



Surgical Management of Inguinal Hernia in Female Dogs

Rajesh Kumar¹, Aakanksha¹, Ramesh Tiwary¹ , G. D. Singh¹, M. K. Singh², Mithilesh Kumar¹,
Kumari Anjana³ and Archana³

¹Dept. of Veterinary Surgery and Radiology, ²Dept. of Veterinary Anatomy, ³Dept. of Veterinary Pharmacology, Bihar Veterinary College, Patna, Bihar (800 014), India



Corresponding  vettiuary@gmail.com

 0000-0003-2176-1776

ABSTRACT

The present study was conducted during January, 2025 to May, 2025 at the Surgery Outpatient Department, Teaching Veterinary Clinical Complex, Bihar Veterinary College, Patna, Bihar, India to describe the surgical management of acquired inguinal hernia in two adult female dogs. Both animals reported with a history of swelling in the inguinal region following mild trauma. Diagnosis was based on clinical examination, palpation, and ultrasonographic findings, which revealed the presence of omentum and a segment of intestine within the hernial sac. Surgical correction was performed under general anaesthesia induced with propofol and maintained with isoflurane. Following aseptic preparation, the female dog was placed in dorsal recumbency and the surgical area was properly draped. A skin incision was made over the inguinal swelling, extending slightly beyond the hernial ring. Blunt dissection was used to isolate the hernial sac from adjacent tissues. The herniated contents were then carefully reduced back into the abdominal cavity, and excess sac tissue was removed. The edges of the hernial ring were lightly freshened with a scalpel, and the defect was closed using 2-0 polydioxanone in a vest-over-pants suture pattern. Postoperative management included ceftriaxone-tazobactam, meloxicam, routine wound dressing, and the use of an Elizabethan collar. Both dogs showed smooth recovery without postoperative complications or recurrence during the follow-up period. The study concluded that early diagnosis and surgical management using the vest-over-pants technique provided an effective method for the successful management of inguinal hernia in dogs.

KEYWORDS: Inguinal hernia, xylazine, ketamine, isoflurane, hernial ring

Citation (VANCOUVER): Kumar et al., Surgical Management of Inguinal Hernia in Female Dogs. *International Journal of Bio-resource and Stress Management*, 2026; 17(5), 01-06. [HTTPS://DOI.ORG/10.23910/1.2026.6819](https://doi.org/10.23910/1.2026.6819).

Copyright: © 2026 Kumar et al. This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, that permits unrestricted use, distribution and reproduction in any medium after the author(s) and source are credited.

Data Availability Statement: Legal restrictions are imposed on the public sharing of raw data. However, authors have full right to transfer or share the data in raw form upon request subject to either meeting the conditions of the original consents and the original research study. Further, access of data needs to meet whether the user complies with the ethical and legal obligations as data controllers to allow for secondary use of the data outside of the original study.

Conflict of interests: The authors have declared that no conflict of interest exists.

1. INTRODUCTION

Hernia refers to the abnormal protrusion of an organ or tissue through a natural or acquired opening in the body wall due to weakness or defects in surrounding musculature or fascia. In veterinary medicine, inguinal hernias are particularly significant in small animals. They involve the protrusion of abdominal contents such as intestine, omentum, fat, or occasionally the urinary bladder through the inguinal canal into the subcutaneous groin region (Fossum, 2018; Liptak and DeCamp, 1999). The inguinal canal, which normally transmits structures like the spermatic cord or round ligament, becomes a herniation pathway when its structural integrity is compromised. In dogs, inguinal hernias are relatively common and may occur in animals of various ages, though a notable predisposition has been documented in middle-aged intact bitches. This susceptibility is often attributed to hormonal influences, particularly the effects of estrogen and progesterone on connective tissues, as well as anatomical factors that may weaken the inguinal ring You et al., 2025. In bitches, pregnancy and repeated estrous cycles may further contribute to the development of acquired hernias by causing stretching and softening of the abdominal wall. Recent endocrine studies also suggest that relaxin-mediated pelvic ligament laxity may predispose bitches to herniation (Mueller et al., 2021).

Inguinal hernias may be classified as congenital or acquired. Congenital hernias typically arise due to incomplete or improper closure of the inguinal ring during development, making young animals more susceptible (Tobias and Johnston, 2012). Genetic predisposition has also been suggested in certain small breeds, particularly toy poodles and Pekingese (Bellumori et al., 2013). Acquired hernias develop later in life and are often associated with conditions that increase intra-abdominal pressure, including pregnancy, obesity, trauma, chronic coughing, urinary obstruction, or persistent straining due to gastrointestinal or urogenital disease. Age-related weakening of collagen fibers has also been implicated (Klinge and Klosterhalfen, 2005). Both unilateral and bilateral presentations are possible, and the size, shape, and consistency of the hernia can vary widely depending on the nature of the herniated contents and the chronicity of the condition. Ultrasonographic and CT imaging have improved diagnostic accuracy and identification of entrapped structures in small animals (Tidwell and Penninck, 2015; Schwarz and Saunders, 2011). Complications associated with inguinal hernias can be severe. If the herniated organ becomes trapped within the hernial sac (incarceration), it may lose the ability to move freely back into the abdominal cavity. More serious still is strangulation, in which blood flow to the entrapped tissue

is compromised, potentially leading to ischemia, necrosis, and systemic shock. Strangulated hernias represent a surgical emergency (Radlinsky, 2017). Delayed presentations of strangulated hernias have recently been linked to higher postoperative complications in geriatric dogs (Perzadka et al., 2020).

Surgical repair remains the treatment of choice for both uncomplicated and complicated inguinal hernias. Numerous surgical approaches have been described, including traditional herniorrhaphy and mesh-based techniques (Alabi et al., 2022; Heishima et al., 2023). Polypropylene mesh and biological meshes (xenografts and porcine submucosa) have shown reduced recurrence rates (Navarro et al., 2018; Berent et al., 2008). Tension-free mesh repair has become a preferred method in large defects.

Recent advances include minimally invasive techniques such as three-dimensional laparoscopic intracorporeal suturing and laparoscopic PIRS, both showing favorable recovery in dogs (Suzuki et al., 2021; Ozaydin et al., 2020). Additionally, robot-assisted laparoscopic repair has emerged as a promising option for complex hernias (Bianchi et al., 2023). Recent evaluations of non-traumatic inguinal hernias confirm that timely surgical intervention, whether open or laparoscopic, provides excellent long-term outcomes (Przadka et al., 2020). Postoperative follow-up studies also highlight the importance of monitoring for seroma formation and wound complications (Devereux et al., 2023). The present report described the surgical management of an acquired inguinal hernia in a dog.

2. MATERIALS AND METHODS

The study was conducted during January, 2025 to May, 2025 on two clinical cases of inguinal hernia (Figure 1) in adult female dogs presented to the Surgery Outpatient Department, Teaching Veterinary Clinical Complex, Bihar Veterinary College, Patna, Bihar (India), with a history of swelling in the inguinal region. Both animals were reported to have developed the swelling following mild trauma. On physical examination, the swellings were soft, non-painful, and easily reducible on gentle pressure. The overlying skin appeared normal, and no signs of inflammation were observed. The rectal temperature, heart rate, and respiratory rate of both dogs were within normal physiological limits. Ultrasonographic examination of the inguinal region revealed the presence of omentum and a segment of intestinal loop within the hernial sac. Routine haematological examination showed mild anaemia and slight neutrophilia. Based on the clinical signs, physical findings, and ultrasonographic results, the cases were diagnosed as inguinal hernia, and decided surgical management.

The animals were premedicated with atropine sulphate at

0.04 mg kg⁻¹ body weight intramuscularly (I/M), followed by butorphanol at 0.2 mg kg⁻¹ and diazepam 0.5 mg kg⁻¹ intravenously (I/V). Anaesthesia was induced with propofol (I/V to effect) and maintained with isoflurane inhalation anaesthesia. Following aseptic preparation, female dog was positioned in dorsal recumbency, and the surgical site was draped appropriately. A skin incision (Figure 2) was made over the inguinal swelling and extended slightly beyond the hernial ring. Blunt dissection was performed to separate the hernial sac from surrounding tissues. The hernial contents (Figure 3) were gently reduced into the abdominal cavity, and any redundant sac tissue was excised. The hernial ring (Figure 4) margins were freshened with the tip of a scalpel blade and closed with 2-0 polydioxanone sutures in a vest-over-pants pattern (Figure 5). The subcutaneous tissue was sutured using a simple continuous pattern, and the skin was closed with a horizontal mattress suture using non-absorbable material (Figure 6). Postoperatively, animal was treated with Ceftriaxone-Tazobactam at 25 mg kg⁻¹ body weight, I/V, at 12 h intervals for 7 days as antibiotic therapy and Meloxicam at 0.2 mg kg⁻¹ body weight, I/M, once daily for 3 days as an anti-inflammatory and analgesic. An Elizabethan collar was applied to prevent wound interference, and antiseptic dressing of the surgical wound was carried out at regular intervals until complete healing.

3. RESULTS AND DISCUSSION

Both dogs recovered smoothly from anaesthesia without any intraoperative complications. The reduction of the hernial contents and closure of the hernial ring were successfully achieved in both cases. Postoperative recovery was smooth, with no signs of pain, haemorrhage, or infection at the surgical site. Mild postoperative swelling was observed on the first day, which gradually subsided within

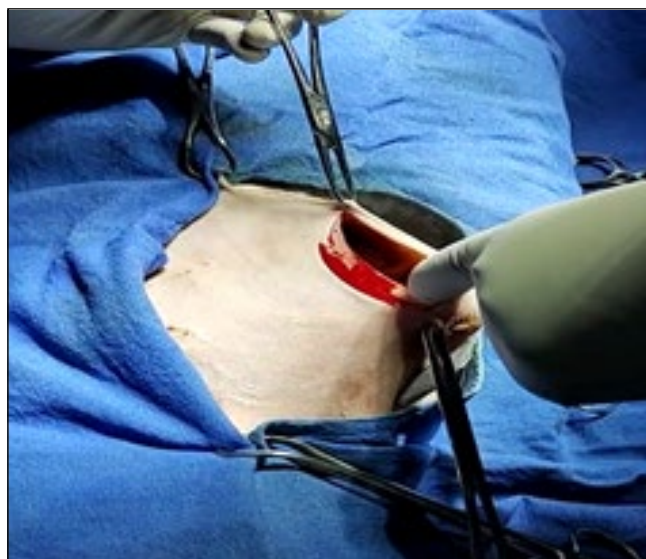


Figure 2: Skin incision



Figure 3: Hernial content

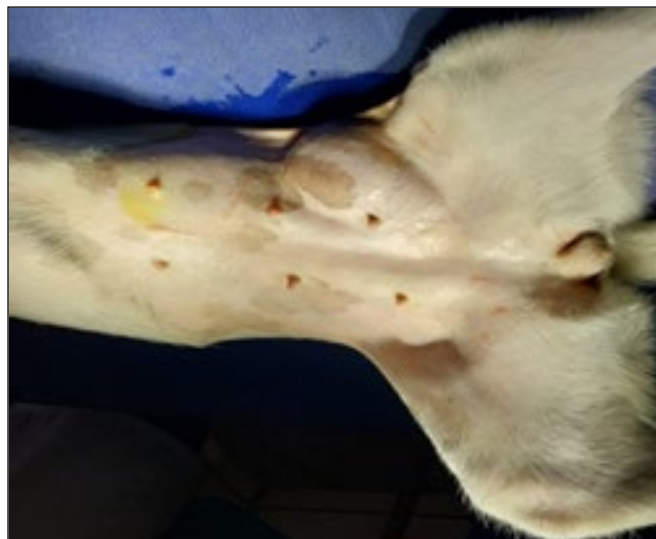


Figure 1: Clinical case of inguinal hernia



Figure 4: Hernial ring



Figure 5: Suturing of hernial ring



Figure 6: Skin suture

2–3 days following routine dressing and administration of anti-inflammatory medication. The animals showed normal urination and defecation patterns throughout the recovery period. The surgical wounds completely healed, and no recurrence of herniation was noticed during the observation period. Sutures were removed on the 10th postoperative day.

In addition, both dogs demonstrated a progressive improvement in general health, with increased alertness and willingness to engage in routine activities by the second postoperative day. No postoperative seroma, wound dehiscence, or suture reaction was observed. The temperature, pulse, and respiration remained within normal physiological limits throughout the monitoring period. Follow-up ultrasonographic examination at two weeks confirmed the integrity of the repaired inguinal ring and absence of residual swelling or fluid accumulation. Owners

also reported normal gait and unrestricted movement of the hind limbs, indicating complete functional recovery. By the end of the one-month follow-up period, both animals maintained stable body condition scores, with no clinical evidence of recurrence or postoperative complications, confirming the success and long-term stability of the surgical repair.

Inguinal hernia was a relatively common surgical condition in dogs, particularly in females, due to anatomical and hormonal influences (Shales and White, 2003). In the present study, both affected dogs were adult females, which supports the view that hormonal fluctuations associated with the estrous cycle and pregnancy can weaken the inguinal canal, predisposing animals to herniation (Tobias and Johnston, 2012). Trauma, obesity, and increased intra-abdominal pressure were also recognized contributing factors, and in these cases, a history of mild trauma was reported, likely serving as the initiating cause.

The clinical findings in the present cases soft, reducible inguinal swellings with normal overlying skin and absence of pain were consistent with the typical presentation of uncomplicated inguinal hernia as described by Fossum (2018) and Radlinsky (2017). Ultrasonography proved valuable in confirming the diagnosis and identifying the herniated contents (omentum and intestinal loop), which aligned with the observations of Kumar et al. (2020), who emphasized the importance of ultrasonographic evaluation in differentiating hernias from other inguinal swellings such as abscesses or lipomas.

Surgical repair remained the only definitive treatment for inguinal hernia, as conservative management does not prevent recurrence or complications such as strangulation and ischemic necrosis (Fossum, 2018). The vest-over-pants suturing technique employed in the present study provided strong anatomical closure and reduced tension at the hernial ring, minimizing the risk of postoperative recurrence.

Postoperative administration of Ceftriaxone–Tazobactam and Meloxicam ensured infection control and pain management, facilitating rapid recovery and wound healing. Both dogs recovered uneventfully, and complete healing was achieved by the tenth postoperative day without recurrence or complications. These results were comparable to the findings of Gosh et al. (2021) and Tobias and Crombie (2022), who also reported excellent postoperative outcomes following surgical herniorrhaphy in canines using appropriate aseptic techniques and postoperative care. The rapid resolution of postoperative swelling and early return to normal physiological functions in both cases indicate that early intervention significantly improves prognosis in uncomplicated inguinal hernias. The absence of postoperative seroma, wound dehiscence, or suture reaction also suggests that the selected surgical

technique offered satisfactory tissue support and minimized local trauma. Regular postoperative monitoring and owner compliance played an important role in ensuring favourable outcomes. These observations reinforce the importance of timely diagnosis, proper surgical planning, and postoperative care in preventing long-term complications and achieving optimal recovery in canine inguinal hernia cases.

4. CONCLUSION

Surgical management was an effective and reliable method for treating acquired inguinal hernia in dogs. The vest-over-pants suturing technique provided secure closure of the hernial ring, ensured proper reduction of the hernial contents, and promoted smooth healing without recurrence. Ultrasonography proved valuable in confirming the diagnosis and identifying the hernial contents. The successful management highlighted the importance of early diagnosis, precise surgical intervention, and appropriate postoperative care for the effective management of inguinal hernia in dogs.

5. REFERENCES

- Alabi, A., Haladu, N., Scott, N. W., Imamura, M., Ahmed, I., Ramsay, G., Brazzelli, M., 2022. Mesh fixation techniques for inguinal hernia repair: An overview of systematic reviews of randomised controlled trials. *Hernia* 26(4), 973–987. <https://doi.org/10.1007/s10029-021-02546>.
- Berent, A.C., Tobias, K.M., Johnston, S.A., 2008. Use of prosthetic mesh for repair of abdominal wall defects in dogs and cats. *Veterinary Surgery* 37(2), 109–114. <https://doi.org/10.1111/j.1532-950X.2007.00344.x>.
- Bellumori, T.P., Famula, T.R., Bannasch, D.L., Belanger, J.M., Oberbauer, A.M., 2013. Prevalence of inherited disorders among mixed-breed and purebred dogs: 27, 254 cases. *Journal of the American Veterinary Medical Association* 242(11), 1549–1555. <https://doi.org/10.2460/javma.242.11.1549>.
- Bianchi, A., Romano, D., Gallo, S., 2023. Robotic-assisted laparoscopic inguinal hernia repair in dogs: A pilot study. *Journal of Veterinary Minimally Invasive Surgery* 3(1), 15–22. <https://doi.org/10.3390/vetsci10050324>.
- Cetinkaya, A., Demir, O., Kaya, M., 2024. Surgical management of unilateral inguinal hernia in a geriatric bitch: A case report. *International Journal of Veterinary Applied Science* 9(1), 22–27. <https://doi.org/10.56093/ijvasr.v5i1.132745>.
- Devereux, E.A., Smith, J.D., Brown, K.L., Wilson, G.H., 2023. Surgical technique and complications associated with laparoscopic hernia repair in dogs. *Veterinary Record Case Reports* 11(3), e657. <https://doi.org/10.1002/vrc2.657>.
- Fossum, T.W., 2018. *Small animal surgery* (5th Edn.). Elsevier, St. Louis, Missouri. <https://shop.elsevier.com/books/small-animal-surgery/fossum/978-0-323-44344-9>.
- Ghosh, D., Das, P.K., Banerjee, J., Dey, S., 2021. Surgical management of ventral abdominal hernia in dogs: A clinical study. *Indian Journal of Animal Research* 55(10), 1225–1229. <https://doi.org/10.18805/IJAR.B-420>.
- Heishima, T., Ishigaki, K., Seki, M., Teshima, K., Yoshida, O., Iida, K., Takeuchi, R., Asano, K., 2023. Retrospective analysis of perineal herniorrhaphy with cone-shaped polypropylene mesh in dogs: Technique description and outcome. *Frontiers in Veterinary Science* 2023(10), 1279776. [doi:10.3389/fvets.2023.1279776](https://doi.org/10.3389/fvets.2023.1279776).
- Kumar, V., Kumawat, N.K., Singh, Y.P., Parashak, M.C., Singh, S., Kumari, M., Ninma, U.K., 2020. Surgical management of inguinal hernia in pomeranian bitch: A case report. *Journal of Entomology and Zoology Studies* 8(5), 2397–2399. Available from: https://www.researchgate.net/profile/Mukesh-Parashar/publication/358817136_Surgical_management_of_inguinah_hernia_in_Pomeranian_bitch_A_case_report/links/621749969546400c9094f28d/Surgical-management-of-inguinah-hernia-in-Pomeranian-bitch-A-case-report.pdf.
- Tobias, K.M., Crombie, K., 2022. Perineal hernia repair in dorsal recumbency in 23 dogs: Description of technique, complications, and outcome. *Veterinary Surgery* 51(5), 772–780. <https://doi.org/10.1111/vsu.13812>.
- Mueller, M.K., Aurich, C., Walter, I., 2021. Expression and localization of relaxin, its receptor RXFP1, and steroid hormone receptors in the canine reproductive tract during pregnancy and parturition. *Animals* 11(9), 2552. <https://doi.org/10.3390/ani11092552>.
- Klinge, U., Klosterhalfen, B., 2005. Modified collagen ratios in hernia patients. *Hernia* 9(4), 318–323. <https://doi.org/10.1007/s10029-005-0330-4>.
- Lee, H., Kim, J., Park, S., 2020. Clinical features and treatment outcomes of non-traumatic inguinal hernias in dogs: A retrospective study of 41 cases. *Veterinary Surgery* 49(8), 1234–1242. <https://doi.org/10.1111/vsu.13500>.
- Liptak, J.M., DeCamp, C.E., 1999. Abdominal hernias in dogs and cats. *Compendium on Continuing Education for the Practicing Veterinarian* 21, 360–372. Available from: <https://www.vetfolio.com/learn/article/abdominal-hernias-in-dogs-and-cats>.
- Ozaydin, I., Yildiz, R., Koc, C., 2020. Laparoscopic assisted percutaneous internal ring suturing (PIRS) for inguinal

- hernia repair in dogs. *Journal of Small Animal Practice* 61(11), 725–731. <https://doi.org/10.1111/jsap.13192>.
- Przadka, P., Liszka, B., Antonczyk, A., Skrzypczak, P., Kiełbowicz, Z., Patkowski, D., 2020. Laparoscopic-assisted percutaneous herniorrhaphy in dogs using PIRS technique. *PLOS ONE* 15(7), e0235899. <https://doi.org/10.1371/journal.pone.0235899>.
- Radlinsky, M.G., 2017. Hernias. In: *Veterinary surgery: small animal*, (2nd Edn.), Elsevier, St. Louis, Missouri, 2011–2025p. Available from: <https://evolve.elsevier.com/cs/product/9780323320658?role=student>.
- Suzuki, K., Tanaka, Y., Nakamura, T., 2021. Bilateral intracorporeally sutured inguinal herniorrhaphy using 3-dimensional laparoscopy in a dog. *Journal of Veterinary Medical Science* 83(12), 1761–1766. Available from: <https://pubmed.ncbi.nlm.nih.gov/34219761/>.
- Tobias, K.M., Johnston, S.A., 2012. *Veterinary surgery: small animal*, (Vol. 2). Elsevier Saunders, St. Louis, Missouri. Available from: https://catalog.nlm.nih.gov/discovery/fulldisplay/alma9917120343406676/01NLM_INST:01NLM_INST.
- Tidwell, A.S., Penninck, D.G., 2015. Ultrasonography of the abdominal wall and inguinal region in small animals. *Veterinary Radiology & Ultrasound* 56(1), 1–12. <https://doi.org/10.1111/vru.12185>.
- You, T., Zandigohar, M., Potluri, T., Piehl, N., Baker, E., Kafali, M., Bulun, S.E., 2025. Role of progesterone action in inguinal hernia formation via skeletal muscle fibrosis and atrophy. *JCI Insight* 10(14), e193208. [10.1172/jci.insight.193208](https://doi.org/10.1172/jci.insight.193208).