



## COMPARATIVE STUDY OF AUTOLOGOUS TUNICA VAGINALIS AND SYNTHETIC MESH GRAFTING FOR REPAIR OF PERINEAL HERNIA IN MALE DOGS

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(Received 26 May, 2025; accepted 10 September, 2025)

### ABSTRACT

Perineal hernia is frequently encountered in intact male dogs. While various surgical approaches exist, this study was aimed to compare the outcomes of autologous tunica vaginalis hernioplasty and polypropylene mesh hernioplasty in 12 dogs, divided equally into two groups. Seven dogs had bilateral perineal hernias while 5 dogs had unilateral hernia of which 4 were in right side and one on the left side. The omentum was the most commonly herniated structure (50%), followed by the prostate, urinary bladder, and rectum. Recurrence was observed in two dogs treated with tunica vaginalis grafts and in three dogs treated with polypropylene mesh. In conclusion, the tunica vaginalis grafting technique demonstrated lower recurrence rates, suggesting greater therapeutic efficacy. Nonetheless, further research involving larger sample sizes and targeted management of postoperative complications like tenesmus, straining, and urinary incontinence could enhance the overall success of the procedure.

**Keywords:** Autologous tunica vaginalis, hernioplasty, male dogs, perineal hernia polypropylene mesh

### INTRODUCTION

Perineal hernia refers to the displacement of abdominal or pelvic organs such as the urinary bladder, prostate, retroperitoneal fat, and intestines through a defect in pelvic diaphragm into the subcutaneous tissue adjacent to anal region. This condition predominantly affects intact male dogs of middle to advanced age, though cases have also been documented in female dogs, cats, buffaloes (Malik *et al.*, 2012), and cows (Parmar *et al.*, 2024). Recent studies suggest that small to medium-sized breeds, including 'Shih Tzus', 'Dachshunds', and 'Maltese', are more susceptible to perineal hernia (Shaughnessy and Monnet, 2015; Bernardé *et al.*, 2018; Cinti *et al.*, 2021). Persistent tenesmus and constipation, often resulting from prostatic enlargement, rectal pathology, hormonal imbalances involving relaxin, and muscular degeneration (Ninu *et al.*, 2024), are the key contributing factors. Diagnostic evaluation is strengthened by assessing the degree of muscular atrophy and prostate size (Ferreira and Delgado, 2003), with radiographic and ultrasonographic imaging playing a crucial role (Zerwes *et al.*, 2011; Singh *et al.*, 2021).

Among the various surgical reconstruction techniques available for repairing perineal defect, muscle apposition technique (Khatri-Chhetri *et al.*, 2016), transpositioning of muscle flaps (Moraes *et al.*, 2017) and synthetic mesh grafting (Al-Akraa, 2015) are the standard treatment protocol but recurrence is a major complication, indicating the necessity for better grafting materials and

techniques. Advanced techniques like porcine or canine small intestinal submucosa grafting (Stoll *et al.*, 2002) are costly and not easily available. In recent studies, autologous tunica vaginalis grafting has been used in dogs to repair perineal defect in dogs (Guerios, 2020) where fibrous connective tissue was formed with the adjacent muscles, thus providing support without any antigenic reaction. In order to find a durable, non-antigenic and easily available suitable grafting material for perineal hernia repair, the present study was aimed to evaluate the efficacy of autologous tunica vaginalis and synthetic polypropylene mesh grafting techniques for perineal hernia repair in dogs.

## MATERIALS AND METHODS

The study involved 12 intact male dogs diagnosed with perineal hernia were randomly allocated into two groups of six animals each. Group I underwent hernioplasty using autologous tunica vaginalis,



**Fig. 1: Coned tunica vaginalis with excess tissue at the centre**



**Fig. 2: Stretched tunica vaginalis graft due to increased abdominal pressure**



**Fig. 3: Coned polypropylene mesh graft**

whereas group II was treated with polypropylene mesh. The dogs presented had clinical signs like perineal swelling, constipation, and difficulty in defecation and urination. Diagnostic evaluation included physical and rectal examinations, radiography, and ultrasonography. Prostatic measurements were obtained via ultrasonography using a Philips machine equipped with a 5-12 MHz linear probe.

### Anaesthesia

All the dogs were premedicated with a combination of butorphanol @ 0.2 mg kg<sup>-1</sup> b.w. (butodol 2 mg mL<sup>-1</sup>, Neon Laboratories Ltd.), acepromazine @ 0.01-0.05 mg kg<sup>-1</sup> b.w. (acepromazine 10 mg mL<sup>-1</sup>, Vetone), and glycopyrrolate @ 0.2 mg kg<sup>-1</sup> b.w. (pyrolate 1 mg mL<sup>-1</sup>, Neon Laboratories Ltd.) intramuscularly, 15 min prior to the induction with intravenous propofol @ 4 mg kg<sup>-1</sup> b.w. (Neorof 10 mg mL<sup>-1</sup>, Neon Laboratories Ltd.). Endotracheal intubation was performed and anaesthesia maintained with 2% isoflurane in oxygen.

### Surgical technique

After performing pre-scrotal open-covered orchietomy in group I, an incision was made on the posterior surface of resected testes and tunica vaginalis was harvested. The size of tunica vaginalis was recorded and dampened sterile gauze pieces were kept to moisten it till hernioplasty. After performing pre-scrotal open-covered orchietomy in group II, hernioplasty with polypropylene mesh (Trulene Laparo Mesh-TVLM 611) was performed.

For hernioplasty, a linear skin incision was made over the hernial defect, 1-2 cm lateral to the anus. After separating the subcutaneous tissue, herniated organs and hernial rings were identified and repositioned. Tissue adhesions were graded 1-3 as per Karatas *et al.* (2014). The size of hernial ring, tunica vaginalis, and polypropylene mesh were measured and compared (Table 2).

The hernial ring was closed with tunica vaginalis (Gr I) or sterile polypropylene mesh (Gr II) in overlay technique. The graft material was placed in shape of cone to reduce tension at the suture area (Fig. 1-3). The tunica vaginalis grafts harvested were directly used without any change in dimension of graft in Gr I; while in Gr II, the size of polypropylene mesh was 2-3 cm more than the actual hernia ring size. The graft and pelvic diaphragmatic muscles were sutured with polydioxanone II (PDS II Ethicon) (No. 2-0) using simple interrupted pattern in both the groups. The subcutaneous tissue was closed with absorbable PDS II (2-0) and the skin with nylon (No. 2-0) in a simple interrupted or cross mattress fashion. In dogs with bilateral perineal hernia, hernioplasty was performed only on one side. In post-operative period, antibiotic ceftriaxone tazobactam intravenously (Intaceftazo: 562.5 mg, Intas Pharmaceutical Ltd.) @ 20 mg kg<sup>-1</sup> b.w. was prescribed twice daily for 5 days along with intramuscular meloxicam @ 0.2 mg kg<sup>-1</sup> b.w. once daily for 3 days (Melonex, 5 mg mL<sup>-1</sup>, Intas Pharmaceutical Ltd). Tablet finasteride (Finapet 5 mg, Vivaldis Animal Health) at 0.1-0.5 mg kg<sup>-1</sup> or 5 mg tablet for 10-50 kg was prescribed for a maximum of 30 days in dogs with prostate gland enlargement. Fibre-rich diet with stool softeners were advised for 3 months. For statistical analyses, the quantitative data estimated by Microsoft Excel 2010 were presented as mean ± SE, while qualitative (subjective) data were expressed as absolute numbers and percentages.

## RESULTS AND DISCUSSION

Perineal hernias were observed across various dog breeds. In present study, German Shepherds (n = 3) and Pomeranians (n = 3) breeds exhibited highest incidence, followed by Labrador Retrievers (n = 2), and single cases each in non-descript dog, Lhasa Apso, Dachshund, and Rottweiler breeds. The average age of affected dogs was 8.20 ± 0.18 years. Bilateral hernias were noted in seven dogs, while five dogs had unilateral hernias, four on the right side and one on the left side (Table 1). The distribution of herniation sides in unilateral cases was consistent with Anjitha *et al.* (2023), who

**Table 1: Signalment and history of the dogs presented with perineal hernia**

Groups	Age (years)	Breed	Weight (kg)	Duration of hernia (months)	Preoperative		Anorexia	Side of hernia	Type of content	Recurrence
					Urination	Defecation				
GI1	9	GSD	30	6	NAD	Constipation (hard faeces)	No	Bilateral	Soft	No
GI2	5	GSD	22	1	NAD	Straining	Yes	Left	Soft	No
GI3	9	ND	15	-	NAD	Straining	No	Bilateral	Soft	Yes
GI4	10	Lhasa apso	7	3	Urine incontinence	Straining	No	Right	Hard	Yes
GI5	8	Pom	9	5	NAD	Difficulty in defecation	No	Right	Soft	No
GI6	11	Pom	10	7	Stranguria	Difficulty in defecation	No	Right	Soft	No
GII1	7	Lab	28	1	NAD	Straining	No	Bilateral	Soft	No
GII2	8.5	Das	9.4	1	NAD	Straining	No	Bilateral	Hard	Yes
GII3	7	Pom	7	2	NAD	Difficulty in defecation	Yes	Bilateral	Hard	Yes
GII4	11	GSD	32	12	NAD	Difficulty in defecation	Yes	Right	Hard	No
GII5	9	Lab	17.5	2	NAD	Tenesmus	No	Bilateral	Hard	No
GII6	4	Rott	36	0.25	NAD	Straining	No	Bilateral	Soft	Yes

GSD = German Shepherd, ND = Non-descript, Pom = Pomeranian, Lab = Labrador Retriever, Das = Dachshund, Rott = Rottweiler, NAD = No abnormality detected); (GI 1-6: Serial numbers of group I dogs; similarly, GII 1-6: Serial numbers of group II dogs.

sided and 35% left-sided hernias in 20 dogs. Contrary to our findings, their study showed higher prevalence of unilateral cases (80%) as compared to the bilateral ones (20%), Clinical signs observed included anorexia (n = 3), stranguria (n = 1), urinary incontinence (n = 1), difficulty in defecation (n = 4), straining during defecation (n = 6), constipation (n = 1), and tenesmus (n = 1). These findings are in agreement with Ragni and Moore (2011), Grand *et al.* (2013), and Bernardé *et al.* (2018). Rectal deviation was identified in 5 dogs (41.66%) on abdominal radiographs, which is lower than the 63.16% incidence reported by Singh *et al.* (2021). Prostatic enlargement was observed in 7 dogs (58.33%) via ultrasonography and in 6 dogs (50%) through radiographic evaluation. The prostate dimensions, recorded in this study (Table 2), were smaller as compared to those reported by Singh *et al.* (2021), who documented an average size of  $4.84 \pm 1.72 \times 3.38 \pm 1.14$  cm.

In present study, both tunica vaginalis and polypropylene mesh grafts were fashioned into a cone shape through suturing. Other researchers have employed alternative graft shapes. For instance, Guerios *et al.* (2020) tailored tunica vaginalis graft into a rectangular form based on the dog's body weight, while Pratummintra *et al.* (2013) utilized triangular grafts with a base width of 3-4 cm. Heishima *et al.* (2023) modified a  $15 \times 15$  cm polypropylene mesh into a cone shape, securing it at 3-4 muscle attachment points corresponding to the hernial ring size, with excess material subsequently trimmed.

**Table 2: Intraoperative and postoperative findings of the dogs presented with perineal hernia (GI: Group I; GII: Group II)**

	Preoperative prostate size (cm)	Post-operative prostate size (cm)	Ring size (cm)	Size of graft (cm)	Herniated organs intra-operatively	Adhesions	Defecation	Urination	Recurrence (%)	Success rate (%)
<b>GI</b>	3.7±0.7 x 3.28±0.6	2.33±0.47 x 2.33±0.51 reduce	2.96±0.63 x 2.73±0.31	4.6±0.57x 4.96±0.48	Omentum - 50%, Prostate and omental fat- 16.66%, Prostate and urinary bladder - 16.66%, Rectum- 16.66%	Grade 1- 50%, Grade 2- 16.6%, Grade 3- 33.33%	Normal - 50%, Straining - 16.66%, Tenesmus 16.66%, Difficulty in defecation 16.66%	Normal- 50%, Stranguria -33.33%, Dysuric- 16.66%	33.33	66.66
<b>GII</b>	3.67±1.17 x 3.26±0.98	2.76±0.65 x 2.6±0.54 reduce	3.01±0.46 x 1.68±0.195	4.58±0.66 x 7.5±0.84	Rectum- 33.33%, Rectum and omentum- 16.66%, Omentum - 16.66%, Urinary bladder along with prostate- 33.33%	Grade 1- 50 %, Grade 2- 33.33%, Grade 3- 16.66%	Normal- 33.33%, Straining- 33.33%, Constipation- 16.66%, Constipation & tenesmus - 16.66%	Normal- 66.66%, Urinary incontinence- 33.33%	50	50

Enlarged prostate on ultrasound in 66.66% dogs  
 Bilateral perineal hernia: 58.33% (GI: 33.33%; GII: 83.33%)  
 Unilateral perineal hernia: 41.67% (GI: 66.66%; GII: 8.3%)  
 (Right side: 33.33%; Left side: 8.33%)

Scrotal edema was observed in eight dogs (66.66%), with four cases in each treatment group, accompanied by defecation and urination difficulties (Table 2). In group I, two dogs experienced hernia recurrence six months postoperatively. Pratummintra *et al.* (2013) reported a 9.09% recurrence rate following autologous tunica vaginalis grafting, potentially due to graft detachment from the

internal obturator muscle and defecation issues. The present study recorded 66.66% success rate for perineal hernioplasty using tunica vaginalis, while Guerios *et al.* (2020) reported 100% success rate in seven dogs treated with the same technique. The comparatively lower success rate in this study may be attributed to the increased intra-abdominal pressure visible during surgery (Fig. 2) and post-operative complications such as straining, tenesmus, constipation, and defecation difficulty, which likely contributed to suture dehiscence (Table 2). In group II, recurrence occurred in three dogs at 2, 4, and 6 months, possibly due to prostatic enlargement causing postoperative straining, tenesmus, and constipation. The success rate for polypropylene mesh grafting in this study was 50%, which is lower than the rates reported by Heishima *et al.* (2023) at 73% and Al-Akraa (2015) at 100%. A postoperative reduction in prostate size was noted in both the groups (Table 2), likely resulting from androgen deprivation and administration of finasteride.

In conclusion, autologous tunica vaginalis grafting proved more effective than polypropylene mesh grafting for managing perineal hernias in terms of lower recurrence rates and cost-efficiency. However, addressing postoperative complications such as tenesmus, straining, and urinary incontinence could further enhance the overall success of the procedure.

**Conflict of interest:** All the authors declare to no conflict of interest.

**Ethical approval:** The study was conducted under the guidelines and approval of Institutional Ethics Committee for the care and use of animals in research (Ref: V-11011(13)/2/2024-CPCSEA-DAFD, Committee for Control and Supervision of Experiments on Animals, New Delhi, India).

**Acknowledgement:** The authors acknowledge the financial support received from the Indian Council of Agriculture (DIMSCA) and Guru Angad Dev Veterinary and Animal Science University, Ludhiana, Punjab for present study.

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