A Review of the Surgical Management of Perineal Hernias in Dogs

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ABSTRACT
Perineal hernia refers to the failure of the muscular pelvic diaphragm to support the rectal wall, resulting in herniation of pelvic and, occasionally, abdominal viscera into the subcutaneous perineal region. The proposed causes of pelvic diaphragm weakness include tenesmus associated with chronic prostatic disease or constipation, myopathy, rectal abnormalities, and gonadal hormonal imbalances. The most common presentation of perineal hernia in dogs is a unilateral or bilateral nonpainful swelling of the perineum. Clinical signs do occur, but not always. Clinical signs may include constipation, obstipation, dyschezia, tenesmus, rectal prolapse, stranguria, or anuria. The definitive diagnosis of perineal hernia is based on clinical signs and findings of weak pelvic diaphragm musculature during a digital rectal examination. In dogs, perineal hernias are mostly treated by surgical intervention. Appositional herniorrhaphy is sometimes difficult to perform as the levator ani and coccygeus muscles are atrophied and unsuitable for use. Internal obturator muscle transposition is the most commonly used technique. Additional techniques include superficial gluteal and semitendinosus muscle transposition, in addition to the use of synthetic implants and biomaterials. Pexy techniques may be used to prevent rectal prolapse and bladder and prostate gland displacement. Postoperative care involves analgesics, antibiotics, a low-residue diet, and stool softeners. (J Am Anim Hosp Assoc 2018; 54:179–187. DOI 10.5326/JAAHA-MS-6490)

Introduction
Perineal hernia is a common presenting condition in intact male dogs.1 Conditions that lead to its development are not fully understood, but it is likely a multifactorial disease. It often warrants surgical intervention. Several surgical techniques have been described for the treatment of perineal hernias. Appositional herniorrhaphy is often not possible due to atrophy of the levator ani and/or coccygeus muscles. The most commonly used technique is internal obturator muscle transposition, which is often successful. However, additional techniques, including gluteal muscle transposition, semitendinosus muscle transposition, synthetic implants, and biomaterials, may be needed to augment internal obturator muscle transposition.2–7 Complicated perineal hernias, which involve rectal prolapse, bladder displacement, or prostate displacement, require additional procedures, such as colopexy, cystopexy, and vasopexy.8,9 Castration is recommended in addition to herniorrhaphy to decrease the size of the prostate and reduce the recurrence of perineal hernias.10,11 A recent study recommended caudal scrotal castration in dogs with perineal hernias, as it eliminates the need for repositioning the animal and has a minor postoperative complication rate similar to that of prescrotal castration.12 This article will discuss anatomy, etiology, clinical signs, and different surgical techniques used for the treatment of perineal hernia in dogs.

Anatomy of the Pelvic Diaphragm
The pelvic diaphragm is composed of the levator ani and coccygeus muscles (Figure 1). The levator ani muscle extends from the floor of the pelvis to the ventral aspect of the seventh caudal vertebra. The coccygeus muscle is a thick muscle lying lateral to the levator ani muscle. It originates from the ischiatic spine on the pelvic floor and inserts ventrally on caudal vertebrae 2 through 5. The sacrotuberous ligament is a fibrous band running from the transverse process of the last sacral and first caudal vertebra to the lateral angle of the ischiatic tuberosity rostral to the pelvic diaphragm. The sciatic nerve

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lies just cranial and lateral to the sacrotuberous ligament. The sacrotuberous ligament is a landmark for the tendon of internal obturator muscle and sciatic nerve. The sciatic nerve can be inadvertently included in a suture or severed by an unaware surgeon. The internal obturator muscle is a fan-shaped muscle covering the dorsal surface of the ischium. It originates from the dorsal surface of the ischium and pelvic symphysis. Its tendon of insertion passes over the lesser ischiatic notch, ventral to the sacrotuberous ligament. Other muscles involved in the repair of perineal hernias include the external anal sphincter, superficial gluteal muscle, and semitendinosus muscles. The external anal sphincter is a large, circumferential band of skeletal muscle and is the chief guardian of the lumen of the anal canal. The superficial gluteal muscle is a flat, rectangular muscle, which extends between the sacrum and the first caudal vertebra proximally and the major trochanter distally. The semitendinosus muscle is a thick muscle, which lies in the caudal part of the thigh and extends between the ischial tuberosity and proximal segment of the shank.

The internal pudendal artery and vein and the pudendal nerve run caudomedially through the pelvic canal on the dorsal surface of the internal obturator muscle, lateral to the coccygeus and levator ani muscles. The pudendal nerve lies dorsal to the vessels and divides into the caudal rectal and perineal nerves. The obturator nerve passes through the ventral aspect of the levator ani in a caudolateral direction. The external anal sphincter is supplied by the perineal arteries and innervated by the caudal rectal branch of the pudendal nerve. The superficial gluteal muscle is supplied by the caudal gluteal artery and innervated by the tibial nerve. The proximal half of the semitendinosus muscle is supplied by the caudal gluteal artery, and the distal half is supplied by the caudal femoral artery. This muscle is innervated by the caudal gluteal nerve.

**Etiology**

**Predisposition**

Perineal hernias occur most commonly in mature male intact dogs. Although they are rarely encountered in females, two separate case reports described a perineal hernia with bladder retroflexion in two young pregnant bitches. Increased intra-abdominal pressure related to pregnancy and relaxation of pelvic muscles caused by relaxin were thought to be the causes in these bitches. The higher incidence of perineal hernias in male dogs is not clearly understood. Some studies suggested that gender-related anatomic variations in females, such as their larger, broader, and stronger levator ani muscles, together with broader rectal attachments and larger sacrotuberous ligaments, make them less prone to perineal hernias. These variations are correlated with the extra load that has to be accommodated by the muscles of the pelvic diaphragm during parturition. However, these gender-related variations are not consistent among different breeds.

Perineal hernias are commonly reported in mixed-breed dogs, as well as Boston terriers, miniature poodles, Bouviers des Flandres, boxers, Old English sheepdogs, and Pekingese. Some breeds of long-tailed dogs as well as short-tailed breeds are overrepresented in various studies of perineal hernias. Whether or not short-tailed breeds have a structural weakness of the pelvic diaphragm has not been determined, although one study found perineal muscles to be greater in long-tailed corgis than in short-tailed corgis. In a study that compared pelvic diaphragm muscles dissected from male short-tailed and long-tailed corgis, the authors found a trend for the weights of the muscles (as a proportion of the total thigh and
perineal muscle weight) to be greater in long-tailed corgis. However, long-tailed breed dogs are also overrepresented in various studies of perineal hernias.

Pathogenesis
Perineal hernia occurs when the pelvic diaphragm muscles weaken, allowing intrapelvic or intra-abdominal structures to move. The cause of pelvic diaphragm weakness is poorly understood. Possible causes include neurogenic atrophy of muscles of the pelvic diaphragm, tenesmus associated with chronic constipation or prostatic disease, rectal abnormalities, hormonal imbalance, and effect of relaxin on muscle fiber weakening.

Atrophy of Pelvic Diaphragm Muscles
Atrophy of the pelvic diaphragm is thought to develop as a result of weakening of the muscles of the pelvic diaphragm, especially the levator ani muscle. An immunohistochemical study revealed destruction of muscle fibers, abnormal-sized muscle fibers, increased expression of epidermal growth factor receptors, caspase-3 activation, and decreased expression of transforming growth factor-α in the levator ani muscle of dogs with perineal hernias, confirming atrophy of the levator ani muscle. Caspase-3 is a cysteine protease, which, when activated, induces apoptosis in skeletal muscles; therefore, its increased expression in affected levator ani musculature suggests increased apoptosis. Upregulation of epidermal growth factor receptor suggests a compensatory effect for decrease in its ligand. Transforming growth factor-α has a potential survival role in skeletal muscles; therefore, its decreased expression suggests muscle fiber degradation. A combined histological and electromyography study of the external anal sphincter, levator ani muscles, and coccygeus muscles in 40 dogs with perineal hernias revealed atrophy of these muscles, with the atrophy thought to be of neurogenic origin. The nerve damage was localized in the sacral plexus proximal to the muscular branches of the pudendal branches or in the muscular branches. A previous study reported that tenesmus resulting from prostatic enlargement may apply traction to the nerves of the sacral plexus.

Role of Prostatic Diseases
Prostatic disease can participate by enlargement, inflammation, and pain by causing tenesmus and increasing pressure on the pelvic diaphragm. In one study, the prostate gland was within the hernial contents of 4 of 32 dogs. A caudally displaced prostate gland and various anomalies, such as paraprostatic cysts, increases the pressure on the pelvic diaphragmatic musculature. A mineralized paraprostatic cyst was reported to be the source of tenesmus and a contributing factor in the development of a perineal hernia in an intact male dog.

Role of Rectal Abnormalities
Rectal abnormalities, such as rectal deviation, sacculcation, and diverticulum, frequently coexist with perineal hernias. These conditions are thought to be the consequences of the perineal hernia rather than the cause; however, the presence of a rectal diverticulum or rectal obstruction may result in excessive straining. A barium study performed in 40 dogs with perineal hernias reported rectal deviation in all the dogs. According to one study, if these conditions are not corrected, they may lead to recurrence.

Role of Hormones
The hormonal role in perineal hernia has not been fully elucidated, but hormonal imbalances are likely important. No significant difference was found in serum testosterone and estradiol-17β concentrations in dogs with or without perineal hernias. Another study reported a lower number of androgen receptors with low sensitivity in the pelvic diaphragm muscles of castrated and intact dogs with perineal hernias as compared with castrated and intact normal dogs. This study also showed that androgen receptors were significantly upregulated within the levator ani and coccygeus muscles after castration in normal dogs, whereas there was no difference in these receptors in the castrated and intact dogs with perineal hernias. A retrospective study reported that the risk of recurrence was 2.7 times greater in intact dogs than in castrated dogs. Another study reported a reduction of 43% in the recurrence of perineal hernias in castrated dogs. Relaxin, a polypeptide hormone belonging to the insulin and insulin-like growth factor family, was first reported to cause relaxation of the interpubic ligament of female guinea pigs. Relaxin is thought to affect connective tissue components via its effect on collagen metabolism. In males, the primary site of relaxin synthesis is the prostate gland, from which the hormone is secreted in the seminal plasma. It has been suggested that relaxin may leak from hypertrophied prostate glands, causing local muscle atrophy and softening of connective tissue, leading to perineal hernias. An in vivo study done to compare the expression of canine relaxin, relaxin-like factor, and relaxin receptors within the muscles of the pelvic diaphragm of dogs with perineal hernias and clinically normal dogs showed higher expression of relaxin receptors within the muscles of the dogs with perineal hernias. This suggests that relaxin might play a role in the pathogenesis of perineal hernias.

Clinical Signs and Diagnosis
Most patients with perineal hernias present with a nonpainful perineal swelling lateral to the anus. They may have other clinical signs, which include constipation, obstipation, dyschezia, tenesmus, rectal prolapse, stranguria, anuria, vomiting, and/or fecal incontinence. A study reported that 48% of dogs with perineal hernia
were presented with perineal swelling and 15% with tenesmus.\textsuperscript{1} The herniation may be unilateral or bilateral. Occasionally, dogs with bladder retroflexion are presented with consequent urinary outflow obstruction and azotemia.

The definitive diagnosis of a perineal hernia is based on clinical signs and findings of a weakened pelvic diaphragm during a digital rectal examination.\textsuperscript{31} Other diagnostic tests include abdominal radiography and ultrasonography, which may help in evaluating the size of the prostate and determining whether the bladder is displaced into the hernia sac. Sometimes, cystourethrography is required to delineate the position of the bladder. An oral or a rectal barium study may be beneficial in demonstrating the position of the colon and rectum.

Presurgical Assessment and Preparation

The laboratory evaluation before surgical repair should include a complete blood count, biochemistry, and urinalysis. Any abnormalities found during a physical examination or the laboratory evaluation should be thoroughly investigated. Stable patients should be fasted the day before the surgery. An enema is not recommended 24 h before the surgery because of potential contamination at the surgical site with liquid feces. Broad-spectrum antibiotics should be administered to decrease opportunistic pathogens. The commonly used antibiotics include first-generation (cefazolin 22 mg/kg, \textit{q} 8 h) and second-generation (cefoxitin 20–30 mg/kg, \textit{q} 8 h) cephalosporins. Anesthetics are administered according to the status of the patient. Epidural anesthetics are useful for supplementing intraoperative and postoperative analgesia. The fecal material should be manually removed from the dilated rectum after anesthetizing the patient, and the anal sac should be evacuated. The patient should be positioned in sternal recumbency, with its tail fixed over its back, its pelvis elevated, and its hind legs padded. A gauze sponge is then placed in the rectum, and a purse-string suture is placed around the anus. A urinary catheter can be placed to facilitate identification of the urethra at surgery.\textsuperscript{31}

Surgical Treatment

Surgery is the standard of care for perineal hernia in stable animals. Urinary bladder retroflexion and visceral entrapment require emergency surgery. Castration is recommended during herniorrhaphy to reduce the recurrence of perineal hernias. The most common surgical technique used for the repair of a perineal hernia is internal obturator muscle transposition. Several other techniques have been developed. These include superficial gluteal muscle transposition, semitendinosus muscle transposition, fascia lata grafts, placement of a synthetic mesh, use of canine small intestinal submucosa, and use of tunica vaginalis communis.\textsuperscript{2–7} Bilateral herniorrhaphy is possible, but it may result in greater postoperative discomfort and tenesmus. Therefore, staged procedures are recommended.\textsuperscript{8} Recurrences can occur, and due to severe displacement of organs, pexy may be necessary. Pexy techniques performed in conjunction with herniorrhaphy include colopexy, vasopexy, and cystopexy. Colopexy may help prevent recurrent rectal prolapse after herniorrhaphy. Vasopexy may help prevent displacement of the bladder or prostate. Cystopexy helps to maintain the urinary bladder in its normal location, thereby preventing bladder retroflexion.\textsuperscript{5,9}

Appositional Herniorrhaphy

Appositional herniorrhaphy was first described in 1944. It utilizes the external anal sphincter and any remnants of the levator ani or coccygeus muscles for primary repair (Figure 2). If the levator ani muscle is significantly atrophied, then the sacrotubercous ligament can be included as a lateral component of the repair.\textsuperscript{32} With appositional herniorrhaphy, it is sometimes difficult to close the ventral aspect of the hernia, resulting in a temporary deformity of the anus. This deformity can cause tenesmus and rectal prolapse. If bilateral hernias are present, then procedures could be staged 3–4 wk apart to minimize tension.\textsuperscript{10} Postoperative complications associated with this technique include incisional infections, rectal prolapses, fecal incontinence, urinary incontinence, and wound seromas, and they have been reported to occur in 29–61% of cases. The recurrence rates range from 10–46%.\textsuperscript{10,30,32}

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\caption{Appositional herniorrhaphy (oblique view). Sutures are placed between external anal sphincter (a) or remnants of levator ani muscle (b), coccygeus muscle (c), and internal obturator muscle (d).}
\end{figure}
Internal Obturator Transposition Herniorrhaphy

This technique utilizes dorsomedial transposition of the internal obturator muscle for the repair of perineal hernias.\textsuperscript{33–35} (Figure 3). The internal obturator transposition technique reduces tension on ventral sutures and thus reduces distortion of the external anal sphincter. The utilization of muscle tissue and associated additional blood supply may facilitate the healing process and prevent breakdown of repair site.\textsuperscript{36} Internal obturator transposition herniorrhaphy is recommended as the procedure of choice for more complex or bilateral hernias.\textsuperscript{37} With this technique, the internal obturator tendon can be transected to provide greater dorsal elevation of the flap and reduce tension on the suture line.\textsuperscript{16,38} The overall complication rates range from 20 to 46%.\textsuperscript{7,30,34} Postoperative complications associated with this technique include wound seromas, wound infections, rectal prolapses, urinary incontinence, and flatus.\textsuperscript{38} The recurrence rates range from 0 to 33%. The recurrence of perineal hernia was reported as long as 1 yr after repair by internal obturator muscle transposition in 27.4% of cases. Postoperative tenesmus is a risk factor for recurrence.\textsuperscript{39}

Synthetic Mesh Implants

Polypropylene mesh has been used alone or as an adjunct to other procedures for the treatment of perineal hernias.\textsuperscript{3,4} Reported advantages of polypropylene include its strength and ease of handling.\textsuperscript{40} Synthetic mesh implantation involves suturing the polypropylene mesh to the coccygeus muscle dorsally and medially, to the sacrotuberous ligament laterally, to the internal obturator muscle ventrally, and to the levator ani and external anal sphincter muscle medially (Figure 4). One study reported that this technique resulted in a success rate of 92%.\textsuperscript{3} In a slightly modified version of the technique, the ventral aspect of the mesh is secured to the ischium through holes drilled in the ischium.\textsuperscript{4} The most significant complications observed with these techniques are suture sinuses

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\caption{Internal obturator muscle transposition. (A) (i and ii) Pelvic diaphragm with hernial defect: a, remnants of levator ani muscle; b, external anal sphincter; c, coccygeus muscle; d, hernial defect; e, internal obturator muscle; f, internal pudendal neuro-vascular bundle. (B) Elevation of the internal obturator muscle from the ischiatic table. (C) Dorsomedial transposition of the internal obturator muscle (arrow). Placement of sutures between the external anal sphincter and levator ani remnants/coccygeus muscle, external anal sphincter and internal obturator muscle, and the coccygeus muscle and internal obturator muscle. Asterisk (*) shows ischiatic table.}
\end{figure}
(12.5%), which resolve after removing the offending suture. The repair of perineal hernias with the obturator transposition technique and polypropylene reinforcement in 36 dogs resulted in an overall success rate of 80.5% with long-term follow-up of 29 mo. The most severe complications reported in this study were incisional infection (5.6%) and resultant wound dehiscence (12.5%). The recurrence rate associated with this technique was 12.5%.

**Superficial Gluteal Muscle Transposition**

Superficial gluteal muscle transposition involves transplanting the superficial gluteal muscle to reinforce the ischiorectal fossa. When used alone in the repair of perineal hernias, this technique did not produce desirable results. The postoperative complication rates associated with this technique ranged from 15 to 58%, and the perineal hernia recurred in 36% of the animals. A modified version of superficial gluteal muscle transposition allows the defect to be closed dorsolaterally by transecting the tendon of the muscle and rotating it 45 degrees caudal to the defect. The tendon is sutured to the internal obturator muscle fascia, the caudal border of the muscle is sutured to the external anal sphincter, and the cranial border is sutured to the sacrotuberous ligament. Transposition of both the internal obturator muscle and the superficial gluteal muscle together in the repair of 52 hernias in 44 dogs resulted in a strong pelvic diaphragm, fewer complications, and good long-term results. The follow-up time in these studies study was 3 yr. Only three dogs developed long-term complications, and the success rate was 89.74%.

**Semitendinosus Muscle Transposition**

This technique is used for ventral hernias, especially bilateral, or as a salvage procedure when other techniques have failed (Figure 5). The semitendinosus muscle is relatively superficial, has a consistent blood supply, and is large enough to fill a hernia defect. Experimental use of semitendinosus muscle as a ventral perineal flap in 10 mixed-breed dogs without perineal hernias caused no alterations in clinical gait examinations or in goniometrical and electromyographical studies in pelvic limbs after surgery, but atrophy was detected by ultrasonography and morphological analysis. A modified technique of semitendinosus muscle transposition was recently described that involves unilateral transposition of the medial half of the longitudinally split semitendinosus muscle. This technique provides sufficient tension to ensure adequate ventral rectal support. When applied in 14 dogs with ventral perineal hernias, the technique resulted in the resolution of clinical signs in all the dogs, with transient low-grade lameness in the limbs of 2 of the dogs. The mean follow-up time in this study was 890 days, and no

**FIGURE 4** Synthetic mesh implantation. A polypropylene mesh (d) is secured dorsally and laterally to the coccygeus muscle (b), ventrally to the fascia of the internal obturator muscle (c), and medially to the external anal sphincter (a) and levator ani muscle.

**FIGURE 5** Semitendinosus muscle transposition. The semitendinosus muscle (d) extends between the ischiatic tuberosity and proximal segment of the shank. The transected part of the muscle (b) is rotated medially, passing beneath the anus up to the lateral perineum of the opposite side. The medial aspect of the muscle is sutured to the external anal sphincter (a), and the lateral aspect to the internal obturator muscle (c), ischiourethralis muscle (e) and periosteum.
short-term recurrence was noted. However, long-term recurrence, together with tenesmus, was detected in two of the dogs.43

Biomaterials
In recent years, significant advances have been made in the use of different biomaterials in the repair of perineal hernias. Biomaterials evaluated for the treatment of perineal hernias in dogs include canine small intestinal submucosa, autologous tunica vaginalis communis, and fascia lata.

Canine Small Intestinal Submucosa
Submucosa derived from canine intestine has been used in the repair of perineal hernia. As it is an allograft, it is associated with fewer complications as compared with xenografts and synthetic materials. It is also resistant to infection. Canine small intestinal submucosa consists primarily of an extracellular matrix, but it also contains factors involved in angiogenesis, cell migration, and cell differentiation. The use of canine small intestinal submucosa allografts derived from a cadaver in the treatment of perineal hernias in two dogs resulted in improvement in defecatory tenesmus, no signs of rejection or self-immune responses, and no complications for 12 mo after surgery.5

Autologous Tunica Vaginalis Communis
Tunica vaginalis communis is derived from the peritoneum, which is composed of mesothelium and connective tissue. It has been experimentally used as an autologous, homologous, or heterologous graft for reconstruction of urethral defects in rabbits, abdominal wall defects in rats, umbilical hernias in sheep, and urinary bladder wall defects in dogs.44–46 The application of autologous tunica vaginalis communis as a free graft in the repair of 11 perineal hernias resulted in no recurrence or discomfort during defecation and urination in 10 hernias followed up for a median time of 13 mo.7 The tunica vaginalis communis was harvested during a closed prescrotal castration before the hernia repair. A histopathological examination of the apposing area between the graft and adjacent tissue revealed neovascularization and connective tissue ingrowth.5

Fascia Lata
Fascia lata grafts have been widely used in humans for the treatment of various disorders, such as male urinary incontinence, tendon rupture repair, and reconstruction of abdominal wall defects.47–49 Fascia lata grafts have been utilized in articular cranial cruciate ligament repair in dogs and in hip joint capsular tear repair after traumatic dislocation.50 They can be used for primary herniorrhaphy, to augment another procedure, or for the treatment of recurrence after other procedures.7 Fascia lata grafts can be easily harvested with minimal morbidity of the donor site and can be easily implanted. Furthermore, when compared with synthetic grafts, the autogenous nature of the graft minimizes the risk of foreign body reactions and does not form a nidus for persistent infection. Fascia lata grafts used for the repair of perineal hernias in 15 dogs resulted in no recurrence within 5–20 mo.7 Lameness in the donor limb was the most frequent but transient complication associated with this technique.7

Pexy Techniques
Cystopexy, colopexy, and vasopexy, in conjunction with castration, have been used as adjunctive therapies for the treatment of perineal hernias.9 Cystopexy, colopexy, vasopexy, and prostatic omentallization, followed by herniorrhaphy with the internal obturator muscle flap or appositional technique, in 41 dogs resulted in the resolution of hernias in 37 dogs.8 Cystopexy and colopexy have been used to prevent the recurrence of bladder retroflexion and rectal prolapse or as a preliminary procedure prior to definitive hernia repair.13,51 Vasopexy performed to correct retrodisplacement of the prostate gland and urinary bladder, in conjunction with herniorrhaphy, in nine dogs led to excellent outcomes.52 The complications involved with these techniques include tenesmus, colitis, constipation, and urinary incontinence.8,9 A recent study showed that urinary bladder retroflexion was not associated with an increased rate of postoperative complications.53 This study also reported that laparotomy performed to correct bladder retroflexion and rectal prolapse in 21 dogs prior to internal obturator muscle transposition offered no clear advantage. Therefore, it was concluded that internal obturator muscle transposition alone was adequate for the repair of perineal hernias.

Postoperative Care
In the immediate postoperative period, analgesic opioids and anti-inflammatory drugs are given to minimize postoperative discomfort. Commonly used opioids include hydromorphone and methadone. Commonly used anti-inflammatories include meloxicam and carprofen (cyclo-oxygenase-2 inhibitory nonsteroidal anti-inflammatory drugs). Oral analgesics, opioids, and nonsteroidal anti-inflammatory drugs are continued at home for 5–7 days. Patients are also placed on a low-residue diet and stool softeners (lactulose) for 8–12 wk. Fluid therapy should be continued in uremic patients. Intravenous antibiotics are continued in the postoperative period for 24 h. As the use of antibiotics has been shown to decrease the rate of postoperative incisional infections, patients are often sent home with oral antibiotics for 7–10 days.50 The commonly used antibiotics for at-home administration include first-generation cephalosporins and amoxicillin/clavulanic acid. Cold compresses are applied to the
surgery site immediately after surgery to minimize hemorrhage and inflammation. An Elizabethan collar is placed to prevent the patient from licking or chewing the incision site until suture removal.

REFERENCES


