

## A modified salvage technique in surgical repair of perineal hernia in dogs using polypropylene mesh

D. VNUK, D. MATICIC, M. KRESZINGER, B. RADISIC, J. KOS, M. LIPAR, T. BABIC

Clinic of Surgery, Orthopaedics and Ophthalmology, Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia

**ABSTRACT:** In 16 male dogs who suffered from perineal hernia, polypropylene mesh was used to close a defect in the pelvic diaphragm. Pelvic bone was drilled on the pelvic floor and mesh was sutured through holes by polypropylene suture. Strong pelvic diaphragm, good long-term results and time-sparing by this technique was achieved. Suture sinuses were developed in two dogs one month postoperatively. Objectives of this study were to describe a new alternative technique of perineal herniorrhaphy and postoperative possible complications. Weakness of internal obturator muscle flap is complication which can be observed during transposition of internal obturator muscle flap. This technique can be used when internal obturator muscle flap is weak like the operation of the first choice.

**Keywords:** perineal hernia; dog; polypropylene mesh

Perineal hernia results from failure of the muscular pelvic diaphragm to support the rectal wall, which stretches and deviates. Pelvic and abdominal contents may protrude between pelvic diaphragm and the rectum. The cause of the muscular deterioration could be one or combination of the following pathological processes: muscular atrophy, myopathies, hormonal influence and prostatic hypertrophy (Bellenger and Canfield, 2002).

Perineal hernia is diagnosed most often in dogs, but occasionally is observed also in the cats (Welches et al., 1992).

The disease occurs commonly in males and is associated with constipation, obstipation, dyschesia, a soft perineal swelling and occasionally urinary problems. The swelling is usually ventrolateral to the anus (Bellenger and Canfield, 2002).

Rectal diseases that may play a role in perineal herniation include rectal deviation (S-shaped curvature of the rectum), sacculation (dilatation of rectal wall), and diverticulum (mucosal protrusion through seromuscular layer of rectal wall) (Mann, 1993).

Since primary suture repair of the muscular pelvic diaphragm was first described in the 1950s, several reports described this standard method of herniorrhaphy (Orsher, 1986). Perineal herniation recurred in 10% (Petit, 1962), 15.4% (Bellenger, 1980) and 46% (Burrows and Harvey, 1973) of cases.

Alternative techniques of perineal herniorrhaphy were described in the 1980s. Transposition of the internal obturator muscle reduced the recurrence rate of perineal hernia to under 10%. In one study only 2.4% of dogs had a recurrence (Hardie et al., 1983).

Only a few reports have described the use of synthetic materials in perineal hernias in dogs. Polyethylene sponge (Koger, 1954), plastic mesh (Larsen, 1966), porcine dermal collagen sheet (Frankland, 1986), polyester mesh (Nommensen, 1974) and polypropylene mesh (Clarke, 1989) were used.

The purpose of the presented study was to describe a new alternative technique of perineal herniorrhaphy and possible complications. The advantage of this technique was strong pelvic

diaphragm and quickness. This technique can be recommended in the case of weakness of internal obturator muscle flap.

## MATERIAL AND METHODS

Polypropylene mesh was used to close a defect in the pelvic diaphragm in 16 dogs who suffered from perineal hernia. Perineal hernia recurred after

perineal herniorrhaphy at privat clinics in 7 dogs. Internal obturator flap was too weak and did not hold a suture after pulling of strands in 5 dogs. Defect in perineal diaphragm was huge and tension was present during suturing of ventral part of defect in 2 dogs. Owners were contacted by telephone during surgery and accepted reparation of perineal hernia by this method. Owners accepted this method as surgery of first choice in 2 dogs.

Table 1. Signalment, duration of disease, clinical signs, side, rectal disease and hernial contents of cases

Breed	Age (years)	Weight (kg)	Duration of disease	Clinical signs	Side	Rectal disease	Hernial content
Maltese	10	6.80	1 year	perineal swelling, tenesmus, dyschezia, haematochezia	bilateral	rectal sacculation	retroperitoneal fat
Pomeranian	14	4.10	1 year	perineal swelling, tenesmus	right	no	retroperitoneal fat
Maltese	8	5.50	8 months	perineal swelling, tenesmus	right	no	retroperitoneal fat
Maltese	6.5	5.20	1.5 year	tenesmus, haematochezia	bilateral	rectal sacculation	small intestine, prostate gland, urinary bladder, retroperitoneal fat
Australian silky terrier	5	6.1	6 months	tenesmus, perineal swelling	right	rectal sacculation	no
Dobermann pinscher	4	45	2 weeks	perineal swelling	right	no	no
Cocker spaniel	9.5	18	1 years	tenesmus, perineal swelling, obstipation	bilateral	rectal sacculation	retroperitoneal fat, prostate gland
Maltese	12.5	5.20	1 years	tenesmus, obstipation	right	rectal flexure	retroperitoneal fat
Pekingese	9	4.90	3 months	perineal swelling, dyschezia	right	rectal diverticulum	prostate gland
Mixed breed	7	23	9 months	perineal swelling, anuria, dilated abdomen, vomiting	right	rectal sacculation	urinary bladder
Mixed breed	8.5	28	6 months	perineal swelling, tenesmus	right	rectal diverticulum	retroperitoneal fat
Pekingese	8.5	5.20	10 months	perineal swelling, tenesmus	left	no	retroperitoneal fat
Poodle	11.5	10.20	4 months	perineal swelling, dyschezia	right	rectal sacculation	no
Mixed breed	6	12	3 months	perineal swelling, tenesmus, anuria	left	no	urinary bladder
Yorkshire terrier	8	6.10	5 months	perineal swelling, dyschezia	left	rectal sacculation	retroperitoneal fat
Boxer	9.5	30.20	1 month	perineal swelling, dyschezia, tenesmus	bilateral	rectal sacculation	retroperitoneal fat, prostate gland

12 patients were treated at privat clinics because of problems caused by perineal hernia. Treatment at privat clinics consisted of perineal herniorrhaphy by standard herniorrhaphy or transposition of internal obturator muscle in 7 dogs. Castration as single operation was performed in 1 dog and in 3 dogs during perineal herniorrhaphy. All dogs had medical treatment (lubricants) and diet (fiber rich diet).

The owners accepted a new surgery technique in repairing of perineal hernia in their dogs using polypropylene mesh. The case records of operated dogs were examined and the owners were surveyed by telephone. The follow-up period after the last surgery procedure to the time of survey was between 15 and 42 months.

The diagnosis was made by rectal palpation. The palpation of perineal diaphragm and rectal wall was done. When a patient had a clinical signs of a urinary tract disturbances, caudal abdominal radiography was performed.

Premedication before surgery was acetylpromazine (Vetranquil 1%, Ceva). In old dogs premedication was diazepam 0.3 mg/kg i.v. (Apaurin, Krka, Slovenia). Amoxicillin with clavulanate (Klavocin, Pliva, Croatia) at the dose of 20 mg/kg was administered intravenously before and after surgery. The Ringer's solution infusion was administered at the rate 10 ml/kg/h. The rate was controlled by infusion pump (BIOF 3000, Biotron CO, South Korea). Induction of anaesthesia was propofol 4 mg/kg i.v. (Propofol, Abbott, UK). Endotracheal intubation was done. Fentanyl citrate (Fentanyl-Janssen, Janssen Pharmaceutica, Belgium) was administered in bolus 10 µg/kg i.v. and afterwards continuous rate infusion 0.2 µg/kg/min i.v. by syringe pump (SEP 11S, Ascor, Poland). Mixture of oxygen and isoflurane (Forane, Abbott, UK) maintained anaesthesia.

The perineal region was liberally clipped. The rectum was emptied manually and anal sacs were evacuated. A lubricated gauze tampon was inserted into the rectum and a pursestring suture was placed in the anus. The patient was positioned in sternal recumbency and was pulled to the end of the operating table. The pelvic limbs were placed off the end of the table and were gently pulled forward. The tail was fixed cranially with several pieces of adhesive tape. The cranial thigh region is cushioned against the table to avoid placing unnecessary pressure on the femoral region. The surgical site was prepared for aseptic surgery.

All these surgery were done by the same surgeon. The laterally curved, dorso-ventral skin incision was done over the hernia, extending from the spot just lateral to the tail base to the medial angle of ischial tuberosity. Hemorrhage was controlled by electrocautery. The hernial sac was opened by blunt dissection. Retroperitoneal fat was ligated and excised. Rectum was examined because of rectal diseases. Rectal diseases were resolved by plication. Plication was done by placement of one to three layers of Cushing suture (PDS 3-0) parallel to rectal direction. Layers of the Cushing suture were placed to the moment when the diameter of rectum cranial to the rectal sacculation/diverticula was the same as diameter at the place of rectal sacculation diverticula. Hernial contents was returned to their original location. After reduction of the hernia, anatomical structures were exposed. One dog had lipoma incorporated in external anal sphincter, lipoma was excised before preplacement of prolene sutures.

Pelvic plate was drilled on the caudal brim with drill of 1.5 mm in diameter. Three holes were made between the ischial tuberosity and midline. All sutures were preplaced before they are tied. First, polypropylene sutures (2-0 or 0 USP-Prolene Ethicon, UK) were preplaced through drilled holes with ½-circle tapercut needle. 2-0 USP Prolene was used in dogs weighed under 10 kilograms and 0 USP Prolene was used in dogs weighed above 10 kilograms. Then three sutures were preplaced laterally through sacrotuberous ligament, coccygeus muscle and levator ani-muscle. Finally, three sutures were done medially through external anal sphincter. Polypropylene mesh (Prolene Mesh, Ethicon, UK) was in shape of triangle. The mesh was sutured by single interrupted suture first at ventral, then lateral and finally at medial position. Any protruding mesh was trimmed. The mesh was covered by subcutaneous tissue using absorbable suture material (2-0 or 3-0 Coated Vicryl, Ethicon, UK). The skin was sutured by nonabsorbable monofilament (3-0 or 4-0 Gore-tex, Gore, USA). The purse string suture was removed. 8 dogs were castrated after perineal herniorrhaphy. Orchiectomy was done in the prescrotal area.

Butorphanol (Butomidol; Richter-Pharma AG, Austria) at the dose of 0.1 mg/kg was given by an intramuscular route at 4-hour intervals during the first day after the surgery. Afterwards, carprofen tablets (Rymadil, Pfizer, UK) at a dose of 2 mg/kg p. o. were administered at 12-hour intervals during

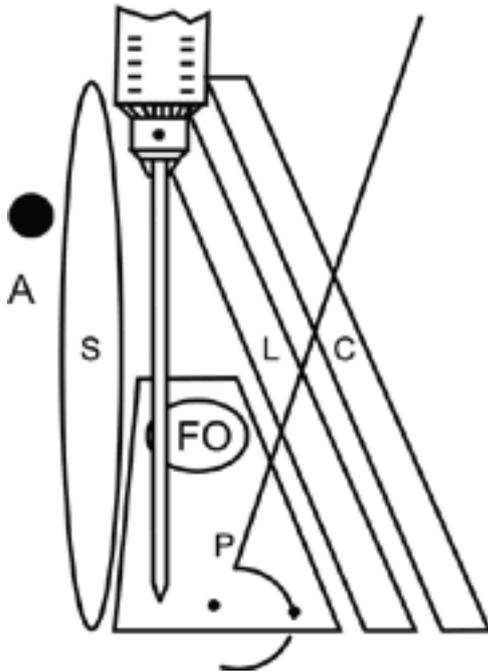


Figure 1. Pelvic plate was drilled on the caudal brim and three holes were made between the ischial tuberosity and midline. All sutures were preplaced before they are tied

A – anus; S – external anal sphincter; L – levator ani muscle; C – coccygeus muscle; P – pelvic bone; F – foramen obturatum

the next three days. Tablets or syrup of amoxicillin with clavulanate (Augmentin, GSK, UK) at a dose of 20 mg/kg were administered orally for five days. Owners cleaned surgical site with dry sterile gauze sponges. Elizabethan collar had been applied for 10 days postoperatively. Obstipation was treated by lubricants if defecation was not observed to third day postoperative. Suture sinus was treated by mesh trimming and antibiotics, but unsuccessfully. Seroma was treated by drainage and flushing. Temporary neuropraxia of nonoperated side was treated by administration of vitamin B-complex and disappeared fifth day after surgery. Sutures were removed at 10<sup>th</sup> day after the surgery (Anderson et al., 1998; Bellenger and Canfield, 2002; Clarke, 1989).

Response to surgery was defined by a cure, good and poor result. Cure was a postoperative period without problems in defecation (constipation and tenesmus). Good result was a postoperative period with occasional problems in defecation (occasional constipation and tenesmus) and a poor result was

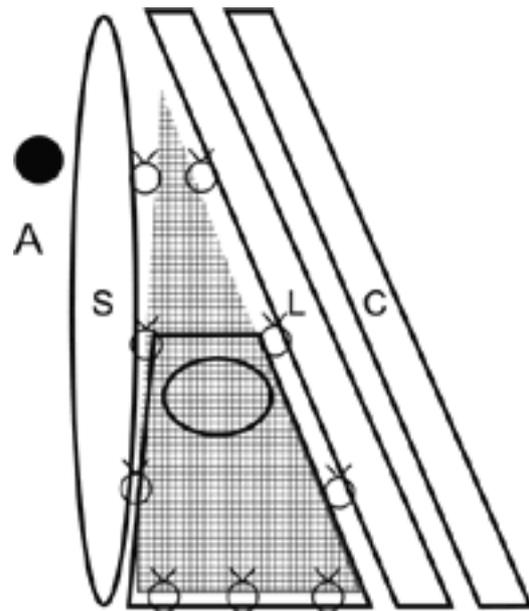


Figure 2. Three sutures were preplaced ventrally through holes in pelvic plate and laterally through sacrotuberous ligament, coccygeus muscle and levator ani muscle. Finally, three sutures were done medially through external anal sphincter. Polypropilene mesh was shaped like triangle. First, the mesh was sutured with single interrupted suture ventrally, then laterally and finally medially. Any protruding mesh was trimmed

a postoperative period with persisting problems in defecation (occasional constipation and tenesmus).

## RESULTS

In 16 male dogs during the two-year period (from March 2002 to May 2004), perineal herniorrhaphy was done by this technique. The range of ages at initial presentation was 4 to 14 years (mean  $8.59 \pm 2.65$  years). The dogs weighed between 4.1 and 45.5 kg ( $19.39 \pm 24.61$  kg). Duration of disease at initial presentation was between 2 weeks and 18 months ( $7.59 \pm 4.86$  months). Four dogs had bilateral and 12 dogs had unilateral perineal hernia. 9 dogs had perineal hernia on the right side and 3 dogs on the left side of the perineum. Dogs who suffered from bilateral perineal hernia were undergo to surgery on one side (side with bigger defect in perineal diaphragm) by semitendinosus muscle transposition because of the weakness of

Table 2. Patient data about castration, stool after surgery, concurrent diseases, postoperative complications, response to surgery and duration of surgery

Castration	Stool after operation (day)	Concurrent diseases	Postoperative complications	Response to surgery	Duration of surgery
Yes (before)	2	incisional hernia	suture sinus	cure	65
Yes	1	perineal lipoma, enlarged prostate	suture sinus	cure	57
Yes	1	kryptorchismus		cure	61
No	1	colitis		good	52
Yes	2	enlarged prostate		cure	49
No	3			cure	59
Yes (before)	5	megacolon	seroma, obstipation	poor	48
No	1	mitral insufficiency		cure	45
Yes	1			cure	41
Yes	2	enlarged prostate		cure	51
Yes (before)	2			cure	58
Yes (before)	4		temporary neuropraxia of nonoperated side	cure	54
Yes	2	enlarged prostate		cure	39
No	1			cure	43
Yes	2			cure	46
Yes	3	enlarged prostate		cure	53

the ventral part of perineum. 4 to 6 weeks after the first surgery, surgery on the other side of bilateral hernia was done by using this new technique. The castration was done in 12 dogs (in four dogs at privat clinics and in 8 dogs at surgery clinic immediately after the perineal herniorrhaphy), where as owners didn't want castration in 4 cases. Rectal disease was noticed in 11 dogs. Rectal sacculation (dilatation of rectal wall into the hernia) was noticed in 8 dogs, rectal diverticulum (a tear in the seromuscular layers of the rectal wall through which the mucosa dilates into the hernia) in 2 dogs and rectal flexure (S-shaped curvature of the rectum into the hernia) in 1 dog. Rectal sacculation and diverticulum were solved during surgery by plication in 10 dogs. Duration of surgery was  $51.31 \pm 7.48$  minutes (range 39 to 65 minutes). Response to surgery was cure in 14 dogs, good result in 1 dog (tenesmus was associated possible with colitis) and poor result was achieved (megacolon complicated result, cisaprid did not have effect and owner didn't want their dog undergo to subtotal colectomy).

## DISCUSSION

Only a few reports had described the use of synthetic materials in perineal hernias in dogs. Larsen (1966) used plastic mesh. Six bilateral and nine unilateral perineal hernias were repaired using this technique with one breakdown. Porcine dermal collagen sheet was used by Frankland (1986). In this study, porcine dermal collagen was used for the repair of 27 perineal hernias in 21 dogs. The material was generally well tolerated and the overall success rate was 59.3%. Four of 5 cases in which polyester mesh was used were successfully treated (Nommensen, 1974). Clarke (1989) used polypropilene mesh for the repair of perineal diaphragm. Out of 17 operated dogs, 13 hernias were unilateral and 4 were bilateral. Only one dog had a recurrence 12 months after surgery.

Failure of internal obturator muscle transposition most commonly occurs in the ventromedial aspect of the transposed muscle. To prevent the failure, subperiosteal elevation should be done very carefully

to prevent excessive trauma to the muscle, and the ventromedial sutures from the internal obturator muscle to the external anal sphincter should be secured (Mann and Constantinescu, 1998).

In this study, during the transposition of internal obturator muscle, was observed that the muscle flap was too weak to hold sutures. Therefore, in some cases this method was used after recurrence of standard method or transposition of internal obturator muscle. This situations were resolved by this modified technique of perineal hernia repair. This modified technique can be used as like as the operation of the first choice, if the internal obturator muscle flap is not weak. On the other hand surgeon shouldn't choose a technique which involves placing a foreign material whenever technique with autogenous tissues is possible. Because of this fact, this modified technique can be used as salvage technique for recurrent, previously failed cases or those with severe perineal diaphragm muscle atrophy.

Clarke (1989) described perineal herniorrhaphy with prolene mesh and observed the recurrence in one dog. It was found to be ventral to the rectum on the side of the original repair. The mesh was detached from the internal obturator muscle ventrally. The advantage of this technique is strong ventral attachment to the pelvic bone. On the ventral side recurrence of the perineal hernia is theoretical impossible, because of strong fixation between the pelvic bone and mesh.

Another advantage of this new technique is shortened duration of the surgery. In this study, the mean duration of the surgery was  $51.20 \pm 7.73$  minutes. In another studies, unpublished as yet, duration of the transposition of internal obturator muscle was 69 minutes. Same surgeon has done perineal herniorrhaphy by new surgery technique and by transposition of internal obturator muscle. Control of hemorrhage during preparation and transposition of internal obturator muscle can be time-consuming. Transposition of internal obturator muscle is precise and slower procedure. Fixation of prolene mesh to perineal diaphragm can be done without preparation of the operation field.

Clarke (1989) had no evidence of postoperative infection in any of the repairs, however, the dogs developed discharging sinuses at the wound site approximately two months postoperatively. In this study, postoperative complications were suture sinuses in two dogs two months after the surgery and seroma immediately after surgery. Disadvantage

of this technique is high cost of polypropylene mesh.

Rectal diseases were noticed in 11 dogs. Because of potential for continued straining postoperatively and resultant herniorrhaphy failure, some surgeons recommend excision of rectal diverticula and large sacculations and suturing of the rectal wall at the time of the herniorrhaphy procedure (Krahwinkel, 1983). Larsen (1966) reduced in size rectal diverticula by placing a few interrupted Lembert sutures into the muscularis of the rectum at the time of herniorrhaphy. We used method of plication, placing some layers of Cushing suture depend on width of rectal diverticula. this method was preferred because of opening of the rectal wall is not necessary and risk of possible contamination during sacculotomy is huge. Resolving of rectal disease by plication can be complicated by rectal prolapse (Larsen, 1966). In this case method of plication was done in 10 dogs and rectal prolapse was not observed.

This technique carried out a strong pelvic diaphragm, good long-term results and it is a time-sparing. This technique can be used in case of weakness of internal obturator muscle flap like the operation of the first choice.

## REFERENCES

- Anderson M.A., Constantinescu G.M., Mann F.A. (1998): Perineal hernia repair in the dog. In: Bojrab M.J. (ed.): *Current Techniques in Small Animal Surgery*. 4<sup>th</sup> ed. Williams and Wilkins, Baltimore. 555–564.
- Bellenger C.R. (1980): Perineal hernia in dogs. *Australian Veterinary Journal*, 56, 434–438.
- Bellenger C.R., Canfield R.B. (2002): Perineal hernia. In: Slatter D. (ed.): *Textbook of Small Animal Surgery*. 3<sup>rd</sup> ed. Saunders, Philadelphia. 487–498.
- Burrows C.F., Harvey C.E. (1973): Perineal hernia in the dog. *Journal of Small Animal Practice*, 14, 315–332.
- Clarke R.E. (1989): Perineal herniorrhaphy in the dog using polypropylene mesh. *Australian Veterinary Practitioner*, 19, 8–14.
- Frankland A.L. (1986): Use of porcine dermal collagen in the repair of perineal hernia in dogs- a preliminary report. *Veterinary Record*, 119, 13–14.
- Hardie E.M., Kolata R.J., Earley T.D. (1983): Evaluation of internal obturator muscle transposition in treatment of perineal hernia in dogs. *Veterinary Surgery*, 12, 69–72.
- Koger R.B. (1954): Polyethylene sponge in perineal herniorrhaphy. *Veterinary Medicine*, 49, 451–453.

- Krahwinkel D.J. (1983): Rectal diseases and their role in perineal hernia. *Veterinary Surgery*, 12, 3, 160–165.
- Larsen J.S. (1966): Perineal herniorrhaphy in dogs. *Journal of the American Veterinary Medical Association*, 149, 277–281.
- Mann F.A. (1993): Perineal herniation. In: Bojrab M.J. (ed.): *Disease Mechanism in Small Animal Surgery*. 2<sup>nd</sup> ed. Lea & Febiger, Philadelphia. 92–97.
- Mann F.A., Constantinescu G.M. (1998): Salvage techniques for failed perineal herniorrhaphy. In: Bojrab M.J. (ed.): *Current Techniques in Small Animal Surgery*. 4<sup>th</sup> ed. Williams and Wilkins, Baltimore. 564–570.
- Nommensen C. (1974): Versuche zur Behandlung von Dammbrochen beim Hund mit Hilfe eines Polyester-netzes. *Tierärztliche Umschau*, 29, 79–84.
- Orsher R.J. (1986): Clinical and surgical parameters in dogs with perineal hernia. analysis of results of internal obturator transposition. *Veterinary Surgery*, 15, 3, 253–258.
- Petit G.D. (1962): Perineal hernia in the dog. *The Cornell Veterinarian*, 52, 261–279.
- Welches C.D., Scavelli T.D., Aronsohn M.G., Matthiesen D.T. (1992): Perineal hernia in the cat: A retrospective study of 40 cats. *Journal of the American Animal Hospital Association*, 28, 431–438.

Received: 2006–01–21

Accepted: 2006–03–13

---

Corresponding Author:

Drazen Vnuk, DVM, MS, University of Zagreb, Faculty of Veterinary Medicine, Surgery, Orthopedics and Ophthalmology Clinic, Heinzelova 55, 10000 Zagreb, Croatia  
Tel. +385 1 2390 390, fax +385 1 2441 390, e-mail: [dvnuke@vef.hr](mailto:dvnuke@vef.hr)

---