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A novel technique to incorporate the sacrotuberous ligament in perineal herniorrhaphy in 47 dogs

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Abstract

Objective: To describe the technique and outcomes after placement of sutures around the sacrotuberous ligament during perineal hernia (PH) repair in dogs.

Study design: Retrospective single-center study.

Animals: Dogs (n = 47) with PH.

Methods: Medical records of dogs treated for PH between 2002 and 2020 were reviewed. Dogs were included when sutures had been placed around the sacrotuberous ligament. Short-term outcomes and intraoperative and postoperative complications were recorded. Long-term outcome was assessed with a questionnaire completed by owners.

Results: Twenty-eight of 47 dogs were medium or large breeds. The primary clinical sign was tenesmus in 43 dogs and dysuria-stranguria in four dogs. Bilateral hernias were detected in 17 dogs. No intraoperative complications occurred. Median surgical time was 50 minutes for unilateral PH and 120 minutes for bilateral PH. Minor postoperative complications consisting of surgical wound swelling (9), wound dehiscence (4), and temporary tenesmus (2) occurred in 10 dogs. No major complications or recurrence were reported. The only factors associated with an increased risk of complications included increasing age ($P = .019$) and surgical treatment of a recurrent PH ($P = .043$). Owners consistently reported good long-term outcomes.

Conclusion: The PH repair described in this study resulted in good long-term outcomes without major complications.

Clinical significance: Placement of sutures around the sacrotuberous ligament represents an alternative during PH, but anatomical knowledge of the sciatic nerve and caudal gluteal vessels is required.

1 | INTRODUCTION

Perineal hernia (PH) is a common presenting condition in intact male dogs resulting from a weakness of the pelvic diaphragm muscles, which results in herniation of the pelvic or abdominal organs into the subcutaneous perineum.[1-4] Usually, perineal deformation is apparent and can be unilateral or bilateral.[1-4] Different factors may contribute to the degenerative changes of the pelvic diaphragm, including tenesmus,[1-5] sex-related pelvic musculature variations,[2] hormone influence,[6-9] and pelvic muscle atrophy due to neuropathy.[10]

Several surgical reconstruction techniques of the weak pelvic diaphragm have been described.[1]

Appositional herniorrhaphy, described in 1947 by Farquharson,[11] is often not possible due to the atrophy of the levator ani and/or coccygeus muscles[2]; internal obturator muscle transposition is the most commonly used technique.[1,2] Additional methods such as superficial gluteal, semitendinosus, and modified semitendinosus muscle transposition; synthetic prosthetic implant and biomaterial; or combinations may be required.[12-23] In addition, castration is recommended in all intact male dogs with a perineal hernia to reduce the risk of recurrence.[1,2]

The sacrotuberous ligament can be incorporated in the lateral component of the repair, especially in chronic perineal hernias with significant muscle atrophy.[1-4,24] Several authors have advocated for the placement of these sutures through the ligament rather than around it to avoid entrapment of the caudal gluteal vessels and sciatic nerve.[1-3] Recently, Bernardé et al[25] described a modified double purse-string internal obturator muscle transposition herniorrhaphy. This technique involves the sacrotuberous ligament and internal obturator muscle with two sutures to create a purse-string pattern to close the pelvic diaphragm, and no sciatic entrapment or complications have been reported.[25] Furthermore, in describing severe chronic cases, some authors have reported the implementation of abdominal organ pexy concurrent with herniorrhaphy with a high success rate and minimal recurrence.[1-4,26] Postoperative complications include incisional infection, seroma formation, fecal or urinary incontinence, neuropraxia, and recurrence.[1-4,27,28] Recurrence rates were from 0% to 33% when the internal obturator muscle transposition was used and 10% when this technique was combined with an abdominal organ pexy in a two-stage procedure.[4,13,26-28]

The close association between the sacrotuberous ligament and the sciatic nerve has been reported; therefore, sciatic nerve entrapment during herniorrhaphy is a potential risk.[1-4] Recently, Khatri-Chhetri et al[24] described the spatial relationship of the sciatic nerve along the sacrotuberous ligament, providing more information to avoid sciatic nerve entrapment during herniorrhaphy. In the authors' experience, the incorporation of the sacrotuberous ligament in the herniorrhaphy does not increase the risk of complications or nerve injury; hence, it could be used to reinforce the repair (Figure 1).[24]

The objective of this report of our retrospective study is to describe the surgical technique for PH repair by using suture placement around the sacrotuberous ligament in dogs and to report complications and long-term outcomes. We hypothesized that sutures around the sacrotuberous ligament would not cause an increase in complications, which is contrary to previously published descriptions.[1-3]

2 | MATERIAL AND METHODS

2.1 | Study design and eligibility criteria

Electronic medical records of dogs treated for PH at between March 2002 and January 2020 were retrospectively reviewed. Dogs with unilateral or bilateral PH treated with reconstruction techniques involving sutures placed around.

The sacrotuberous ligament were included. A minimum follow-up of 2 months was required. The procedures were performed at the same institution by the same board-certified surgeons (F.C., G.P.). Data retrieved from the records included signalment, clinical history, examination findings, PH location, preoperative diagnostic findings, surgical treatment, and surgical and hospitalization times. The occurrence of any intraoperative and postoperative complications was recorded. Complications were classified as minor, defined as complications that did not require additional surgical treatment to resolve, and major, defined as complications or associated morbidity that required additional surgical treatment to resolve. To evaluate outcomes, a questionnaire was designed, and owners were requested to answer questions about their dog's outcome and quality of life (Questionnaire S1).

2.2 | Surgical procedure

The anesthetic protocol varied during the study period; however, most dogs were premedicated with a combination of dexmedetomidine (range, 3-5 μg/kg IM; Dexdomitor Zoetis, Rome, Italy) and methadone (0.2-0.3 mg/kg IM Synthadon; Animalcare, York, United Kingdom). General anesthesia was induced with propofol (2-4 mg/kg IV; Ecuphar, Milan, Italy) and maintained with isoflurane (IsoFlo; Zoetis, Milan, Italy) in a mixture of oxygen and air after orotracheal intubation. Cephazolin (22 mg/kg IV Cefazoline Teva; Teva, Milan, Italy) was administered at induction and repeated every 90 minutes during surgery. Analgesia varied at the discretion of the surgeon (methadone 0.2-0.3 mg/kg IV Synthadon; Animalcare or fentanyl 2-10 μg/kg/h IV constant rate infusion; Halmen, Nexus, Gloucester, United Kingdom); no dogs received a lumbosacral epidural block. The anal sacs were evacuated, and a purse-string suture was placed around the anus with monofilament nonabsorbable material (Ethilon nylon; Ethicon, Guaynabo, Puerto Rico). Perineal (47/47), prescrotal (38/47), and abdominal (2/47) aseptic preparation were performed by using an alcoholic-based surgical scrub (chlorhexidine gluconate 4%; chlorhexidine gluconate and isopropyl alcohol). A temporary

semirigid urinary catheter was placed to facilitate urethral identification during surgery in all dogs.

All dogs were placed in sternal recumbency, with the pelvic limbs placed over the padded end of the surgery table slightly tilted to elevate the hindquarters. The incision was made over the hernia beginning near the tail base and extending just ventral to a point midway between the ischial tuberosity and the pubis symphysis. The hernia sac was opened, and the herniated organs were reduced into the pelvic or abdominal cavity through the muscular defect. The internal obturator muscle was incised along its caudal lateral border aponeurosis and elevated from the ischium, maintaining the insertion intact. Digital palpation was used to identify the sacrotuberous ligament. The proximal half of the sacrotuberous ligament was bluntly dissected from the surrounding tissue by using right-angle forceps. Two different methods were used to incorporate the sacrotuberous ligament. When a nonswaged suture needle was used, the ends of multiple sutures were grasped by the tip of

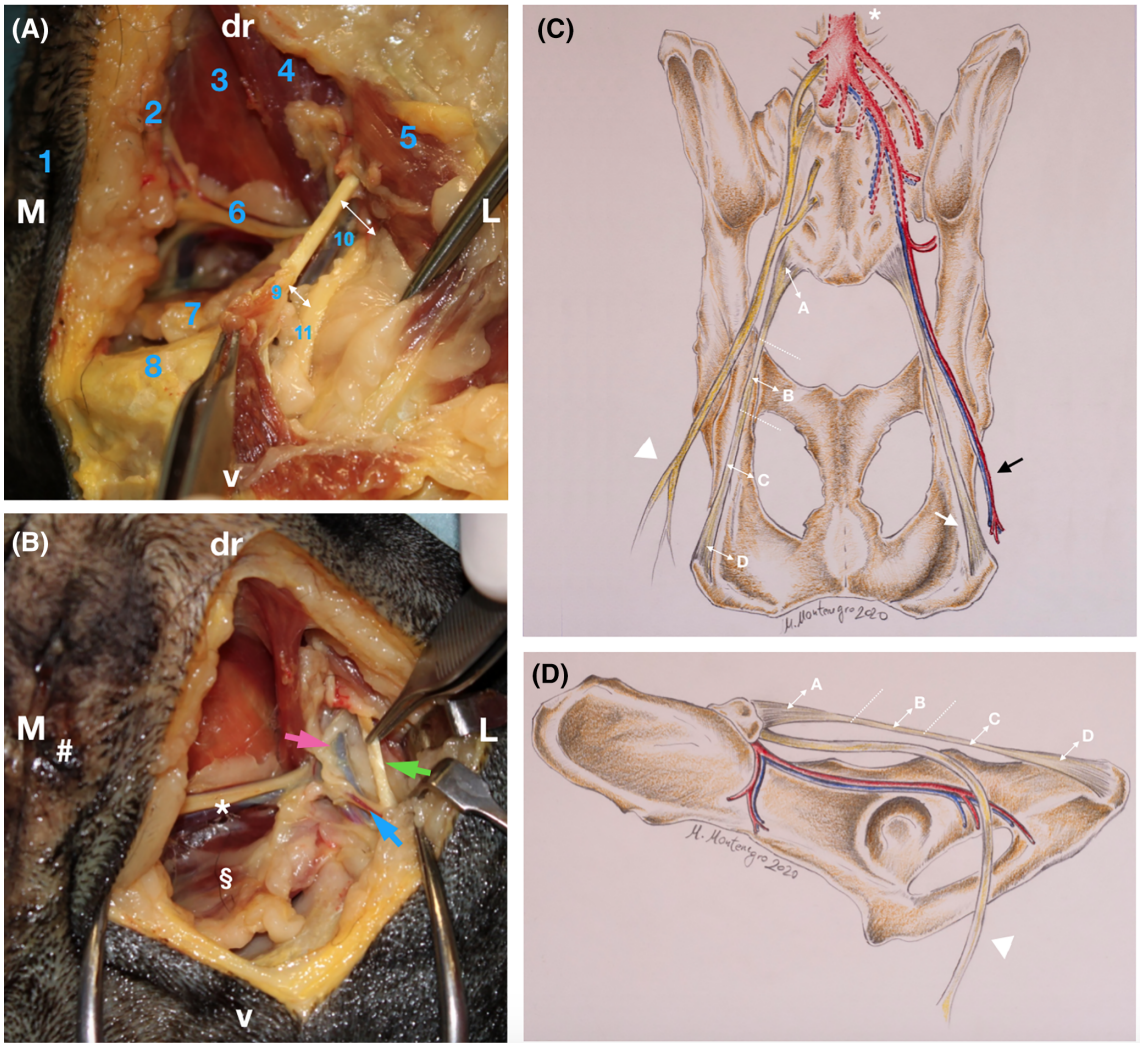

FIGURE 1 Ex vivo anatomic images (a,b) and schematic representations of the surgical anatomy (c,d). a, Right laterocaudal view of perineal area after partial dissection of biceps femoris muscle. 1, anus; 2, external anal sphincter; 3, levator ani muscle; 4, coccygeal muscle; 5, biceps femoris muscle; 6, pudendal artery, vein, and nerve; 7, internal obturator muscle; 8, ischium; 9, sacrotuberous ligament; 10, caudal gluteal artery and vein; 11, sciatic nerve. Arrows illustrate the distance from the sacrotuberous ligament to the sciatic nerve. dr, dorsal; L, lateral; M, medial; v, ventral b, Caudal view of perineal area. Pink arrow, caudal gluteal artery and vein; blue arrow, sciatic nerve; green arrow, sacrotuberous ligament. #, anus; §, internal obturator muscle; *, pudendal artery, vein, and nerve. dr, dorsal; L, lateral; M, medial; v, ventral. c,d, Schematic representations. Dorsoventral (c) and laterolateral (d) views of pelvic area. A, Proximal attachment of the sacrotuberous ligament; B, one-third distance from the proximal attachment; C, two-thirds distance from the proximal attachment; and D, distal attachment of the sacrotuberous ligament. The dotted lines illustrate the points where sutures should be positioned around the sacrotuberous ligament. *, abdominal aorta; arrowheads, sciatic nerve; black arrow, caudal gluteal artery/vein with their branches; white arrow, sacrotuberous ligament

the right-angle forceps and passed closely around the sacrotuberous ligament in one single maneuver; a needle was then loaded on the free end of each suture medial to the sacrotuberous ligament. When a swaged suture needle was used, the free ends of multiple sutures were grasped by the tip of the right-angle forceps and passed closely around the sacrotuberous ligament in a single maneuver, from medial to lateral, with the needle remaining medial to the sacrotuberous ligament.

After suture placement, constant traction of the sutures was applied perpendicular to the sacrotuberous ligament for 1 minute while intraoperative oscillometric noninvasive mean arterial blood pressure (MAP), systolic arterial blood pressure (SAP), diastolic arterial blood pressure (DAP), and heart rate (HR) were carefully monitored as an indirect evaluation pain test to rule out sciatic nerve entrapment. All sutures were preplaced from dorsal to ventral incorporating coccygeal, levator ani, and external anal sphincter; while the internal obturator muscle was involved only by the most ventral sutures (Figures 2 and 3, Video S1). A digital rectal examination was performed at the end of the surgery in all dogs for evaluation of the pelvic diaphragm reconstruction.

2.3 | Data analysis

Descriptive statistics were computed for all variables. Continuous explanatory variables assessed included age, body weight, duration of clinical signs, surgical time, and hospitalization time. Were a Shapiro–Wilk test used, none of these data sets were likely to be from a normal distribution ($P < .001$), so they are reported as median (range). Categorical variables assessed were sex, neuter status, size (<10 kg vs >10 kg), duration of clinical signs, unilateral vs bilateral, right vs left, hernia location, normal vs abnormal prostate, swaged vs nonswaged needle, type of suture material, concomitant procedures, and surgery for a recurrence. To assess the association of these clinical variables with the presence of complications, univariate logistic regression was performed. Variables with a $P < .20$ in the univariate analysis were included in the multiple logistic

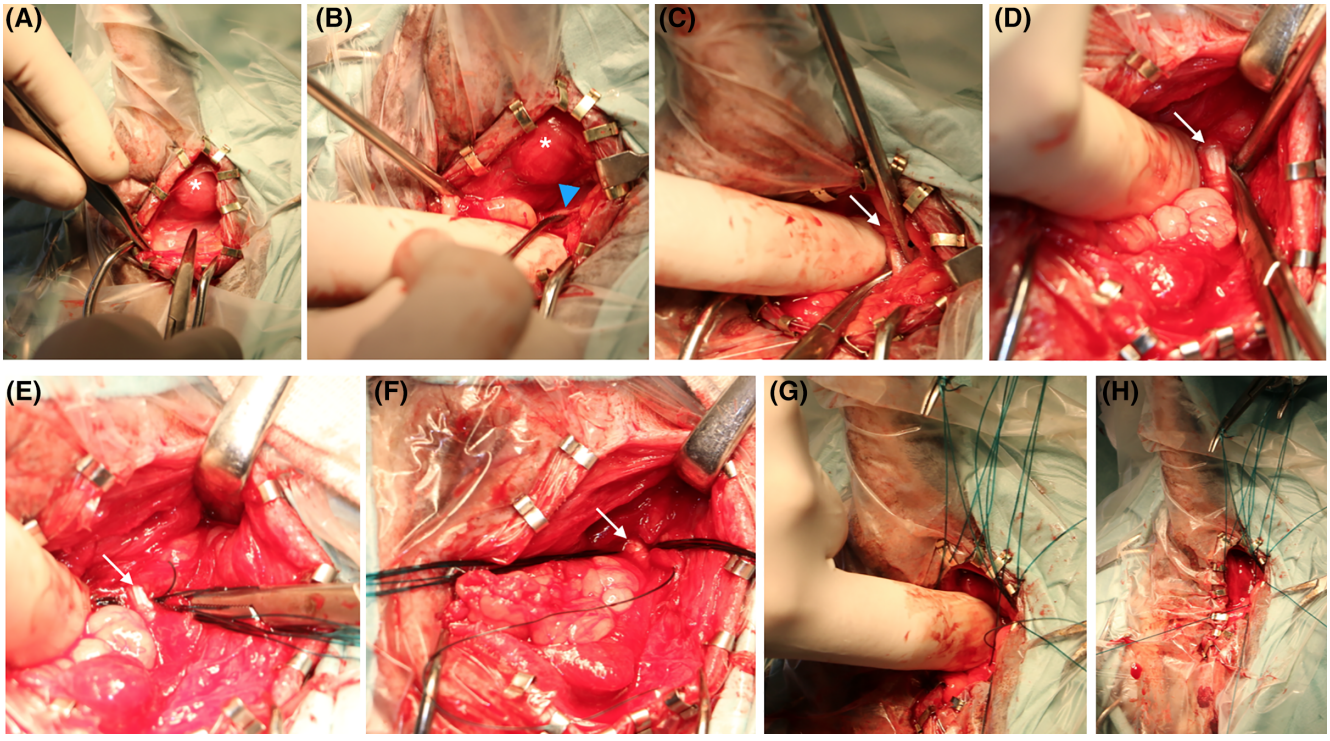

FIGURE 2 Intraoperative image of a right perineal hernia. a, Perineal skin incision, evidence of the perineal hernia sac (*). b, Internal obturator muscle elevation (arrowhead) from the ischium bone with a periosteal elevator. c,d, Blunt dissection of the proximal half of the sacrotuberous ligament (arrows) with right-angle forceps. e, Multiple ends of nonswaged needle sutures were grasped by the tip of the right-angle forceps and passed closely around the proximal half of sacrotuberous ligament in one single maneuver, from lateral to medial. f, Suture positioned just behind the sacrotuberous ligament. Traction of the sutures perpendicular to the sacrotuberous ligament, as indirect evaluation pain test to rule out sciatic nerve entrapment. g,h, A needle was loaded on the free end of each suture, medial to the sacrotuberous ligament, and the sutures were preplaced incorporating coccygeal, levator ani, external anal sphincter, and internal obturator muscles

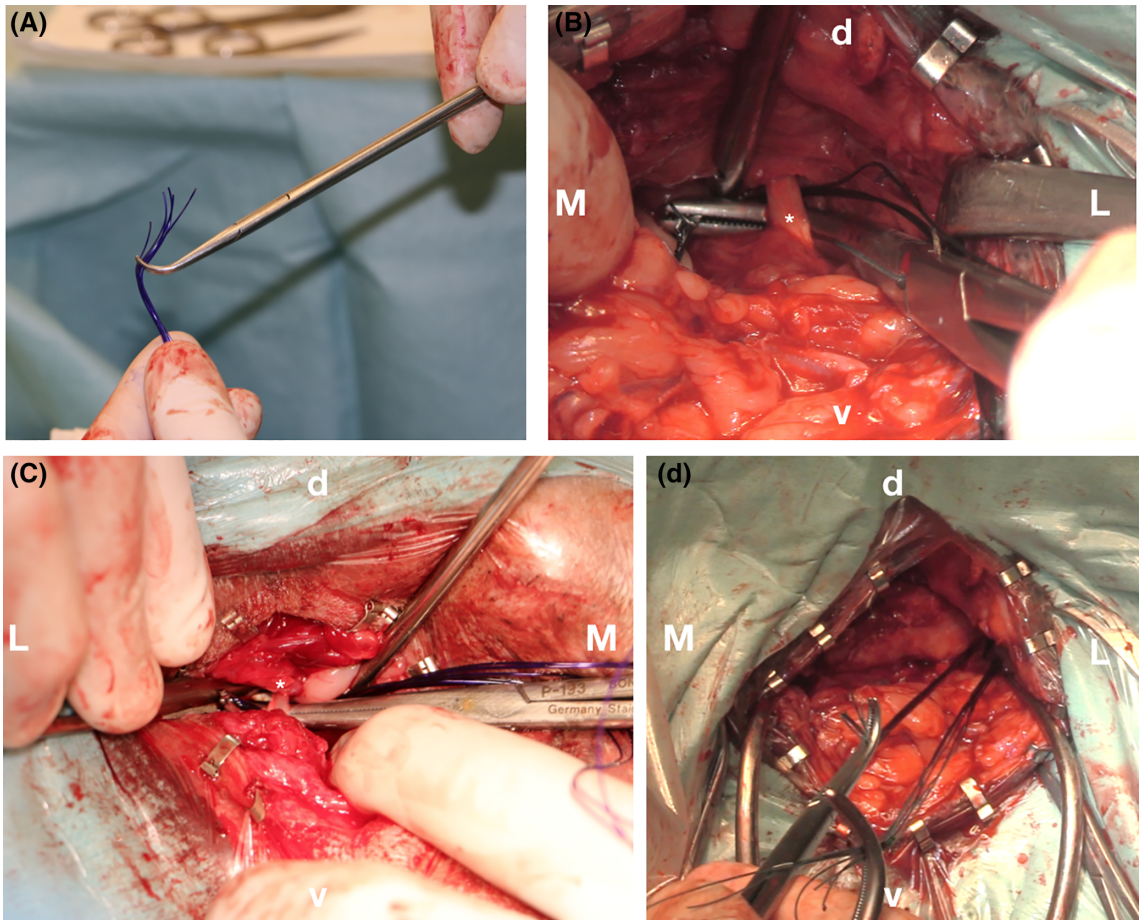

FIGURE 3 Main steps of the suture placement with nonswaged or swaged needle sutures in two dogs. a, Right-angle forceps were used to grasp the free end of multiple sutures. b, Multiple ends of nonswaged needle sutures were grasped by the tip of the right-angle forceps and passed closely around the proximal half of the sacrotuberous ligament from lateral to medial in one single maneuver. c, Multiple free ends of swaged needle sutures were grasped by the tip of the right-angle forceps and passed closely around the proximal half of the sacrotuberous ligament in one single maneuver, from medial to lateral. d, Traction of the sutures perpendicular to the sacrotuberous ligament as indirect evaluation pain test to rule out sciatic nerve entrapment. d, dorsal; L, lateral; M, medial; v, ventral

models. The model was then refined over multiple rounds by using backward-stepwise elimination of the least significant variable each time, and variables were retained in the final model when they were significant in their own right ($P < .05$). Logistic regression results are reported as odds ratios, 95% CI, and the associated *P*-value. Analyses were performed in Excel 2011 (Microsoft, Redmond, Washington) and in SPSS 24.0 (IBM, Armonk, New York).

3 | RESULTS

3.1 | Demographics and preoperative findings

In total, 55 dogs met the eligibility criteria for the study, but eight dogs were excluded because the sacrotuberous ligament was not incorporated during the herniorrhaphy, leaving a study population of 47 dogs.

All dogs were male, 38 of 47 intact and nine of 47 neutered. At the time of surgery, the median age of the population was 9.2 years (range, 3-12), and the median weight was 16.4 kg (range, 3-39). Breeds included cross breed (21), Pomeranian (3), dachshund (3), Segugio Italiano (3), German shepherd (2), Yorkshire terrier (2), border collie (2), Epagneul Breton (2), poodle (1), pointer (1), springer spaniel (1), Spinone Italiano (1), Maremma sheepdog (1), boxer (1), beagle (1), miniature pincher (1), and shih tzu (1). Twenty-eight dogs were considered medium-large breeds (>10 kg), and the remaining 19 of 47 dogs were small breeds (<10 kg). Tenesmus was reported as the primary clinical sign in 43 of 47 dogs, and dysuria-stranguria was reported in the remaining four of 47 dogs. The clinical sign was evident in 23 of 47 dogs for less than 1 month, in 15 of 47 dogs from 1 to 2 months, and in two of 47 dogs for more than 2 months.

Findings at physical examination included a unilateral or bilateral perineal swelling in all dogs; specifically,

PH was diagnosed on the right side in 20 of 47 dogs, bilaterally in 17 of 47 dogs, on the left side in nine of 47 dogs, and combined ventral/left side in one dog of 47. After digital rectal examination and abdominal ultrasonography, benign prostatic hyperplasia was reported in 29 of 47 dogs, 12 of 47 dogs had a normal prostate, one dog of 47 had a prostatic abscess, and no records were available for five of 47 dogs. Bladder retroflection into the hernia and emergency ultrasound-guided cystocentesis through the perineal skin and bladder repositioning were performed in four of 47 cases. Seven dogs had previous PH (five had traditional herniorrhaphy, and two dogs had internal obturator muscle transposition in a different hospital) and were referred within 1 month postoperatively for recurrence of clinical signs.

Complete blood count and serum biochemistry were performed in all dogs, and mild azotemia was reported in six of 47 cases. Urinalysis and urine bacteriology results were available in 25 of 47 cases; in 16 cases, white blood cells were present in the sediment with a positive bacterial culture.

3.2 | Surgical findings

Intraoperatively, the location of the PH was caudal in 30 of 47 dogs, dorsal in 16 of 47 dogs, and ventral in one dog of 47. The levator ani muscle was deemed completely atrophied in 40 of 47 cases. Herniorrhaphy was performed by using the internal obturator muscle transposition technique in 45 of 47 procedures, five of which were revision surgeries. The remaining two cases were revision surgeries from a previous internal obturator muscle transposition; semitendinosus muscle transposition was used in one dog, whereas the previous repair was only reinforced with additional sutures placed around the sacrotuberous ligament in the other dog.

Perineal herniorrhaphy was performed with six sutures around the sacrotuberous ligament in 28 of 47 dogs, and eight sutures were used in 19 of 47 dogs. The sutures were placed in the proximal half of the sacrotuberous ligament in all dogs. A nonswaged suture needle was used in 10 of 47 cases, and a swaged suture needle was used in the remaining 37 of 47 cases. Polydioxanone (PDS II; Ethicon) suture material was used in 42 of 47 dogs, 2-0 US Pharmacopeia (USP) was used in 18 of 47 dogs, and 0 USP was used in 24 of 47 dogs; polyglyconate (Maxon; Ethicon) suture material was used in five of 47 dogs, 2-0 USP was used in two of 47 dogs, and 0 USP was used in three of 47 dogs. The intraoperative oscillometric noninvasive MAP, SAP, DAP, and HR were recorded during surgery in all dogs; no changes were noted during suture placement and traction. Concomitant prescrotal castration was performed in all intact dogs (38/47). Three concomitant abdominal surgeries were performed in two dogs including left side colopexy/vasopexy (1) and omentalization of prostatic abscess (1). Median surgical time was 50 minutes (range, 40-85) for unilateral PH and 120 minutes (range, 100-160) for bilateral PH.

3.3 | Complications and outcomes

A rectal laceration occurred in a poodle during a preoperative rectal examination; rectal repair and PH were uneventfully performed, and a closed suction drain was maintained into the subcutaneous perineum for 3 days postoperatively with no complications reported. No intraoperative complications or changes providing evidence of sciatic nerve or caudal gluteal vessel entrapment/damage were reported in any of the dogs. Postoperative hospitalization ranged from 24 to 36 hours (median, 24), and no lameness or neurological sign compatible with sciatic nerve entrapment was noted. Postoperative antimicrobials were used in all cases (amoxicillin and clavulanic acid [Synulox] 20 mg/kg every 12 hours orally; Zoetis or marbofloxacin [Marbocyl] 3 mg/kg every 24 hours orally; Vetoquinol, Magny-Vernois, France) for 7 days. A combination of opioid and nonsteroidal anti-inflammatory medication was used for postoperative analgesia (tramadol [Altadol] 2-4 mg/kg every 12 hours orally; Formavet, Milan, Italy and meloxicam [Metacam] 0.2 mg/kg every 24 hours orally; Boehringer Ingelheim) for 4 days.

A minimum follow-up of 2 months was recorded for all dogs. During the postoperative period, 15 complications occurred in 10 of 47 dogs including surgical wound swelling (9), wound dehiscence (4), and temporary tenesmus (2); all resolved within 2 weeks without any treatments. No major complications were reported. Long-term follow-up was available for 30 of 47 dogs and ranged from 4 months to 10 years after surgery. Long-term issues were reported in seven of 47 dogs; four dogs had mild persistent tenesmus, and four dogs had mild perineal swelling still present 4 months after surgery. No recurrences were reported. According to the owners' responses on the questionnaire, none of the dogs seemed to be negatively affected by the surgery, and the functional outcome and quality of life were considered good in all dogs.

3.4 | Risk factors associated with complications of perineal hernia repair

Logistic regression analysis was used to determine factors associated with the occurrence of complications when possible confounding factors were taken into account (Table 1). After the initial model was refined by

TABLE 1 Simple logistic regression results[a]

	Complications		
Logistic regression	**OR**	**95% CI**	***P* value**
Age	1.68*	1.10-2.56*	.015*
Neuter Status	0.54	0.04-6.45	.628
Body Weight	0.95	0.89-1.02	.212
Size	0.51	0.15-1.71	.279
Duration of clinical signs	1.01*	1.00-1.02*	.036*
Herniation side	0.96	0.29-3.20	.954
Hernia location	1.38	0.40-4.77	.609
Type of material	0.43	0.12-1.56	.202
Type of needle	3.66	0.43-31.20	.234
Prostate pathology	0.29*	0.08-0.99*	.049*
Concomitant procedures	1.70	0.13-20.74	.678
Recurrence	5.00*	1.19-30.92*	.028*
Bilateral hernia	0.58	0.13-2.60	.486

Abbreviation: OR, odds ratio.

[a]Determining factors associated with all complications after surgical correction of perineal hernia and incorporation of the sacrotuberous ligament in dogs.

*$P < .20$, qualified for inclusion in the multiple-regression analysis (Table 2).

TABLE 2 Multiple logistic regression results[a]

	Complications		
Logistic regression	**OR**	**95% CI**	***P* value**
Age	1.66	1.08-2.55	.019
Duration of clinical signs	1.00	0.98-1.02	.664
Prostate pathology	0.39	0.09-1.70	.215
Recurrence	5.19	1.05-25.57	.043

Abbreviation: OR, odds ratio.

[a]Determining factors associated with all complications after surgical correction of perineal hernia and incorporation of the sacrotuberous ligament in dogs.

backward-stepwise elimination, the best-fit model was one that included four variables. In the final multiple-regression model (Table 2), the only factors associated with an increased risk of complications included increasing age ($P = .019$) and surgery for a PH recurrence ($P = .043$).

4 | DISCUSSION

No evidence of sciatic nerve or gluteal vessel damage was noted in this study, and complication rates were comparable to those described in previous reports, providing sufficient evidence for us to accept our hypothesis that sutures around the sacrotuberous ligament will not cause an increase in complications.[1-4] Furthermore, no evidence of recurrence or requirement of revision surgery was recorded in any dog. Increasing age and surgery for PH recurrence increased the risk of postoperative complications. These could have been the result of weakening and a less intact pelvic diaphragm is more weakening in old dogs and in dogs with second (revision) surgery, making them more prone to postoperative complications.

Sciatic nerve entrapment can occur as a postoperative complication of PH repair when the sacrotuberous ligament is incorporated during herniorrhaphy, resulting in sciatic sensory loss and paralysis of the hind leg.[1,24] It has been recommended that the suture be placed through the sacrotuberous ligament to avoid sciatic nerve and caudal gluteal vessels injuries.[1-3] Placement of sutures through the ligament is considered safe; however, this approach could represent a technical challenge, increase surgical time and cause complications such as bleeding from the caudal gluteal artery and vein, sciatic nerve injury, and glove perforation.[1-4,24] We had also hypothesized that repeated needle placement through the sacrotuberous ligament followed by traction of the sutures could weaken the ligament. In the technique described here, all sutures were placed around the sacrotuberous ligament in one single maneuver, reducing the risk of bleeding, sciatic nerve damage, or irritation and weakening of the ligament. Furthermore, the use of PDS or Maxon suture on either a swaged or nonswaged needle was deemed safe.

In a recent report, authors divided the sacrotuberous ligament into four parts according to their spatial relationship: (A) proximal attachment of the sacrotuberous ligament at the level of apex of the sacrum and the transverse process of the first caudal vertebra; (B) one-third distance from the proximal attachment; (C) two-thirds distance from the proximal attachment; and (D) distal attachment at the level of lateral angle of the ischiatic tuberosity. The authors described that C was the section of sacrotuberous ligament closest to the sciatic nerve (range, 0.3-1.5 cm) compared to A, B, or D sections (range, 0.4-3.0 cm).[24] Furthermore, a shorter distance may be present between the sciatic nerve and the sacrotuberous ligament in smaller dogs; thus, small dogs could be more vulnerable to sciatic nerve entrapment.[24] Khatri-Chhetri et al[24] provided invaluable information for avoiding sciatic entrapment and advised to approach this area cautiously during PH repair, especially in small breed dogs. In the technique described here, the sacrotuberous ligament was divided intraoperatively into the proximal half and the distal half, with the objective to place the sutures around only the proximal half of the

sacrotuberous ligament. This suture placement corresponded approximately to the B part of the sacrotuberous ligament described by of Khatri-Chhetri et al.[24]

Positioning the sutures in only the proximal part of the sacrotuberous ligament rather than its entire length could be a limiting factor for this technique; however, because of the good outcomes reported, lack of recurrence, and low complication rate in this study, it may be possible that the position of the suture along the ligament is not that essential.

Variations in the pelvic angulation and pelvic size among different breeds are well documented and can cause differences in the distance between the sacrotuberous ligament and the sciatic nerve.[24] As described by Khatri-Chhetri et al,[24] a shorter distance may be present between the sacrotuberous ligament and the sciatic nerve in small breed dogs. In the study reported here, no modifications were required for small breed dogs, and no increased risk of complications was found; however, according to findings in previous study, precautions should be taken when this technique is performed in small breed dogs.[24]

In the case of sciatic nerve entrapment, the traction maneuver of suture should induce intraoperative pain evidenced by an increase of MAP and DAP.[29,30] The most important variables for intraoperative nociception are the increase of MAP and DAP, unlike the HR that cannot be consistently correlated to intraoperative nociception.[29,30] In the study reported here, none of the dogs had an increase of MAP, DAP, or HR during surgery, and no intraoperative complications were recorded.

Sciatic nerve and gluteal vessels have a close anatomic correlation at the level of the ischial spine; specifically, the caudal gluteal artery is localized cranial to the sacrotuberous ligament and sciatic nerve (Figure 3).[31] However, despite the close anatomical relationship of these structures, suture placement around the proximal half of the sacrotuberous ligament resulted in no obvious damage to the sciatic nerve or caudal gluteal vessels. The only serious complication reported in this study was a rectal laceration that was independent of the surgical technique during the preoperative rectal examination. All postoperative complications reported, such as mild tenesmus or mild perineal swelling, were minor and self-limiting. This is in line with what has been recently reported in the literature.[2,3]

The authors acknowledge several limitations in this study. Because of its retrospective nature, standardization of the data collected could not be controlled, the sample was small, and long-term follow-up was not available in every case. The long-term outcomes of the dogs in our study were based on subjective evaluations by the owners. This assessment may be less reliable as a result of incorrect perceptions of the owners. It was not the intent of the authors to address the learning curve required to safely perform this technique; it is possible that this technique may not be suitable to all levels of surgical practice.

In conclusion, placement of sutures around the proximal half of the sacrotuberous ligament for PH repair resulted in no increase in complication rate, with no evidence of sciatic nerve or gluteal vessels injuries. No evidence of recurrence or requirement for revision surgery was recorded in any dog. This technique resulted in a good outcome for every dog in this population; however, older age and surgery in dogs with PH recurrence could be factors that increase the risk of postoperative complications.

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AUTHOR CONTRIBUTIONS

Cinti F, DVM, PhD, GPCert(SASTS), DECVS, MRCVS: Conception of the study, study design, collected the data, data analysis and interpretation, and drafted, revised and approved the submitted manuscript; Rossanese M, DVM, SPSA, CertAVP, MSU, MRCVS: Collected the data, data analysis and interpretation, performed the statistical analysis, and drafted, revised and approved the submitted manuscript; Pisani G, DVM, DECVS: Conception of the study, collected the data and revised and approved the submitted manuscript.

CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this report.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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