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Case Report

Surgical Management of External Hernia with Entero-Mesenteric Incarceration in an Uda Ewe

Iliya Paul Sambo*

Veterinary Teaching Hospital, University of Jos, Nigeria

* *Corresponding author:* Iliya Paul Sambo, Veterinary Teaching Hospital, University of Jos, Nigeria. Email: paulsambo2021@gmail.com

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ABSTRACT

Introduction: External hernias with incarcerated contents pose a significant risk to animal patients, and prompt attention is crucial to prevent complications. The present study aimed to describe the clinical findings, diagnosis, and successful surgical management of an external hernia with incarcerated entero-mesenteric content in a 2-year-old Uda ewe.

Case report: A 2-year-old Uda ewe, weighing 40 kilograms, was presented to the Veterinary Teaching Hospital, University of Jos, Nigeria, with a large swelling on the right ventrolateral abdominal wall, attributed to a traumatic incident caused by a horn gore from a bull. Clinical examination revealed a large protrusion on the right ventrolateral abdominal wall region, with a soft, tender swelling beneath. The swelling was partly reducible through a partially palpable hernia ring. The vital parameters (rectal temperature, pulse, and respiratory rates) and hematological parameters such as complete blood count were within normal reference ranges. A clinical diagnosis of incarcerated external hernia was made based on the animal's history and clinical findings. The ewe underwent surgical correction via herniorrhaphy using a continuous suture pattern. The procedure involved meticulous blunt and sharp dissection to separate the incarcerated entero-mesenteric tissues, followed by a two-layer closure. The peritoneum, rectus abdominis, and transversus abdominis muscles were sutured as the first layer using a simple novel technique. This technique involved taking continuous sutures from both ends of the hernia ring toward the center and securing with a surgeon's knot at an equidistant point, which helped evenly distribute the tension along the length of the hernia ring and prevented tissue tearing. The internal and external oblique muscles were sutured as the second layer, which further strengthened the repair. The skin sutures were removed on postoperative day 10, and the ewe recovered without complications.

Conclusion: The present study highlighted the pivotal role of timely detection, precise diagnosis, and surgical intervention in managing external hernias with incarcerated content, which can significantly impact the outcomes in ruminants.

1. Introduction

External hernias involve protrusion of an organ or part of an organ through an opening in the abdominal wall[1]. In contrast, internal hernias occur when an organ protrudes through a peritoneal or retroperitoneal foramen in the abdominal cavity, such as an opening in the mesentery or omentum[2,3]. Both types of hernias can be congenital or acquired. Congenital hernias typically occur through natural openings, such as the inguinal or umbilical regions[4,5]. Acquired hernias, on the other hand, often result from trauma, surgery, or weakened abdominal musculature[6,7]. In ruminants, most acquired external hernias have a history of traumatic incident resulting from injuries such as horn gores, kicks, or blunt trauma[8-10]. However, automobile accidents are a common cause of traumatic external hernias in small animals, such as dogs and cats[11,12]. External hernias can be diagnosed clinically based on the animal's history and physical examination. However, imaging techniques, such as radiography and ultrasonography, may be employed to confirm the diagnosis[1,6,13]. A hernia is considered incarcerated (irreducible) when the herniating content within the hernial sac cannot be pushed back into the cavity from which it protruded[13]. The incarcerated content often varies with the animal species and the type and location of the hernia. Different organs, including omentum, abomasum, intestines in

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cattle[3,5,6], and spleen in dogs[14], have been reported to be incarcerated. The small intestine is the most commonly incarcerated organ in both internal and external hernias, as documented in previous studies[6,15]. The present study aimed to report the clinical findings, diagnosis, and the successful outcome of an external hernia with incarcerated entero-mesenteric content, successfully managed via herniorrhaphy in an Uda ewe.

2. Case report

A 2-year-old Uda ewe, weighing 40 kg, was presented to the Large Animal Clinic of the Veterinary Teaching Hospital, University of Jos, Nigeria, with a primary complaint of a large bulge on the right side of its abdomen. The owner reported that the ewe had a small swelling approximately six months earlier, following a traumatic injury when she was gored by a bull in the same enclosure. Further history revealed that the flock was managed under an intensive system. Consent from the owner was obtained while collecting information about the case's history.

2.1. Clinical observations

Clinical evaluation revealed vital signs, including a respiratory rate of 30 breaths per minute, a rectal temperature of 39.1°C, and a pulse rate of 84 beats per minute. Upon physical examination, a prominent swelling was observed on the right ventrolateral aspect of the abdominal wall (Figure 1), characterized by a soft and tender swelling beneath. The swelling was partly reducible through a partially palpable hernia ring. A thorough clinical and hematological examination revealed the hematological parameters; the regular complete blood count (CBC) with differential, including packed cell volume (PCV, %), total white blood cell count (WBC, 10^3/µL), segmented neutrophils, band neutrophils, lymphocytes, monocytes, eosinophils, and basophils within the Schalm's veterinary hematology[16] reference values (Table 1). Based on these clinical findings and the case history, a clinical diagnosis of incarcerated external hernia was made. The ewe was subsequently scheduled for herniorrhaphy using a simple innovative approach to close the hernia ring (abdominal wall defect).

Figure 1. 2-year-old ewe with a large protrusion (white arrow) on the right ventrolateral abdomen

Table 1. Haemogram results of a 2-year-old Uda ewe with an incarcerated external hernia

Parameters/Units	Patient values	Reference values*
Pack cell volume (%)	30	27-45
Total white blood count (× 10^3/µL)	6100	4000-8000
Segmented neutrophils (cells/µL)	2480	700-6000
Band neutrophils (cells/µL)	00	00
Lymphocytes (cells/µL)	3150	2000-9000
Monocytes (cells/µL)	470	0-750
Eosinophils (cells/µL)	00	0-1000
Basophils (cells/µL)	00	0-300

Reference values: Schalm's veterinary hematology[16]

2.2. Preoperative preparations and anesthesia

The patient's surgical site was aseptically prepared for herniorrhaphy (Figure 2A). After administering intravenous sedation with 2 mg of xylazine (Xylased® Biaveta, Czech Republic) at a dose of 0.1 mg/kg[10], the ewe was restrained in left lateral recumbency, and the surgical site was draped in a triangular pattern (Figure 2B). Local anesthesia was achieved with 10 mg lidocaine (Pharmax India Pvt. Ltd., Mumbai, India) at 2 mg/kg employing the inverted L pattern through local infiltration[10].

2.3. Surgical procedure and treatment

The overall surgical procedure was based on the Fubini and Ducharme guidelines[17], however; a simple, innovative approach was carried out to close the hernia ring during the surgery. A horizontal skin incision was made over the proposed hernia ring region (Figure 3A), and blunt dissection of the underlying tissues revealed the hernia content (bowel), which was located directly beneath the subcutaneous tissues (Figure 3B). The hernia content, comprising the small intestine and mesentery, was carefully exteriorized (Figure 3C) to access the hernia ring. However, the hernia content was found to be incarcerated (Figure 3D and 3E). To address this, a meticulous blunt and sharp dissection was performed to separate the incarcerated entero-mesenteric tissues from the hernia ring (Figure 3F). After successful separation from the hernia ring, the hernia content was returned to the peritoneum, and the excess skin over the hernial area was excised (Figure 3G). Herniorrhaphy was carried out using size 2 Polyglactin 910 suture (Agarycryl, Angel Med. Ins. Co., Ltd, China), wherein the peritoneum, rectus abdominis, and transversus abdominis muscles were closed in a simple continuous pattern as a layer (Figure 3H). A novel technique, in which continuous sutures were taken from both ends of the hernia ring (yellow arrows) toward the center and then secured with a surgeon's knot at an equidistant point, was employed during the present surgical procedure. This simple, innovative method (approach) helped to evenly distribute tension along the length of the hernia ring (about 12 cm) and prevented tissue tearing. The internal and external oblique muscles were then sutured with size 2 Polyglactin 910 suture as a second layer (Figure 3I) for additional support. The skin was routinely closed with size 2 silk suture (Kangning Ind., Co.,

Ltd, Tianchang, China) using an interrupted horizontal mattress[17]. The surgical site was cleansed with a 10% solution of Povidone-iodine (Kattle Care Ltd, Nigeria). Postoperative care included alternate-day wound dressings and intramuscular administration of 200 mg amoxicillin (five-Amox.20, JSC Central Veterinary medicines 5, Hanoi, Vietnam) at 20 mg/kg, and repeated after 48 hours. Additionally, 25 mg diclofenac (Jiangxi Kangtai Pharmaceutical Co., China) at 1 mg/kg was administered for three consecutive days[10]. The ewe recovered uneventfully, with skin sutures removed 10 days postoperative (Figure 3J and 3K).

Figure 2. Presurgical preparation of a 2-year-old ewe with an incarcerated external hernia. A: The proposed surgical site, aseptically prepared for the surgical procedure, B: The ewe, under sedation on left lateral recumbency with triangular draping of the proposed surgical site achieved.

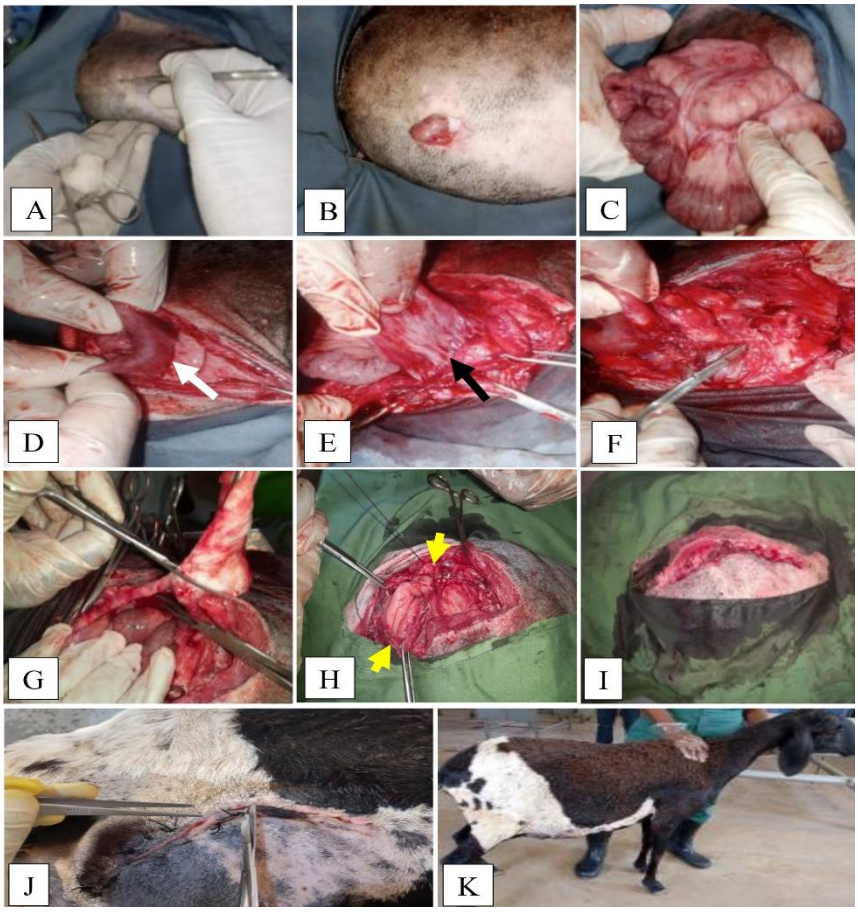

Figure 3. Herniorrhaphy and surgical outcome in a 2-year-old ewe. A: Horizontal linear skin incision, B: Part of the hernia content revealed directly beneath the subcutis, C: The hernia content (small intestine and mesentery), exteriorized to access the hernia ring, D: Incarcerated small intestine (white arrow), E: Incarcerated mesentery (black arrow), F: Careful separation of the incarcerated tissues via blunt and sharp dissection, G: Ablation of the excess skin fold, H: The peritoneum, rectus and transversus abdominis closure in continuous pattern from both ends (yellow arrows) of the hernia ring towards the middle, I: The internal and external oblique muscles sutured as second layer, J: Suture removal at the tenth post-operative day, K: The ewe showing uneventful recovery.

3. Discussion

The clinical findings of a large protrusion on the right ventrolateral abdomen, pain on palpation, and a partially palpable hernia ring were consistent with previous studies on external hernias in ruminants[1,8,9]. Traumatic incidents, such as horn gores, kicks, and blunt traumas, are common causes of external hernias in ruminants[8-10]. This is consistent in the current case, where the ewe had a history of a horn gore from

a bull six months before presentation to the Large Animal Clinic of the Veterinary Teaching Hospital, University of Jos, Nigeria. In the present study, a clinical diagnosis of incarcerated external hernia was made based on observed clinical findings, including a large protrusion, tenderness on palpation, and partially reducible hernia contents. These clinical findings align with earlier studies indicating that incarcerated external hernia can be simply diagnosed based on the patient's history and the observed clinical signs[6]. However, diagnostic techniques such as radiography and ultrasonography can facilitate a definitive diagnosis[13], which could adequately guide presurgical preparations. Intraoperatively, blunt dissection of the subcuticular layer revealed part of the hernia content (intestine) directly beneath the subcutis. This finding suggested a possible lack of a peritoneal sac, allowing the hernial content to protrude through a defect in the abdominal wall, consistent with previous reports of traumatic abdominal wall hernia in farm animals[8,10]. Furthermore, entero-mesenteric incarceration, involving the small intestine and mesentery, was encountered, posing two major challenges, including increased risk of bowel injury and hemorrhage. To mitigate these risks, meticulous blunt and sharp dissection of the incarcerated tissues was performed, although this was time-consuming. The small intestine and mesenteric incarceration in the present case aligned with previous studies reporting external hernias with small intestinal incarceration in ruminants[1,6,15]. Additionally, incarceration of other organs, such as the omentum and abomasum in ruminants and the spleen in dogs, has also been documented[5,14]. A novel technique of suturing the hernia ring from both ends toward the center in a continuous pattern, as employed in the present study, was crucial for evenly distributing tension along the ring. This innovative suturing could prevent tissue tearing and reduce the possibility of recurrence. Additionally, the closure of internal and external oblique muscles further strengthened the repair, contributing to the successful outcome. Furthermore, the Polyglactin 910 suture utilized for the herniorrhaphy likely contributed to the overall success due to its favorable properties, such as biocompatibility, greater handling, and knot security, as suggested by Hendrickson and Baird's study[18]. The present study emphasized the crucial role of a meticulous approach in achieving an overall successful outcome, including the precise detection of the incarcerated hernia, meticulous separation of the incarcerated tissue, the selection of an appropriate suture material (polyglactin 910), and the application of a simple, innovative surgical technique.

4. Conclusion

The present study demonstrated the importance of prompt diagnosis and surgical intervention in managing external hernia with entero-mesenteric incarceration in a 2-year-old Uda ewe. Timely recognition and treatment significantly improved the outcome, prevented severe complications, and reduced morbidity. Veterinarians should be aware of the clinical signs and risks associated with visceral incarceration. Future studies could investigate the long-term outcomes of herniorrhaphy in ruminants, identify risk factors for complications, and explore the application of advanced diagnostic imaging techniques for early detection of visceral incarceration. Additionally, investigations on the development of evidence-based guidelines for the management of external hernias in small ruminants would be beneficial.

Declarations

Competing interest

There is no conflict of interest.

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Authors' contributions

Iliya Paul Sambo conceived the idea, designed the case report, collected and analyzed the data, performed the surgical procedure, managed the case, and wrote the manuscript. The author has read and confirmed the last edition of the manuscript before publication.

Availability of data and materials

The data that support the findings of the present study are available within the manuscript and from the corresponding author upon reasonable request.

Ethical considerations

The author declared that this original case report has not been published or submitted for publication elsewhere. The manuscript underwent plagiarism, data fabrication, and falsification screening before publication. No AI was used during the conduct of the present study.

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