on that.