8:00am - 8:20am

7. UTILITY OF VISCOELASTIC ASSAYS BEYOND COAGULATION: PRE-OPERATIVE TEG INDICES PREDICT TUMOR HISTOLOGY, NODAL DISEASE, AND RESECTABILITY IN PATIENTS UNDERGOING PANCREATECTOMY

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Presenter: Hunter Moore MD
Invited Discussant: Jason Fleming MD, Tampa, FL

Background: Since the 1860’s hypercoagulability and malignancy have been linked. However, the impact of different neoplasms on the multiple components of the coagulation system remains poorly understood. Thrombelastography (TEG) enables the measurement of different components of coagulation ranging from clotting factors to fibrinolysis. We hypothesize that specific TEG indices are associated with hypercoagulability in patients with adenocarcinoma undergoing pancreatic resection.

Methods: Patients undergoing pancreaticoduodenectomy or distal pancreatectomy were prospectively enrolled over a 16-month period. Blood samples were obtained before surgical incision and assayed with TEG. The four indices of coagulation measure by TEG included in the analysis were R time (minutes ~ coagulation factors) Angle (degrees ~ fibrinogen function) MA (mm ~ platelets function) and LY30 (%~ fibrinolysis). Outcomes included tumor type, nodal metastasis, complete pathologic resection, and thrombotic complications. Statistical analysis contrasted groups with Mann-Whitney U analysis and receiver operating characteristic (ROC) curves.

Results: One-hundred patients were enrolled with 20% of patients undergoing distal resection, and 17% completing neoadjuvant therapy prior to surgery. The majority of patients (n=63) had a pathologic diagnosis of adenocarcinoma (ACA), followed by neuroendocrine tumors (n = 15 NET), IPMN (N=11), or inflammatory/pre-cancerous lesions (N=11). Angle was significantly elevated in patient with ACA compared to other lesions (49° vs 43 p=0.011). When excluding patients that underwent neoadjuvant therapy, patients with ACA had shorter R-times (12.5 min vs 14.2 P=0.051), steeper angles (49° vs 43 p=0.010), and higher MA (67mm vs 62 p=0.017) compared to other lesions. An increased angle (49° vs 41 p=0.007) and MA (64 vs 62 p=0.017) were associated with nodal disease. A shorter R-time (10.1min vs 14.0 p=0.033) and Angle (44° vs 58 p=0.025) were associated with successful surgical resection of the mass. This persisted in patients that underwent neoadjuvant therapy in which R time performed well (ROC areas under the curve 0.825) to predict resectability, which was greater than Ca19-9 (0.673). TEG variables were not associated with deep venous thrombosis, but several (R-time 8.2min vs 11.1 p=0.020, Angle 58° vs 45 p=0.044, and LY30 0.0 vs 0.4 p=0.022) were associated with post-operative pulmonary embolism.

Conclusion: Patients with adenocarcinoma undergoing pancreatic resection have multiple TEG abnormalities consistent with hypercoagulability that include indices associated with coagulation factor, fibrinogen, and platelets. These multiple TEG outputs are associated with nodal disease and probability of a successful resection. The use of pre-operative TEG has the potential to aid surgeons and patient’s discussion on anticipated disease burden and prognosis prior to resection, in addition to risk stratifying patients for post-operative pulmonary embolism and warrant continued investigation.
Background: Though opioids date back centuries, there has been a recent increase in the use and abuse of a variety of opioids. These include prescription opioids, heroin, as well as opioid antagonists. The frequency of physicians prescribing opioids has increased significantly in recent decades. In the past, most physicians would avoid opioids to treat chronic pain in non-cancer patients for fear of addiction, overdose, and lack of effect. However, in the early 1980’s, there was a surge of journal articles and editorials purporting the safety of opioids in the treatment of chronic pain in non-cancer patients. This change in mindset led to the widespread practice of identifying and treating pain at all costs, making treatment of pain a priority with little or no regard for abuse, overdose, and death from opioid medications. In the late 1990’s and early 2000’s, this change in mindset led to a sharp increase in the availability, non-medical use, and abuse of prescription opioids in this country.

Methods: To determine the rate of new, persistent opioid use in the post-operative general surgical population, we performed a retrospective analysis of a national, private claims database (Truven Marketscan) for several common general surgical procedures (hernia repair, appendectomy, cholecystectomy, colectomy, and simple mastectomy). We tested the null hypothesis that the rate of new, persistent opioid use in post-operative surgical patients would be equal to the rate seen in the general population. The primary aim of this study is to define the incidence of ongoing opioid use in adult patients that were not taking regular opioids in the year prior to surgery by determining the rate of opiate prescriptions between 90 and 180 days after surgery compared to a control group that did not undergo surgery of any type.

Results: There were 14,773,229 patients in the database that had no operation, 2.8% of them had prolonged opiate use and served as the control group. Prolonged opiate use following each procedure included hernia repair (5.1%, Odds Ratio: 1.75, 95% CI: 1.71-1.80, p<0.001), appendectomy (5.1%, Odds Ratio: 1.75, 95% CI: 1.68-1.83, p<0.001), cholecystectomy (6.1%, Odds Ratio: 2.22, 95% CI: 2.17-2.27, p<0.001), colectomy (12.2%, Odds Ratio: 4.15, 95% CI: 4.02-4.29, p<0.001), and simple mastectomy (26.1%, Odds Ratio: 8.9, 95% CI: 8.56-9.30, p<0.001).

Conclusion: Prolonged opiate use is increasingly common, especially following general surgical procedures. Different surgical procedures have different rates of prolonged opiate use. Undergoing a general surgical procedure is a risk factor for prolonged opioid use, and future research should be aimed at delineating the patient, procedure, and physician factors responsible. This study confirms the importance of and need for increased surveillance of patients prescribed opiates in the post-operative period.
9:00am - 9:30am

9. ITERATIVE REDESIGN OF WEB-BASED ENTRUSTABLE PROFESSIONAL ACTIVITY ASSESSMENTS

CI Anderson, MSA, M Ali, MS, MSU GOAL Consortium
Michigan State University

Presenter: Cheryl Anderson RN, BSN, MSA
Invited Discussant: R. James Valentine MD, Nashville, TN

Background: It is increasingly important for faculty to document timely, formative and continuous feedback of surgical trainee performance, given summative (commercialized) assessments often yield low compliance. Unfortunately, summative evaluation tools are not intended to assess resident performance based on daily workplace or entrustable professional activities (EPAs). We initiated a multi-center study to assess select observed resident activities. Through iterative changes, we sought to increase the use/type of timely formative assessments of EPAs while engaging residents in their education.

Methods: A web-based platform was developed for consented faculty (n=87) and residents (n=149) from 7 U.S. training programs to enter assessments from any computer/smart phone with Internet access. Operative performance was assessed using the perioperative briefing/intraoperative teaching/debriefing model where residents selected preoperative learning objectives, postoperatively self-reflected and received surgeon feedback. Both participants then independently recorded the exchange, rating resident performance using Operative Performance Rating System validated tools within 2 weeks of observation. Resident skills observed during patient encounters (PE, ex.clinics) and academic performances (AP, ex.M&Ms) were later added and assessed by faculty using newly developed tools with behaviorally-anchored ordinal scales. Data were sent to a central repository, analyzed and reported. Iterative changes were made based on participant feedback, individual preferences, and database refinements.

Results: Participants submitted 2952 assessments from Jul2014-Jun2017. Faculty/residents entries averaged 54 and 44 assessments/month respectively (40 procedures; 10 PE/AP/month from surgeons; 34 procedures/month from residents). The timeliness of entries (initially unrestricted) was reduced from 14 to 3 days post-observation day following Plan/Do/Check/Act improvements, increasing day-of-procedure entries by 40.0%. Design iterations evolved from open text boxes for documentation, viewed in a vertical (scrolling) layout to radio buttons, dropdown menus, and horizontal viewing. Faculty views added 3 “clicks” once entries focused on 13 key procedures and resident clicks were reduced by 28.6%. Automated emails with prepopulated demographic data increased faculty-resident matched entries by 9.1%. A search engine optimization process enhanced website visibility and program director portals allowed access to live data. One program reduced summative evaluations of residents by 39% and resident evaluations of surgeons by 74% in one year.

Conclusion: We were able to successfully assess resident performance of daily professional activities and sustain participation over 30 months. Multiple iterations resulted in more timely entries, precise feedback to identify programmatic/individual learning needs (previously reported) and resident engagement. Database improvements eased submission efforts with continued iterations planned.
10. CONVENTIONAL EPIDURAL VERSUS TRANSVERSUS ABDOMINIS PLANE BLOCK WITH LIPOSOMAL BUPIVACAINE IN COLORECTAL SURGERY
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Henry Ford Allegiance Health
Presenter: Matthew Torgeson DO
Invited Discussant: Michael B. Ujiki, MD, Evanston, IL

Background: Colorectal surgery is a focus of enhanced recovery programs (ERP). The utility of Transversus Abdominis Plane (TAP) block for abdominal surgery has been demonstrated to be effective in ERP, however no direct comparison of epidural versus TAP block have been published. We hypothesized that TAP block is equivalent to epidural anesthesia with regards to length of stay (LOS) and return of bowel function in colorectal surgery.

Methods: Patients undergoing open and laparoscopic colorectal surgery were randomized into epidural (n=39) or TAP block (n=44) groups prior to surgery. Anesthesiologists performed respective blocks in the pre-operative area using a standardized methodology. Following surgery, patients were initiated on an ERP pathway with standardized discharge criteria. Five patients unable to complete ERP due to postoperative complications or technical factors were excluded from the analysis.

Results: The populations of the two study arms were found to be statistically similar for age, gender, BMI, ASA classification, and operative factors of temperature, parenteral fluids, operative time and fascial incision length. Return of bowel function was equivalent in patients with epidural compared with TAP block (POD 1.7 vs POD 1.9). Length of stay was lower in TAP group (POD 3.3 vs 2.8 p=0.023). Urinary retention occurred with higher frequency in patients with epidural (30% vs 15% p=0.11). Post-operative nausea was greater in the TAP group (14% vs 33% p=0.057).

Conclusion: TAP using liposomal bupivacaine offers an effective alternative to epidural anesthesia in appropriately selected patients for endpoints of length of stay, readmission indices, and return of bowel function. Use of TAP was associated with a 0.5 hospital day reduction in length of stay. Early indication favors TAP block in patients with urinary retention and epidural in patients with history of post-operative nausea and vomiting.
Background: Pancreatic cancer is now the 3rd leading cause of cancer related death in the United States. The most common type of mucinous pancreatic cyst that may progress to pancreatic cancer is known as intraductal papillary mucinous neoplasm (IPMN). While IPMNs with low or moderate grade dysplasia are considered to be at low risk of malignant transformation, those with high grade dysplasia are at increased risk. However, there are currently no accurate, reliable means of distinguishing between cysts which can be safely monitored from those which should be resected. We hypothesize that blood concentrations of leptin, an adipokine involved in metabolic regulation, may aid in differentiating between low and high risk IPMN to optimize clinical management.

Methods: Plasma or serum was collected from consenting patients undergoing pancreatic resection. Diagnosis was confirmed by surgical pathology, and dysplastic grade was determined according to World Health Organization criteria. Of the 148 total cases of IPMN included in this study, 93 were classified as low/moderate grade, 33 as high grade, and 22 as invasive. Leptin levels were determined by enzyme-linked immunoassay and correlated with surgical pathology. Correlation of leptin with low and high risk IPMN as well as with demographic and clinical characteristics was analyzed.

Results: Circulating leptin levels (mean ± SEM) were significantly higher in patients with low/moderate IPMN than high grade/invasive IPMN (17523 ± 2629 vs. 10084 ± 1375 pg/ml, respectively; p=0.013). Although leptin was found to correlate with both BMI (positive correlation; p<0.001) and gender (higher leptin in females; p<0.001), neither BMI nor gender was significantly different between low/moderate and high grade/invasive IPMN groups. Radiographic main duct involvement was significantly more common among patients with high grade/invasive IPMN (p=0.01); however, there were no significant differences in all other tested clinical variables (age, hemoglobin A1c, and cyst size) between groups. Leptin and ductal involvement were each independent predictors of dysplastic grade on multivariate regression analysis. When further stratified by gender, mean leptin levels in males (n=74) was not significantly different between low/moderate and high/invasive IPMNs (6459 ± 1400 vs. 5759 ± 1057 pg/ml, respectively; p=0.69) but was significant in females (n=74, 27457 ± 4384 vs. 15275 ± 2384 pg/ml, respectively; p=0.017).

Conclusion: Circulating leptin levels are elevated in patients with low/moderate grade compared to high grade/invasive IPMN, specifically in females. This suggests that circulating leptin may be a useful plasma/serum biomarker to predict malignant risk of IPMN and thus improve clinical decision-making.
12. UTILIZATION OF SHORT COURSE RADIATION IMPROVES COMPLETION RATE OF TRIMODALITY THERAPY AND OVERALL SURVIVAL FOR RESECTABLE METASTATIC RECTAL CANCER

H Chung MD, ML Silviera MD, PJ Parikh MD, MG Mutch MD, J Vetter MS, SC Glasgow MD, PE Wise MD, SR Hunt MD
Washington University in Saint Louis

Presenter: Haniee Chung MD
Invited Discussant: Nabil Wasif MD, MPH, Phoenix, AZ

Background: Patients with resectable metastatic rectal cancer who are treated with curative intent require trimodality therapy (systemic chemotherapy, radiation [XRT] and surgery). While traditional long course chemoradiation requires 5 weeks of treatment followed by a 6-8 week waiting period prior to surgery, short course XRT can be delivered over 5 days followed by immediate surgery. We hypothesized that the use of short course XRT in this population would allow for a higher rate of treatment completion and more expeditious delivery of all components of trimodality therapy.

Methods: In this retrospective study, we identified rectal cancer patients with metastatic disease who received trimodality therapy with curative intent between 2000 and 2014. Completion of trimodality therapy was defined as delivery of the appropriate fractions of radiation (5 for short course, 25-28 for long course), completion of 12 cycles of systemic chemotherapy, and surgical resection of the primary tumor. Patient demographics, comorbidities, treatment details, tumor characteristics, metastatic sites, metastatic burden and TNM staging were analyzed. End points included overall survival, rate of completion and time to completion of trimodality therapy.

Results: 143 patients with resectable metastatic rectal adenocarcinoma received neoadjuvant XRT as part of a trimodality treatment regimen with curative intent. Of these, 103 patients had complete data for analysis. By intention to treat, 69 patients received long course and 34 received short course XRT. On univariate analysis, the short course treatment group had a higher rate of trimodality therapy completion compared to the long course group (74% vs 48%, p=0.013). After adjusting for age and comorbidities, multivariable regression confirmed a higher rate of trimodality therapy completion with short course XRT (p=0.007). For the 58 patients who completed trimodality therapy, the median time to complete treatment was 42 weeks for short course and 50 weeks for long course XRT (p=0.081). With a median follow up of 2.9 years, Kaplan-Meier analysis showed improved survival in the short course XRT group (p=0.035). Cox proportional analysis for overall survival demonstrated a hazards ratio of 0.37 for short course XRT (95% CI 0.16-0.84, p=0.018).

Conclusion: This study shows that neoadjuvant short course radiation for the curative treatment of resectable metastatic rectal cancer improves the rate of completion of trimodality therapy and overall survival. Additionally, short course XRT in this population may shorten time to complete trimodality therapy. Further studies should characterize the clinical and financial benefits of short course XRT.
10:00am - 10:20am
13. DEFINING THE COST SAVINGS BENEFIT OF ENHANCED RECOVERY
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University of Texas MD Anderson Cancer Center
Presenter: Michael Egger MD, MPH
Invited Discussant: Charles Woodall, MD, MSc, Springfield, MO

Background: Previous studies have demonstrated that Enhanced Recovery programs are associated with reduced complications, improved postoperative quality of life, and faster recovery. Cost savings related to these programs and the specific costs areas that are affected are not known.

Methods: 212 patients undergoing hepatectomy from 02/2012-09/2016 at a single center, 72 in an Enhanced Recovery in Liver Surgery (ERLS) program and 140 patients treated using a Traditional Recovery (TR) program, were compared. The ERLS protocol included patient education, narcotic-sparing anesthesia and analgesia, rapid diet advancement, restrictive fluid use, early ambulation, and avoidance of drains and tubes. Clinical outcomes and 30-day perioperative costs were compared between the two groups. Cost data included professional and hospital costs, accounting for overhead and resources using a consistent institutional methodology.

Results: The ERLS pathway was used in 49% (49/99) of minor hepatectomies and 20% (23/113) of major hepatectomies. Regarding pain control, 48% (32/66) of patients prescribed a PCA underwent ERLS and 27% (40/146) of patients treated with an epidural had ERLS. Median length of stay (LOS) was less in ERLS vs. TR (5 vs. 6 days, p=0.001). Thirty-day morbidity rates were similar between the two groups (ERLS 4.2%, TR 7.1%, p=0.55), and there were no 90-day mortalities in either group. Overall, ERLS patients incurred 9.1% lower costs (p=0.001). Major cost differences were attributed to lab (-15.0%, p=0.001), room and board (-13.9%, p=0.0001), and professional costs (-19.3%, p>0.001). In subgroup analysis, no cost differences were seen between ERLS and TR in major hepatectomy, with epidural analgesia, or in patients with length of stay >5 days. In the 99 minor hepatectomy patients, ERLS patients incurred 17.6% lower overall costs (p=0.020), with major cost differences attributed to lab (-17.6%, p=0.011), room and board (-12.7%, p=0.013), and professional costs (-18.0%, p=0.010). Compared to patients treated with a PCA + TR, those treated with a PCA + ERLS incurred 32.0% lower overall costs (P<0.001). In this subgroup analysis, the cost differences were due to 34.3% lower lab (p<0.001), 33.3% lower room and board (p<0.001), 51.6% lower professional costs (p<0.001), and 22.5% lower pharmacy costs (p=0.011). In the 105 patients with a length of stay less than 6 days, overall costs were 28.2% lower in ERLS vs. TR patients (p=0.001). Again, lab (-27.5%, p<0.001), room and board (-22.4%, p<0.001), and professional costs (-47.8%, p<0.001) were all lower in the ERLS group in this subgroup analysis.

Conclusion: This study demonstrates significant cost savings and lower resource utilization in patients undergoing ERLS compared to TR for liver surgery, most pronounced in patients undergoing minor hepatectomy, in those without epidural analgesia, and patients with LOS <6 days.