Case Report

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Laparoscopic Management of Strangulated Left-Sided Amyand's Hernia in a Child: A Case Report

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ABSTRACT

Background/Aims: Amyand's hernia is a rare condition where the appendix is found within the sac of an inguinal hernia, and it can either be inflamed/perforated or non-inflamed in an irreducible hernia. Left-sided AH is less common than right-sided, and its management is challenging, especially in the pediatric age group.

Case Presentation: We present a case of an 18-month-old male child with a history of left groin hernia since birth, who presented with a sudden increase in the size of the hernia, associated with vomiting and tenderness. A laparoscopic exploration revealed entrapped loops of the intestine in the left internal ring, which was successfully reduced without any injury or complication. The contents of the hernia included the terminal ileum, the ileocecal junction, the caecum, and the appendix, which were all viable. The internal ring was repaired using prolene sutures, and the peritoneum was closed using vicryl sutures. The child had an uneventful postoperative course and was discharged on the same day of surgery.

Conclusions: This case highlights the importance of prompt diagnosis and appropriate surgical management in pediatric patients with AH to prevent complications and ensure optimal outcomes. Also, laparoscopic reduction and repair of an incarcerated left-sided AH is a safe and effective procedure in pediatric patients. Laparoscopic management offers several advantages over open techniques and is a suitable alternative.

Keywords: Amyand's Hernia; Laparoscopy; Left Amyand's Hernia; Incarcerated Hernia; Strangulated Hernia

Introduction

In Amyand's hernia (AH), the appendix is found intraoperative inside the sac of an inguinal hernia. It may be non-inflamed or inflamed and intact or ruptured [1,2]. Due to the patent processes vaginalis, children are three times more likely to develop it than adults [3,4]. Though left-sided situs inversus, malrotation, or mobile caecum are less common, most documented AH cases have been observed in the right inguinal area. [5-7]. Despite the extreme rarity of left AH, the potentially serious complications of missing the diagnosis of the incarcerated appendix necessitate its inclusion in the differential diagnosis of left inguinal painful swelling [8-10]. The management of AH in pediatric patients remains challenging for the surgeon. In diagnoses, it shares similar symptoms with incarcerated or strangulated hernias and acute appendicitis and is usually identified during the operation [11]. However, the advent of laparoscopic repair, which has gained popularity due to its minimally invasive nature and improved visualization of the internal anatomy, has significantly improved the treatment landscape [12]. In this report, we present a case of successful laparoscopic reduction of a strangulated left-sided AH in an 18-month-old child, underscoring the transformative potential of this approach.

Case Presentation and Surgical Technique

An 18-month-old child with a history of left groin hernia presented to the emergency room with complaints of tenderness and a sudden increase in hernia size, accompanied by greenish vomiting. Physical examination revealed a tense and tender hernia. Laboratory tests were conducted along with an abdominal ultrasound. Under general anesthesia, a laparoscopic exploration was performed with meticulous insertion of ports to facilitate a comprehensive view of the abdominal cavity. A 5-mm port for the 5 mm 30° scope was carefully inserted into the umbilicus. During exploration, intestinal loops were caught in the left internal ring **Next Video**. To finish the surgical

process, two more 5 mm ports were strategically placed in the midclavicular lines. The right port was positioned slightly below the umbilical port, and the left port was positioned at the same level as the umbilicus, ensuring an optimal surgical setup. Our institute policy is to reserve the 3-mm ports/ instruments for infants up to 12 months, as these instruments are somewhat fragile, further emphasizing our commitment to our low-resource settings. Intestinal loops caught in the left internal ring were discovered and reduced, with careful maneuvers to avoid injury.

The appendix, cecum, ileocecal junction, and terminal ileum were viable, with the appendix initially appearing cyanosed (Figure 1) but later recovering its normal color (Figure 2). No malrotation of the colon was observed, but a mobile cecum and oedematous internal ring were noted. The sac was separated from the peritoneal cavity, and the ileopubic tract was repaired with continuous sutures as shown in video link: "https://player.vimeo.com/video/866994353". A 3/0 prolene suture was used to repair the inguinal hernia defect and narrow the internal ring, with careful dissection to avoid injury to vital structures. The internal ring was tightened so that it could comfortably pass the tip of the 5-mm instrument (about 3-mm) beside the vas and vessels, which should be carefully dissected and protected from injury. Following the procedure, the child had a straightforward postoperative course and was discharged after 6 hours of surgery. Subsequent follow-ups at one, three, and seven weeks showed no complications.

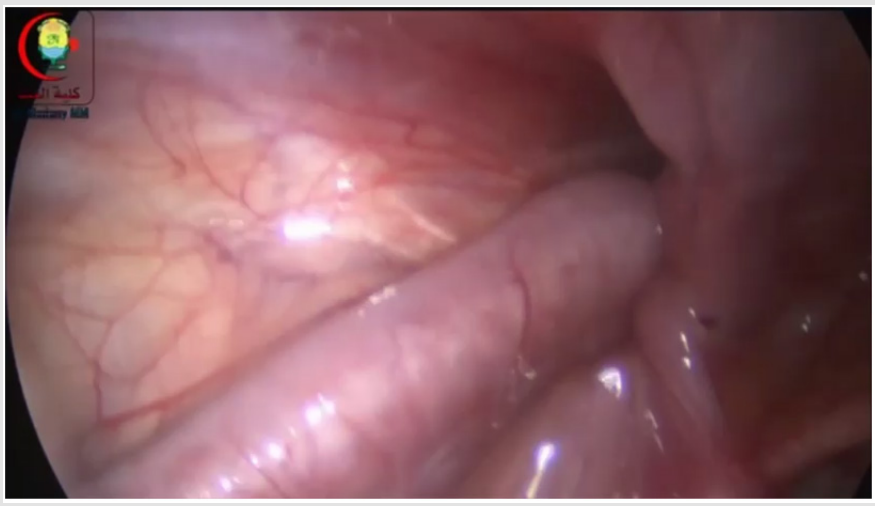

Figure 1: Cyanosed appendix on immediate reduction of the contents of left Amyand's hernia.

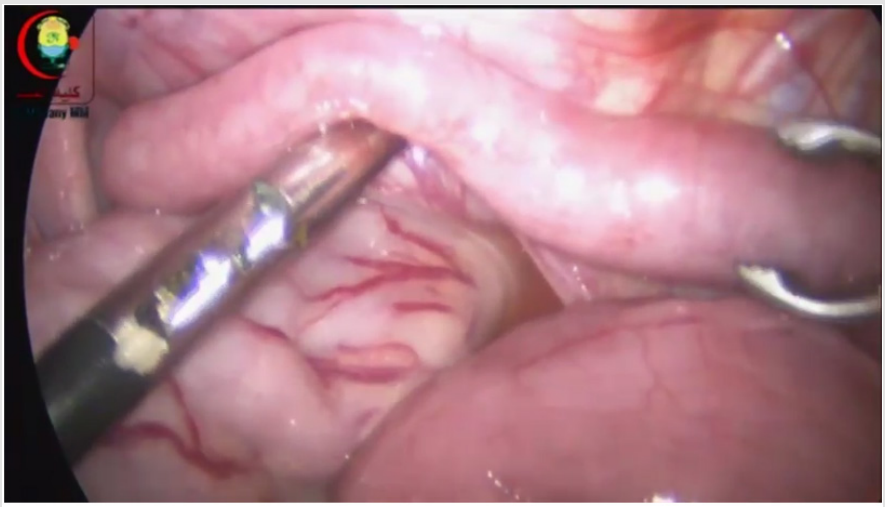

Figure 2: The appendix recovered its normal color.

Discussion

This case describes the presentation and management of an 18-month-old male child with a strangulated left AH. AH is more commonly observed in males than females. This predominance is linked to the higher occurrence of a patent processus vaginalis in boys. It can affect all age groups, showing a bimodal age distribution in infants and the elderly since the size of the internal inguinal ring varies with age, being relatively large at birth, narrowing during midlife, and enlarging again with advancing age [11,13]. In their retrospective analysis, Almetaher, et al. (2020) presented 12 pediatric patients aged between 15 days and five years with right AH and operated in their tertiary referral hospital. Ten out of the 12 children were boys [4]. In the 20-year systematic review conducted by Manatakis, et al. (2021), the left AH has been reported in about 42 (9.5%) of the 442 cases (children and adults). Children accounted for 42.5% of cases (18 cases). After that review, we identified another two cases in children, one in a 2-month-old male infant and the other in a 15-month-old male child [11,14,15].

The child in our study presented to the emergency room with tenderness and a sudden increase in hernia size, along with greenish vomiting, indicating potential bowel obstruction. Physical examination revealed a tense and tender hernia, prompting further evaluation with laboratory tests and an abdominal ultrasound. Diagnosing AH preoperatively can pose challenges, often presenting as incarcerated inguinal or inguinoscrotal swellings. Surgeons should be vigilant about this rare condition, especially when encountering an irreducible hernia without typical signs of intestinal obstruction. Clinical examinations of AH can reveal incarceration without the symptoms and signs of intestinal obstruction as mentioned by Almetaher, et al. (2020). Symptoms like fever, vomiting, and abdominal distention may vary depending on the condition of the appendix, whether inflamed or perforated. The possible conditions that may be mistaken for AH are broad and may comprise irreducible, incarcerated, or strangulated hernia, acute appendicitis, urological emergencies, and cutaneous complications. Imaging techniques such as inguinoscrotal ultrasonography and CT scan are crucial for accurate prediction and diagnosis [4,16].

The appendix within the hernia sac is usually discovered incidentally during planned hernia surgeries. However, not all cases of the appendix moving into the inguinal canal result in acute appendicitis, and the lower likelihood of the appendix becoming trapped and inflamed in an inguinal hernia may be explained by the inguinal ring being wider and more flexible than the femoral ring [16-18]. According to the classification of AH presented by Losanoff and Basson (Table 1), and as our case did not have any manifestation of peritonitis or an abscess, we opted for laparoscopic management. Of course, if the diagnosis is unclear, laparoscopy is helpful [19,20]. In our study, meticulous port insertion allowed for a comprehensive view of the abdominal cavity. Intestinal loops caught in the left internal ring were identified and reduced using careful maneuvers to avoid injury to the bowel. In our case, we discovered a mobile caecum as the etiology. That is in agreement with Joshi, et al. (2022) who reported that there was no situs inversus or intestinal malrotation observed in their patient and concluded that a mobile caecum was the likely cause for the left-sided nature of the hernia in their case [15].

Table 1: Types of Amyand's hernia and their management.

Type of hernia	1	2	3	4
Salient features	Normal appendix	Acute appendicitis localized in the sac	Acute appendicitis, peritonitis	Acute appendicitis, other abdominal pathology
Surgical Management	Reduction or appendectomy (depending on age), mesh hernioplasty	Appendectomy through hernia, endogenous repair	Appendectomy through laparotomy, endogenous repair	Appendectomy, diagnostic workup and other procedures as appropriate

For type 1 hernias, considering the patient's age and lifelong risk of appendicitis is crucial before deciding on appendix removal. Routine appendectomy is not universally recommended, as even elective procedures raise the risk of complications. The choice between mesh - rarely used in infants or children- or endogenous tissue repair for type 2 hernias depends on specific surgical circumstances [19,20]. The approach to dealing with a normal-looking appendix in pediatric patients with AH remains a topic of debate. While it is generally agreed upon that appendectomy should be performed in cases of AH with appendicitis, there are controversies regarding AH cases where the appendix appears normal [4,21-23]. Many authors argue that a normally looking appendix incidentally discovered during surgery, without any signs of inflammation, should not be removed, and prophylactic appendectomy is unnecessary [4,24,25].

They suggest that unnecessary appendectomy may increase operative risks, potentially lead to the dissemination of infection, and weaken tissues at the incision site, possibly resulting in recurrence. Additionally, the appendix may have future utility in other surgical procedures, such as urinary diversion. This perspective is supported by a case series study, where keeping the normally looking appendix and repairing AH were performed in 11 patients without postoperative complications or recurrences [4]. On the other hand, some authors advocate for appendectomy in all AH patients. They argue that the high likelihood of appendix herniating in young patients, leading

to recurrence, may predispose them to later appendicitis [4,21-23]. Luciana, et al. (2019) reported right-side AH in a 2-year-old male who came to the emergency department with a history of irreducible lump along with right scrotal tenderness 6 hours before admission and progressively increased. There is no specific sign of obstruction, dehydration, or infection. In contrast to our case, this patient did an open repair of hernia as diagnostic and therapeutic; identification of the appendix was a non-inflamed appendix inside the right scrotum, with no sign of incarceration, strangulation, or perforation. No complications were reported until two months postoperative.

They choose to perform appendectomy for this case with a satisfying outcome [3]. Furthermore. in cases of AH with acute appendicitis, recurrent hernial cases, and in cases of left AH to prevent further diagnostic delays in cases of acute appendicitis [4,7,26,27] and those cases where adhesion of the appendix with hernial sac is encountered, wherein the vascularity of the appendix is compromised, we believe that the removal of the appendix is justified. Otherwise, if the appendix can be readily reduced without compromising its blood supply, a preventive appendectomy is not necessary [1]. In our case of left AH, we did not remove the appendix because it was non-inflamed, and its blood supply was not compromised. A laparotomy might be required in a few instances with clinical signs and symptoms of a suspected severe strangulated inguinal hernia. However, the inguinal approach is generally sufficient to treat most cases with AH [7,26]. De Almeida, et al. [27] reported a 7-month-old infant with strangulated AH, necessitating a laparotomy. During the procedure, ischemic necrosis of the caecum, terminal ileum, and appendix was discovered, requiring resection and ileocolic anastomosis.

In a similar vein, Singh et al. reported a 1.5-year-old male child who suffered from strangulation and had primary repair for a caecal perforation [28]. Although the open herniotomy is a well-established technique for repairing inguinal hernias in pediatric patients, laparoscopic repair is becoming increasingly popular due to its advantages, including reduced postoperative pain, shorter hospital stays, and earlier return to daily activities. We opted for laparoscopic management in our case as we believe that laparoscopy presents a multifaceted advantage over open techniques. As a diagnostic tool, it provides unparalleled precision, particularly in discerning the complex pathology of left-sided AH. It aids in identifying anatomical anomalies such as situs inversus total is, malrotation, and mobile caecum, ensuring treatment planning. Moreover, it minimizes the risk of overlooking an inflamed appendix.

By allowing for meticulous assessment and reduction of herniated contents without undue traction, it facilitates the safe evaluation of the strangulated appendix and surrounding viscera. Additionally, laparoscopic appendicectomy can be seamlessly integrated into the repair process, reducing contamination risk, and enabling efficient management of left-sided AH. Various techniques have been described for laparoscopic inguinal hernia repair in pediatric patients, including the closure of the internal ring, the division of the hernia sac, and the use of sutures, staples, or mesh to secure the repair [29,30]. In our current case, we chose to disconnect the hernia sac and then tighten the internal ring using continuous 3/0 prolene sutures between the transversus abdominis muscular arch and the iliopubic tract, respecting the contents of the internal ring. Continuous sutures have been demonstrated to lower the recurrence rate in laparoscopic hernia repair compared to interrupted sutures [31]. In our case, the entrapped intestine was reduced through gentle manipulations from the inside, combined with gentle external pressure on the swelling by the surgeon's and assistant's fingers. This method was found to be safe and effective for reducing incarcerated inguinal hernias in children.

One potential complication of laparoscopic inguinal hernia repair is injury to the testicular vessels or vas deferens, which can result in testicular atrophy or infertility [32]. In this current case, careful attention was paid to protect the vas and gonadal vessels during the disconnection of the sac from the peritoneal cavity. In our case, the absence of malrotation of the colon but the presence of a mobile cecum and oedematous internal ring were noted during the procedure. Repairing of the ileopubic tract with continuous sutures and narrowing of the internal ring was performed to prevent hernia recurrence. Careful dissection protected vital structures such as the vas and vessels. Following the successful surgical intervention, the child had a straightforward postoperative course and was discharged after 6 hours of surgery. Subsequent follow-up appointments showed no complications, indicating a favorable outcome of the procedure. Several studies have reported comparable outcomes between open and laparoscopic repair regarding recurrence rates, complication rates, and postoperative pain. However, laparoscopic repair may offer advantages such as shorter hospital stays, earlier return to normal activities, and improved cosmesis [33].

Conclusion

In conclusion, this case highlights the importance of prompt diagnosis and appropriate surgical management in pediatric patients with groin hernias to prevent complications and ensure optimal outcomes. Also, laparoscopic reduction and repair of an incarcerated left-sided inguinal hernia is a safe and effective procedure in pediatric patients. It offers several advantages over open techniques and is a suitable alternative for the repair of pediatric inguinal hernias particularly left-side AH.

Declaration

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Consent for publication was obtained from the legal guardian.

This Study was Posted as a Preprint on the Research Gate on 16 August 2024

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Availability of Data and Materials

Data is provided within the manuscript or supplementary information files. Complete nonedited video recording of the procedure is available on request.

Competing Interests

Not applicable.

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Authors' Contributions

The study has a single author.

Patient Perspective

Not applicable.

Disclosures

I have nothing to disclose.

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