




CASE REPORT

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Surgical repair of incarcerated umbilical hernia in a white German Spitz

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Abstract

Background An umbilical hernia is common, but its incarcerated form is quite rare in dogs. An incarcerated hernia is characterized by the entrapment of herniated contents within the hernial sac, often accompanied by a constricted or narrower ring. It is usually refractory to the conservative approach, i.e., manual reduction, and surgical treatment is crucial to avert the risk of ischemia that can potentially lead to necrosis and gangrene in the involved tissues.

Case presentation A 7-month-old female white German Spitz of 13.22 kg was presented with an ovoid swelling in the umbilicus, including a history of intermittent vomiting, progressive hyporexia, and weakness. Physical examinations led to a presumptive diagnosis of irreducible umbilical hernia after ultrasonography had shown a defect in abdominal wall continuity. Surgical intervention further confirmed an umbilical hernia with the incarceration of an omental flap. Herniorrhaphy was performed after resolving the incarceration and returning the content (i.e., omental flap) to the abdominal cavity. Postoperatively, supportive medications and routine care were provided. The external sutures were removed after two weeks, and periodic follow-ups revealed no complications. Ultrasonography was performed again on the 78th postoperative day, which indicated no breach in the abdominal wall integrity around the umbilicus. To the authors' knowledge, this is the first documented case of a successfully treated incarcerated umbilical hernia in a white German Spitz.

Conclusions Umbilical hernias in young Spitz dogs can undergo incarceration over time if left untreated during the early stages. Meticulous diagnosis and specific treatment including surgical correction are essential for optimal outcome, avoiding further complications.

Keywords Spitz dog, Swollen umbilicus, Incarcerated omental flap, Herniorrhaphy, Ultrasonography

Background

A hernia can be defined as an abnormal outpouching or protrusion of contents (mostly visceral organs) or part(s) of contents of a body cavity through a normal or

abnormal opening in the cavity wall (Conze et al. 2001; Stubbs and Hyder 2009). The protruded contents usually lie beneath the intact skin or may occupy another adjacent body cavity (Krishnamurthy 1996; Munif et al. 2022a). Hernias are broadly divided into reducible and irreducible forms (Kealy et al. 2011). However, depending on the location, it can further be classified into various categories, i.e., umbilical, inguinal, scrotal, perineal, ventral, hiatal, diaphragmatic, and abdominal hernias (Przadka et al. 2020; Munif et al. 2022a).

An umbilical hernia is a common anomaly in neonatal animals (especially ruminants) (Doijode 2019). However, this type of hernia is occasionally found in some dog breeds such as Airedale Terrier, Pekingese, Maltese, Weimaraner, and Basenji (Roberts 2022). An incarcerated

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hernia (Fig. 1) is referred to as a typical irreducible hernia, in which, the herniated content cannot be returned manually to its anatomical point of origin through the hernial orifice (ring). The failure of conservative reduction, in this context, is likely due to the voluminous herniated content that ultimately gets confined in the hernial sac over time, necessitating a greater diameter than that of the hernial ring for it to get back to the cavity. Usually, in long-term unresolved cases, adhesions are found between the herniated contents and surrounding structures (Cooper and Ferzoco 2004).

The primary cause of umbilical hernia is of congenital origin involving the failure of normal closure (cicatrization) of the umbilical ring after birth, which results in the protrusion of abdominal contents into the overlying subcutis (Doijode 2019). Apart from congenital cases, acquired umbilical hernias have also been reported in dogs (Jahromi et al. 2009). Acquired cases often result from factors such as trauma or injury to the umbilicus, infection hindering natural orifice closure, intense straining from diarrhea and constipation, elevated intra-abdominal pressure during pregnancy causing muscle relaxation, and weakened abdominal muscle intersections (Hassen et al. 2017; Munif et al. 2022a).

In the case of an umbilical hernia, a prominent spherical swelling is evident at the umbilicus, and the herniated contents are usually the abdominal fat, omentum, or intestine (Kulacoglu 2015; Park 2015). A distinct circular or oval hernial ring can be palpated externally in most cases of reducible hernia (Fesseha 2020). Small (based

on ring diameter) and reducible hernias are unlikely to be painful (Jahromi et al. 2009). In contrast, irreducible hernias are manifested with predominant clinical signs including periodic pain, vomiting, lack of appetite, and depression (Hassen et al. 2017; Doijode 2019).

The diagnosis is generally based on clinical signs and physical examinations. The treatment of hernia includes conservative and surgical approaches, depending on the severity of the condition (Morgan et al. 2020). Various surgical techniques have been reported for repairing hernia. The most common one is herniorrhaphy, a surgery to repair an uncomplicated hernia by suturing the abdomen's site (Munif et al. 2022a). Hernioplasty is another surgical method to treat large and complex hernias using prosthetic mesh (Elkasapy et al. 2022). Other complex repairing protocols include tissue extension, transfer, and transplantation (Whitfield-Cargile et al. 2011).

This study describes an incarcerated umbilical hernia in a young Spitz dog, which is not frequently reported. The diagnosis of the case and relevant surgical intervention along with the outcome are also documented here.

Case presentation

Case history

A 7-month-old, female (entire), white German Spitz of 13.22 kg body weight (BW) was referred to a regional veterinary teaching hospital. The dog appeared with the complaint of a small, spherical lump on the navel region. At the presentation, an ovoid swelling was found over the umbilicus, lying on the ventral midline of the abdomen, which had a diameter of 2.5 cm at the longest axis. The swelling was somewhat button-like in appearance and was just cranial to and in between the teats located in the mesogastric region (mid-abdomen) (Fig. 2A, B). According to the owner, this defect was detected within a month following the purchase of the dog from a local puppy shop. There was no known history of trauma or injury in and around the umbilicus. In addition, no congenital umbilical abnormalities were documented, and navel cord affections (e.g., infections and inflammations) were not evident. Besides, mating and reproduction records were not available. However, there was a slow and steady increase in the size of the swelling, accompanied by periodic discomfort, progressive hyporexia, intermittent vomiting, and general weakness.

Investigations

During physical examination (PE), an irreducible, soft, and fluctuating mass was palpated over the skin, which had protruded just from the point of the umbilicus. Fine needle aspiration (FNA) revealed a very small amount of fluid-like materials resembling that of peritoneal contents. On deep percussion, there was mild pain response.

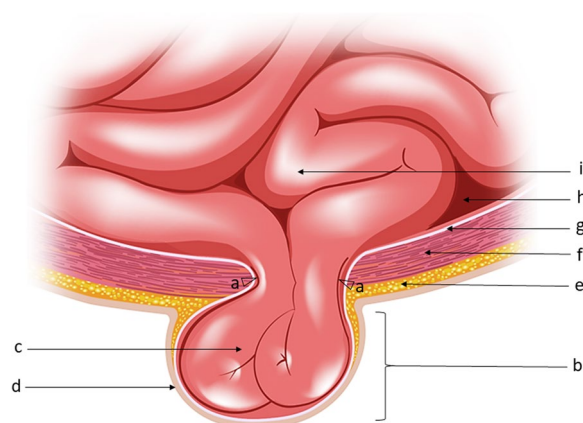


Fig. 1 Schematic presentation of an external incarcerated hernia (image generated by Adobe Illustrator CC version 22.0): (a) protrusion of intestinal loop through the hernial ring (arrowheads), (b) hernial sac, (c) herniated content; being voluminous, trapped into the sac. The ring diameter is narrower compared to that of the entrapped content, (d) outer skin layer, (e) subcutaneous layer with adipose tissue, (f) muscular wall of body cavity, (g) peritoneal lining, (h) body cavity, and (i) intestine

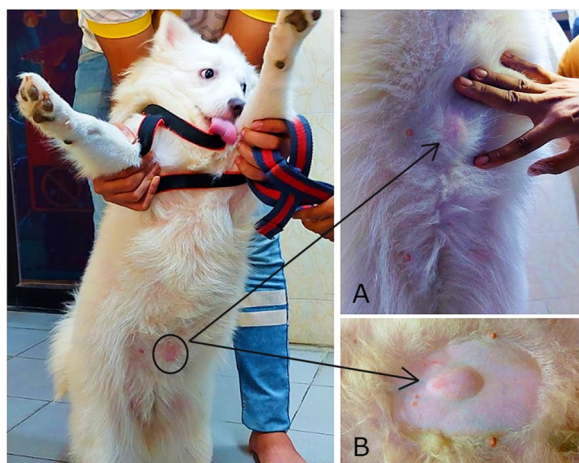


Fig. 2 The swollen umbilicus in the dog: **A** an ovoid swelling between the teats in mid-abdomen, and **B** button-like appearance of the swelling noted after hair trimming

Other than these, no gross abnormalities were detected, and the dog was quite docile. The clinical and major hematobiochemical parameters were within normal ranges (Table 1). The mucous membranes (MMs) were of light-pink color, having a capillary refill time (CRT) of 1.5–2 s for the gum areas.

Abdominal ultrasonography was performed using a portable ultrasound machine (Digital Ultrasonic Diagnostic Imaging System: Eickemeyer, Magic 5000, Tuttingen, Germany). A superficial linear probe was placed over the swollen umbilicus to detect the abnormality. This produced a sonogram on the monitor indicating a discontinuity in the abdominal wall integrity (Fig. 3).

Based on the history, clinical examinations, and imaging findings, a presumptive diagnosis of umbilical hernia (irreducible) was made.

Treatment

With the informed consent of the owner, a decision was made to proceed with surgical intervention. At the outset, the dog was kept off feed and water for 12 h and then stabilized with intravenous (IV) 350 ml of 5% dextrose in normal saline (0.9% NaCl) solution. Before the surgery, premedication was done with atropine sulfate at 0.04 mg/kg BW (Atrovet[®], Techno Drugs Ltd., Narsingdi, Bangladesh), and subsequent sedation was ensured with xylazine hydrochloride (HCl) at 1.1 mg/kg BW (Xylaxin[®], Indian Immunologicals Ltd., Hyderabad, India) via intramuscular (IM) injections. Approximately 10 min after sedative injection, ketamine HCl at 5.5 mg/kg BW (Ketalar[™], Popular Pharmaceuticals Ltd., Dhaka, Bangladesh) was used IM for induction of general anesthesia. Presurgical aseptic preparations were done over

Table 1 Clinical and hematobiochemical parameters of the dog at first presentation

Parameters	Tested values	Reference intervals*
<i>Clinical</i>		
T (°F)	101.2	99.5–102.5
HR (beat/min)	129	120–140
RR (breath/min)	23	18–30
SpO ₂ (%)	98	95–100
<i>Hematobiochemical</i>		
Glc (mg/dl)	89	80–120
TEC (× 10 ⁶ /μl)	6.47	4.95–7.87
TLC (× 10 ³ /μl)	7.81	5.0–14
Hb (g/dl)	13.9	11.8–18.5
Hct (%)	48.1	35–57
TSP (g/dl)	6.46	5.5–7.2
BUN (mg/dl)	14.3	9–26
Cr (mg/dl)	0.88	0.6–1.4
ALP (U/L)	59.6	7–115
AST (U/L)	20.4	18–56
ALT (U/L)	26.7	17–95
Na (mmol/L)	145.9	143–150
K (mmol/L)	4.76	4.1–5.4
Cl (mmol/L)	110.5	106–114

T Temperature, HR Heart rate, RR Respiratory rate, SpO₂ Saturation of peripheral oxygen, Glc Glucose, TEC Total erythrocyte count, TLC Total leukocyte count, Hb Hemoglobin concentration, Hct Hematocrit, TSP Total serum protein, BUN Blood urea nitrogen, Cr Creatinine, ALP Alkaline phosphatase, AST Aspartate aminotransferase, ALT Alanine aminotransferase, Na Sodium, K Potassium, Cl Chloride

* Reference intervals were adapted from scholarly sources (Fielder 2022; McCourt and Rizzi 2022)

the ventral abdomen, particularly on and around the umbilicus (Fig. 4A). Under general anesthesia, in the dorsally recumbent dog, a 3-cm ventral midline skin incision was made over the swelling by an electrosurgical scalpel (Fig. 4B) powered from an electrosurgical unit [Meditom[®] MT-400, Class I, Type CE, 40,013 Castel Maggiore (BO) Italy via C. Bonozzi]. This unit was adjusted to electric supply at 40 Watt (W) and 30 W for tissue cutting and coagulation, respectively. Next, the skin incision was extended carefully with the blunt ends of straight scissors (Fig. 4C). This subsequently exposed a hernial sac (Fig. 4D) and confirmed the diagnosis of an umbilical hernia. The attachment of the sac to the surrounding tissues was detached (Fig. 4E) by blunt dissection. Then, the tip of the sac was incised cautiously to expose the herniated content (Fig. 4F) without any injury. The content was a small omental flap, which was incarcerated and was not ready to be reduced back to the cavity through the hernial ring due to the adhesion between the stump of the herniated omental flap and the ring (Fig. 4G). Hence, this case was termed as an incarcerated umbilical hernia.

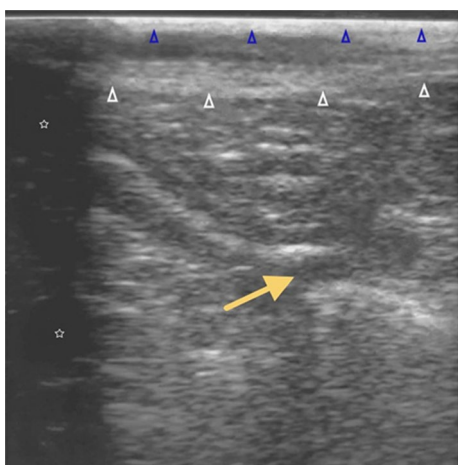


Fig. 3 Ultrasound image, suggestive of umbilical hernia in the dog. The hernial gate (yellow arrow) was marked by a clear breach (hypoechoic zone) in the abdominal wall integrity (hyperechoic curvilinear reflectors). The skin border (white arrowheads) and probe-contact surface (blue arrowheads) were distinctly highlighted (hyperechoic linear areas), along with a few anechoic zones (white stars). Linear probe; orientation: longitudinal, frequency: 5 MHz, depth: 5.1 cm

The hernial sac was trimmed just at the level of the ring, and the adhesion was then cut gently by the electro-surgical scalpel maintaining a circular pattern to open the ring and also to release the trapped omental flap (Fig. 4H) without any damage. Then the free omental flap was returned to the cavity through the ring (Fig. 4I). After hernial reduction, herniorrhaphy was performed, which involved closure of the ring by horizontal mayo-mattress sutures (Fig. 5A, B) using polyglactin 910 of size 1 (Vicryl™, Ethicon, J & J Medical Devices Companies, United States). Repair of the ring was guided by simple forceps (blunt) (Fig. 5C) to avoid any adhesion to the underlying peritoneal content(s). After the ring closure (Fig. 5D), the surrounding muscle layers were approximated by simple interrupted sutures (Fig. 5E) using Vicryl™ of size 1. Finally, the exposed skin edges were sewn together by intradermal suture (Fig. 5F) using Vicryl™ of size 2–0. Besides, two protective knots (Fig. 5G) with simple interrupted sutures using Vicryl™ (2–0) were placed over the intradermal suture for better security.

Postoperative care and follow-up

In the postoperative phase, the dog was resuscitated with IV 200 ml of 5% dextrose in normal saline. In addition, a

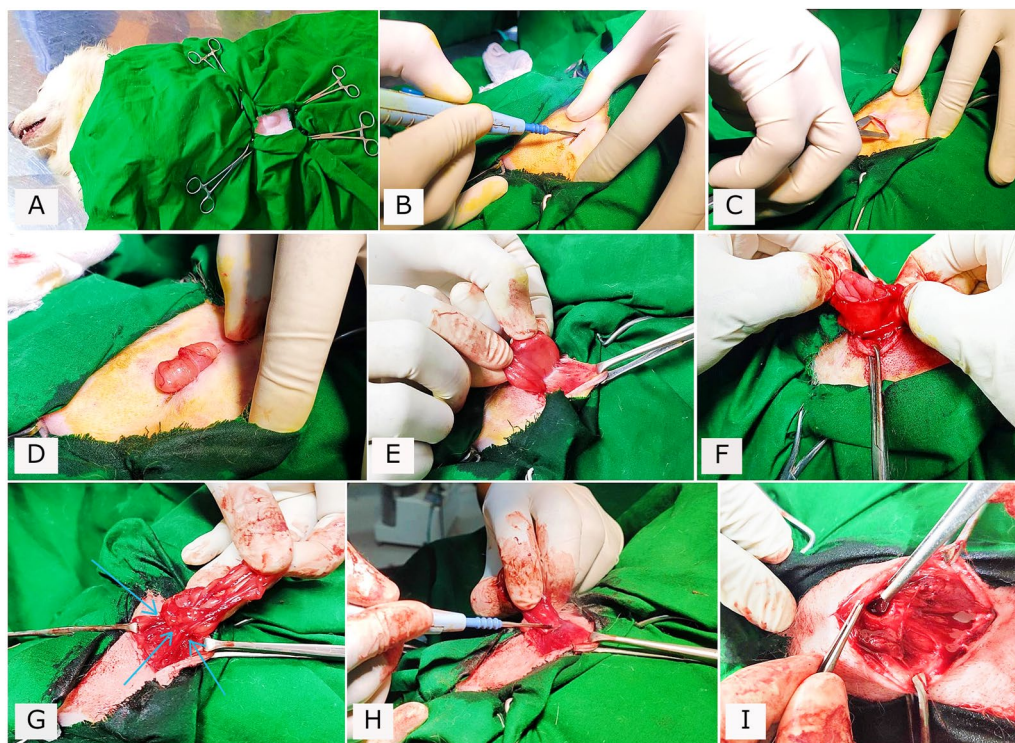


Fig. 4 Surgical intervention and hernial reduction: **A** patient preparation, **B** initial skin incision by electro-scalpel, **C** blunt expansion of skin incision by straight scissors, **D** exposure of the hernia sac, **E** detachment of the adhesion between the hernial sac and adjoining tissues, **F** disclosure of the herniated content after careful splitting of the sac, **G** small omental flap (held in fingertips) with incarceration (blue arrows) at the level of the hernial ring, **H** adhesion removal by electro-scalpel to resolve incarceration, **I** free hernial ring (umbilical opening) following reduction of herniated content (omental flap)

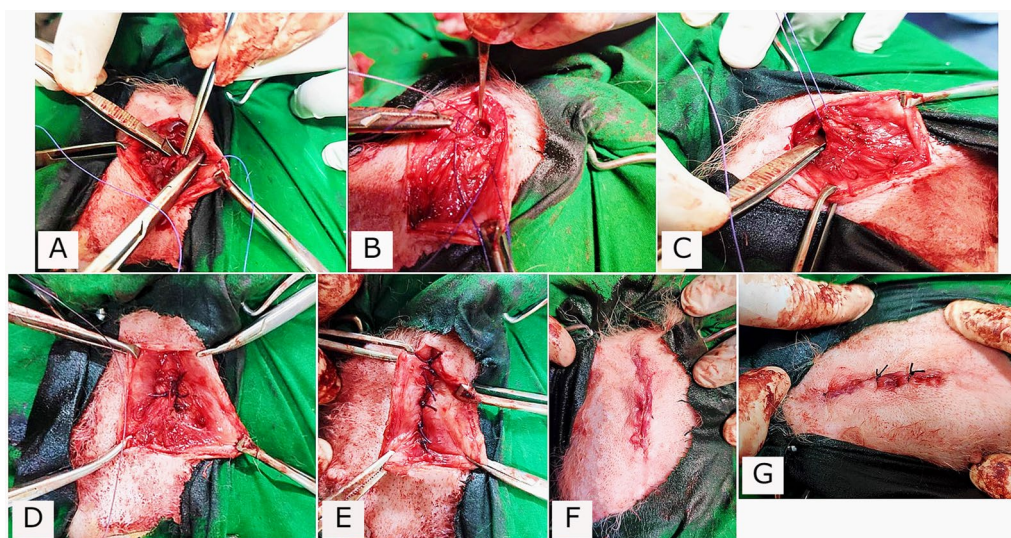


Fig. 5 Herniorrhaphy and wound closure: **A, B** suture needle insertion and passing through the edges of the hernial ring, **C** installation of simple forceps through the ring to gently compress down the abdominal contents to aid adhesion-free suturing, **D** closure of the hernial ring by horizontal mattress sutures, **E** approximation of abdominal muscles by simple interrupted sutures, **F** skin closure by intradermal suture, and **G** external simple interrupted sutures to secure the underlying sutures

14-day Elizabethan collar was prescribed to prevent the dog from licking and/or biting the surgical site. Trimming of nails was also done to prevent self-inflicting (scratching) injury that could delay the wound healing. The routine postoperative medications included ceftriaxone sodium IM at 35 mg/kg BW (Triject[®], Eskayef Pharmaceutical Ltd., Dhaka, Bangladesh) once daily for twelve days, ketoprofen IM at 2.2 mg/kg BW (Ketovet, Techno Drugs Ltd., Narsingdi, Bangladesh) once daily for five days, and pheniramine maleate IM at 1 mg/kg BW (Anti-hista-Vet[®], Square Pharmaceuticals Ltd., Dhaka, Bangladesh) once daily for seven days. Topical antiseptic such as 5% povidone-iodine (Viodin[®] 5% Ointment, Square Pharmaceuticals Ltd., Dhaka, Bangladesh) was used twice daily for five days. After the 5th postoperative day, oral vitamin C supplementation at 250 mg/dog (Ceevit[™], Square Pharmaceuticals Ltd., Dhaka, Bangladesh) was maintained once daily for the next two weeks. Besides, frequent exercises and hangouts were restricted for one month following surgery. On the 14th postoperative day, the external sutures were removed, and the Spitz had no noticeable complications. Weekly follow-up was maintained over the mobile phone for four weeks after suture removal. On the 78th postoperative day, the owner curiously brought the dog again to the hospital for a checkup. During the inspection, proper healing at the surgical site was observed (Fig. 6A). Another ultrasonography was performed with an advanced sonography machine (SonoScape P15, Shenzhen, Guangdong, China), which revealed complete abdominal wall integrity without any

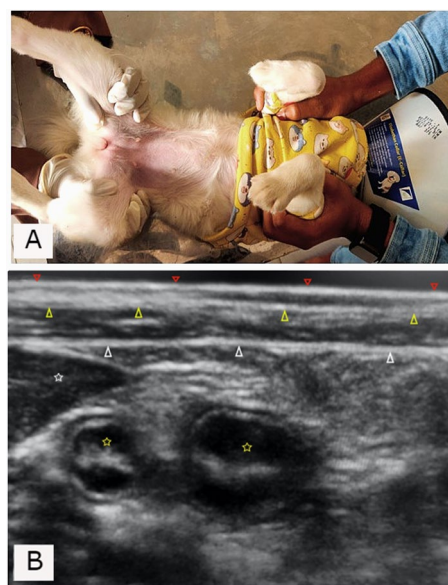


Fig. 6 Clinical inspection and abdominal ultrasonography in the dog on the 78th postoperative day: **A** surgical site revealed a complete recovery without any complications, and **B** ultrasound image showed full integrity (prominent hyperechoic line marked by white arrowheads) of the abdominal wall around the umbilicus. The skin border (yellow arrowheads) and probe-contact surface (red arrowheads) were distinctly highlighted (hyperechoic linear areas), along with surrounding structures: spleen (hypoechoic structure marked by a white star) and bowel segments (heteroechoic spherical structures marked by yellow stars). Linear probe; orientation: longitudinal, frequency: 7.5 MHz, depth: 2.3 cm

remarkable defects around the umbilicus (Fig. 6B). No other diagnostic tests were performed due to the owner's constraints, and the patient was released subsequently; thereafter, the follow-up was lost.

Discussion

Spitz dogs are known for their energetic and playful demeanor with comparatively diminutive stature, low predatory drive, extreme dominance, and notable ease of trainability that render them well-suited companions; nevertheless, they are occasionally found with health ailments including hernias, which are mostly attributed to specific genetic factors and/or poor breeding practices (Fitzgerald n.d.; Aliabadi and Dehghani 2007; Kumar et al. 2017, 2023).

The manifestation of hernia is generally regarded as a matter of clinical concern. Dogs of all ages are predisposed to different types of hernias; of which, inguinal, perineal, and diaphragmatic hernias have been reported frequently (Waters et al. 1993; Gill and Barstad 2018; Pereira et al. 2023). An umbilical hernia is likely to be a less common case in dogs, as few published reports are available (Robinson 1977; Jahromi et al. 2009; Park 2015; Alkattan et al. 2018). It is found in some young puppies below six months of age and often undergoes spontaneous remission (auto-reduction followed by self-closure of the hernial ring) as the animals mature (Park 2015; Alkattan et al. 2018). Hence, invasive treatments including surgical corrections are not usually recommended for newborn and immature puppies. However, persistent cases in mature puppies above six months warrant appropriate management. In this study, a 7-month-old, female white German Spitz was found with an incarcerated umbilical hernia. Although earlier studies reported incarcerated perineal and inguinal hernias in dogs (Stelmach et al. 2016; Iodence et al. 2021), incarcerated umbilical hernia is relatively rare in this regard. To the best of our knowledge, this type of case has yet to be documented.

The hernia was denoted as incarcerated, signifying the distinctive characteristic wherein the herniated content was confined within the sac in an irreducible manner. It is noteworthy that this specific case can be differentiated from strangulation by the absence of ischemic features in the herniated content, as compromised blood supply to the herniated part was not evident during the case management (i.e., surgical intervention). These assertions are substantiated by arguments delineated in various reports (Yang and Liu 2014; Pastorino and Alshuqayfi 2022). Furthermore, the state of incarceration in this particular case might be ascribed to the adhesion of entrapped content to the hernial sac over an extended period.

The hernia was considered to be of idiopathic origin, as the exact reason for this remained elusive. It is worth mentioning that idiopathic umbilical cord weakness might constitute a plausible factor contributing to the condition spontaneously. Moreover, the genetic background emerges as a pertinent concern in this context; a reasonable hypothesis supported by the statement in another research (Robinson 1977). However, it is imperative to acknowledge that reliable information is lacking, given that the owner was unable to provide a standard ancestral record of the Spitz breed. Besides, an alternative conjecture could be postulated based on prior investigations that highlight the influence of certain hormones on muscle fibers, culminating in the development of various types of hernias (Niebauer et al. 2005; Zhao et al. 2018). However, as far as we know, such studies on canine umbilical hernias are very limited. Therefore, the implications of endocrine factors in the occurrence of umbilical hernias in dogs could be a promising avenue, suggesting future research.

The clinical presentations of this case are consistent with those found in related studies (Park 2015; Alkattan et al. 2018). The MMs color and CRT were considered normal, aligning with the findings of other reported cases in dogs (Goucher et al. 2019; Chalifoux et al. 2021). As the primary clinical and hematobiochemical indices did not show any major alterations, no rigorous medical therapies were considered at the outset. During comprehensive medical checkups, the PE and FNA played a pivotal role in the systematic exclusion of alternative (differential) diagnoses and provided valuable insights toward the provisional diagnosis of an umbilical hernia.

Ultrasound imaging was used to aid the diagnosis, which indicated a distinct split in the contour and integrity of the ventral abdominal wall, specifically centered on the umbilicus. This led to a presumptive diagnosis of umbilical hernia. The second sonographic image taken during case follow-up was resembling to be somewhat different from the first one, as two different ultrasound modalities were used to produce the images during the pre- and post-surgical scanning. The second image was generated by an advanced ultrasound device mentioned earlier, which provided more structural details compared to the preceding image. However, the main focus regarding the abdominal wall integrity around the umbilicus was notable in both images. The application of sonographic scanning as a noninvasive means, in this context, proved to be pragmatic and demonstrated a correlation with the utility of this modality in various studies (Young et al. 2007; Prządka et al. 2020; Wu et al. 2022). Apart from this, radiography and computed tomography scanning could have been useful in making the diagnosis, as found in several investigations (Åhlberg et al. 2022; Akgul

et al. 2023), however, these were unavailable during the case study. During surgical exploration, an incarcerated umbilical hernia incorporating a small omental flap was precisely identified, which confirmed the diagnosis.

The procedures involved in the premedication, sedation, and anesthesia of the dog were correlated with the protocols used in other research (Munif and Alam 2021; Munif et al. 2022b). Herniorrhaphy was performed in this case to repair the hernia after the reduction of herniated content; this procedure aligns with those in antecedent research (Niwas et al. 2018; Nath et al. 2019; Rajavardan et al. 2023). Unlike hernioplasty, herniorrhaphy is the surgery of choice when the diameter of the hernial ring is small enough to permit closure through suturing, as demonstrated in this case. Although laparoscopy-guided herniorrhaphy is a less invasive and contemporary technique (Prządka et al. 2020; Griffin et al. 2021), the unavailability of the required device rendered it unfeasible in this instance and necessitated the adoption of the aforementioned traditional herniorrhaphy. The surgical intervention was conducted employing electro-surgical units to minimize the extent of tissue damage and bleeding. The application of electro-surgery, encompassing the aforementioned processes of cutting and coagulation, is concordant with the findings documented in various investigations (Meakin et al. 2017; Munif et al. 2023a). The used suture patterns and suture materials are consistent with those in other related studies (Munif and Alam 2021; Munif et al. 2023b; Munif and Safawat 2024). Surgery was crucial in this case to repair the hernia. In essence, for any incarcerated hernia, prompt surgical intervention should be considered; otherwise, untreated cases can lead to severe complications, such as compromised blood supply, resulting in strangulation, necrosis, and gangrene of the herniated mass, which are serious life-threatening medical conditions (Simsek et al. 2020).

This case averted the risks of postoperative complications such as inflammation, infection, and hernia recurrence through supportive medications and careful management. Specifically, the medications comprising antibiotic (ceftriaxone), antihistamine (pheniramine), and anti-inflammatory (ketoprofen) drugs were provided to prevent infection(s), mitigate tissue reaction, and alleviate pain, respectively. The topical ointment (povidone-iodine) was used to prevent contamination at the surgical site. The preoperative and postoperative fluid therapies were implemented using dextrose in normal saline to eliminate the risks of dehydration, hypovolemia, and hypoglycemia. Vitamin C was supplemented to facilitate healing by promoting collagen formation and tissue repair. Besides, strenuous movement and activity were restricted postoperatively to

accelerate healing, preventing recurrence. After two and a half months post-surgery, on a random checkup, the dog appeared with complete recovery confirmed by ultrasonography, which indicates the success of overall case management.

Conclusions

This study outlines the diagnosis and successful treatment of an incarcerated umbilical hernia (likely idiopathic) in a growing Spitz. Abdominal ultrasonography aided in accurate diagnosis while prompt, appropriate surgery with postoperative care was vital for effective management. Further research should explore the etiological factors particularly related to the intricate interplay between age-related hormonal influences and hernia genesis in dogs.

Abbreviations

ALP	Alkaline phosphatase
ALT	Alanine aminotransferase
AST	Aspartate aminotransferase
BUN	Blood urea nitrogen
BW	Body weight
Cl	Chloride
Cr	Creatinine
CRT	Capillary refill time
FNA	Fine needle aspiration
Glc	Glucose
Hb	Hemoglobin concentration
HCl	Hydrochloride
Hct	Hematocrit
HR	Heart rate
IM	Intramuscular
IV	Intravenous
K	Potassium
MMs	Mucous membranes
Na	Sodium
PE	Physical examination
RR	Respiratory rate
SpO ₂	Saturation of peripheral oxygen
T	Temperature
TEC	Total erythrocyte count
TLC	Total leukocyte count
TSP	Total serum protein
W	Watt

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Author contributions

MRM was involved in the conceptualization, supervision, investigation, methodology, data curation, and writing—original draft. RIM contributed to the visualization, investigation, methodology, and writing—review and editing. ST performed the visualization, methodology, and writing—review and editing. All authors have read and approved the final manuscript.

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Availability of data and materials

All the data and supporting files are presented in the case report.

Declarations

Ethics approval and consent to participate

This report outlines a case handled within the routine clinical caseload of the Veterinary Teaching Hospital at Bangladesh Agricultural University. As it was part of the hospital's standard procedures, ethical approval for animal care and welfare was deemed unnecessary. Approval for publication was granted by the hospital director, and consent for participation was taken.

Consent for publication

Informed consent for publication was obtained from the animal owner.

Competing interests

The authors declare that they have no competing interests.

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