

Unexpected Findings in Abdominal Herniation As A Surgical Challenge in the Emergency Setting

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Abstract

Abdominal hernias are among the most common surgical problems, often posing diagnostic and technical challenges in the emergency setting. These hernias may sometimes represent a real criticality due to unexpected content and their complexity. Among the complications , strangulation of the hernia content(s), occurring in approximately 1-3 % of groin hernias and variably in the other types of abdominal hernias, is the most serious with potentially lethal consequences. Due to the rarity of certain presentations, the surprise encountered during surgery of abdominal hernias entrapping unexpected content may lead to suboptimal treatment. Timely preoperative diagnosis and appropriate surgical intervention for hernia cases associated with gastrointestinal obstruction and /or peritonitis remain challenging, even for the expert surgeon , due to their complexity. Relative management recommendations depend on a variety of patient-related and hernia-related factors. Understanding the underlying mechanism(s) that had been implicated in the hernia’s complicated condition is essential for enabling timely and effective treatment.

Keywords: abdominal hernia, unexpected hernia content, bizarre hernia findings, emergent surgery

1. INTRODUCTION

Typically, abdominal hernias can be classified into external, internal and diaphragmatic, with most cases containing a portion of small bowel and /or a pedicle of greater omentum [1,2]. Rare reports of other entrapped abdominal organs have also been published, including the vermiform appendix inflamed colonic or Meckel’s diverticulum, sigmoid colon, caecum or stomach, colonic epiploic appendage, fallopian tube with the ovary and urinary bladder [3-10]. Incarceration of hernia occurs in a significant proportion of cases (approximately, 10 % of inguinal cases), which can occasionally lead to more severe complications such as intestinal obstruction, strangulation/necrosis and infarction [4,11-13]. In some cases, the free perforation of a strangulated colonic segment into an inguinal hernia may lead to rapidly progressive necrotizing fasciitis affecting the genitalia [6,13]. Notably, obstructive bowel conditions distal to large paraesophageal hernias can result in acute complications in the contents of the proximal hernias [14,15]. Entrapment of small bowel co-herniated into a deep cul-de-sac

during specific perineal surgeries for benign disease can transform the procedure into a disaster [1,2].

In acute cases, cardiopulmonar resuscitation of the unstable patients is performed immediately and simultaneously alongside the urgent surgical intervention [5,11,15-17]. Key concerns include the hernia’s content condition (irreducibility, incarceration, strangulation), the status of viability of the imprisoned organ, the possibility to sacrifice an inflamed or gangrenous organ, extended resections (including, damage-control surgery), and reconstruction of the residual hernia opening in cases with heavily contaminated field. A rare but significant concern is malignancy, which occurs in about 0.5% of inguinal hernias, necessitating clear oncological removal margins [3-5,17-23].

This article seeks to highlight the importance of understanding rare abdominal hernias that trap unexpected contents and present with the features of a surgical emergency, particularly in adults and adolescents. A comprehensive literature review was conducted to group cases and identify optimal diagnostic and treatment

strategies. Intentionally, a PubMed search of the MEDLINE database was conducted for recent English-language articles on various aspects of the performance of the unexpected abdominal hernias, using the search terms “abdominal hernia”, “unexpected hernia content”, “complicated hernia”, “emergent surgery”. Unpublished images from our own material are used after obtaining informed consent by the patients.

2. CLASSIFICATION OF ABDOMINAL HERNIAS

Abdominal hernias can be classified in several ways based on their location, origin or severity. If all or part of an organ or tissue protrudes through an opening in the abdominal wall and toward the outside of the body, this hernia is defined as an external one. Over 70% of external abdominal hernias are inguinal, 15% are incisional, 10% are umbilical and epigastric, and 5% are femoral [4]. Inguinal hernias are much more common in men, though they are also the commonest hernias in women; their prevalence exceeds 6% in the elderly [1]. Femoral and umbilical hernias are more frequently seen in women [1]. Groin hernias are either inguinal or femoral. A hernia, whether external, internal or diaphragmatic, is termed reducible when its content(s) return to the abdominal cavity either spontaneously or with applied pressure. In irreducible or incarcerated hernias, the hernial fascial defect traps the contents outside the abdominal wall. In strangulated hernias, the fascial defect constricts the herniated organ or tissue, compromising its blood supply [1,4,7,12,19,20].

Internal abdominal hernias occur when an abdominal organ protrudes through a normal or abnormal mesenteric or peritoneal aperture into a compartment within the abdominal or pelvic cavity. The protrusion in internal hernias remains inside the body [1]. Internal hernias include the paraduodenal (over 50% of cases; left-sided associated with Landzert's fossa, right-sided associated with Waldeyer's fossa), pericaecal, transmesenteric, of foramen of Winslow, intersigmoid, supramesocolic/pelvic, retroanastomotic, and transomental [2,24,25]. This type of herniation differs from the external abdominal herniation, where the protrusion occurs through an opening of the abdominal wall, and the diaphragmatic herniation, which unifies two major body cavities through a diaphragmatic area of weakness.

Diaphragmatic hernias, which can be congenital (CDH) or acquired (ADH), occur when abdominal organs move into the chest cavity (pleural cavity, lower mediastinum) through a defect or hole of the muscular diaphragm [2,14,15,26,27]. In CDHs, the process leading to formation of the diaphragm is disrupted before completion, while ADHs may arise from trauma or iatrogenic causes, or from widened pre-existing openings (e.g., the esophageal) [2,26]. CDHs include Bochdalek hernias (most common) and Morgagni's hernias [26,28], while ADHs include hiatal/paraesophageal hernias (PEHs) and post-traumatic or iatrogenic hernias [2,14,27]. Factors contributing to the enlargement of these hernias include elastin/collagen abnormalities (in CDHs and PEHs), esophageal shortening, and increase in intraabdominal pressure [14,15]. Additionally, the indolent or hidden co-presence of midgut malrotation (MGM) can contribute to entrapment of gradually more excessive amount of mobile abdominal viscera, as in cases of PEHs and Morgagni's hernias [14,27].

In emergency situations, diagnosis is typically assisted by ultrasound (U/S), computed tomography (CT) scan or magnetic resonance imaging (MRI) [27,29].

3. COMMON HERNIAS OF ANTERIOR ABDOMINAL WALL COMPLICATED WITH RARE CONTENTS

3.1. Complicated Groin and Umbilical Hernias

Seventy-five percent of all hernias occur in the inguinal region [4]; these hernias have a prevalence of 6% in the elderly [19]. The inguinal, inguinoscrotal, femoral or umbilical hernias are mostly hosting a portion of bowel (small bowel or large bowel in the sliding form, or both), or greater omentum, and they present as painful swellings [1]. However, these hernias may occasionally contain or entrap the vermiform appendix (in inguinal/inguinoscrotal hernias: Amyand's hernia, femoral hernias: De Garengot's hernia) [5,10,11,16,2,30] or the Meckel's diverticulum (in inguinal/femoral/umbilical hernias: Littre's hernia) [12,13].

The primary concern with these types of hernias is whether the imprisoned organ is normal, incarcerated (ischemic/necrotic or inflamed) or, in rare cases malignant (such as adenocarcinoma or neuroendocrine tumours).

Incarceration of inguinal hernia occurs in 10% of cases and, if non-reducible, it can lead to intestinal obstruction, strangulation and infarction [3,4,6,7,20]. Strangulation occurs in approximately 1-3% of groin hernias and is the most serious complication [4,20]. Diagnosing complicated anterior abdominal wall hernias can be challenging due to their varied clinical presentations and the lack of distinctive radiological features [5,31]. U/S and CT scan or MRI may aid in diagnosis, but most cases are virtually diagnosed intraoperatively [1,11,12,17,22,30]. Suspicion and experience are crucial for the timely and optimal intervention [13,30].

Groin hernias of Amyand's and De Garengeot's type are usually found on the right side due to the normal anatomic position of the appendix; in extremely rare cases, associated with MGM and mobile caecum or situs inversus, these hernias may occur on the left side [5,16,30]. The incidence of a non-inflamed appendix in an adult inguinal hernia (Amyand's) is about 1%, while the occurrence of an inflamed/perforated appendix or periappendicular abscess is much rarer (0.1%) [11,21]. The De Garengeot's hernia, found in 0.5% - 5% of all the femoral hernias surgically treated, has similar clinical features and poses similar diagnostic and treatment challenges [30]. In emergency situations, differential diagnosis should include incarcerated or strangulated hernia, strangulated omentocele, Richter's hernia, acute orchitis/epididymitis, testicular tumour, and inguinal adenitis [16]. Adenocarcinomas of the appendix are very rare, accounting for 0.2% - 0.5% of all the intestinal malignancies and 4% - 6% of the primary appendiceal neoplasms [11].

Littre's hernia is a rare type of hernia in which a Meckel's diverticulum protrudes through an abdominal wall defect (hernias: inguinal 50%, umbilical 20%, femoral 20%). This diverticulum, a saccular formation of the lower part of the small intestine resulting from embryologic closure failure of the omphalomesenteric duct, is one of the most common malformations of the digestive tract (1-3%) [12,13,32].

Unusual contents of the hernial sac may pose surgical dilemmas even to an experienced surgeon, such as deciding whether to preserve or sacrifice an organ [5]. Typically, excision of the inflamed organ and hernioplasty provides effective surgical management [12,13]. Many investigators suggest that prophylactic appendectomy is not necessary when the appendix is normal [11]. In Littre's hernia,

resection of the diverticulum (most common) or T-shaped bowel resection and ileo-ileal anastomosis is usually required. Accordingly, most surgeons agree that the presence of an inflamed appendix or diverticula within a hernia sac should be a contraindication for the use of synthetic mesh or plug, with primary reconstruction using sutures being preferred [6,12,16,30]. There are only few reports that support a mesh repair in cases with minimal contamination, along with the use of broad-spectrum antibiotics for several days [4]. However, the evidence concerning hernia repair without prosthetic mesh in the case of potential contamination is still controversial [11-13,16,30].

The sigmoid colon typically herniates through the left inguinal canal, often as a sliding inguino-scrotal hernia [4]. However, a right-sided inguinal hernia containing the sigmoid colon is extremely rare [3,4,6,20] (Fig.1). In this right-sided case, a long movable sigmoid colon (dolichocolon) reaching the opposite ilioinguinal region, along with a weakened or widened internal ring, contribute to entrapment, potentially along with an appendix epiploica in the canal or an accidental fixation of a malignant invading lesion [3,4].

Other rare entities that can be misdiagnosed as irreducible or incarcerated/strangulated (inguinal) hernias include epiploic appendage/appendagitis [5,8], torsion of greater omentum pedicle [7], leiomyoma of the round ligament of the uterus [33], right colon in a right inguinal hernia [5,34], omental fibroma [9], ovarian teratoma [23], and rhabdomyosarcoma of the inguinal region [35].

3.2. Unexpected Malignant Content in Groin Hernias

A recent retrospective study determined an incidence of unusual contents in an inguinal hernia sac at 1.5% [5]. In 0.5% of the cases, inguinal hernias may contain malignancies, most commonly of intestinal origin (e.g., sigmoid colon, caecum) [3-5,19,20,22,34], and very rarely malignant ovarian teratomas [23], sarcomas of the region [35], or metastatic tumours [18]. Malignant tumours may present in incarcerated/strangulated groin hernias, and can invade the groin region [3,4]. Ascending colon adenocarcinoma incarcerated in an ipsilateral inguinoscrotal hernia has been reported [34]. Perforation of either colonic cancer or an ischaemic colonic segment into an inguinal hernia may become sealed, possibly resulting in rapidly progressive necrotizing fasciitis involving the

genitalia, or may leak freely ,causing fecal peritonitis [4,6,19,20,22]. Perforated colonic cancers in these cases are associated with high morbidity and mortality rates [3,22].

Due to the rarity of cases with complicated malignancies in groin hernia sacs, the surprise encountered during emergent surgery may lead to suboptimal treatments [19,22]. In some of these cases the surgeon may confront with malrotation of bowels (MGM)[16]. However, oncologically optimal surgery in malignant cases presents its own technical challenges [19]. If underlying colonic cancer in the sac is unanticipated or suspected during hernia surgery, meticulous abdominal exploration and oncologic resection are considered the optimal choice [4,6,19,22]. A combined exploratory laparotomy and inguinal incision may be required due to the possible invasion of the inguinal region, which could prevent the mass from being delivered into the abdominal cavity through the restricted internal ring [4,6]. In 2018, Chern et al [34] reported a rare case of ascending colon adenocarcinoma found in a right inguinoscrotal hernia in an elderly patient, who successfully underwent laparoscopically assisted right hemicolectomy and laparoscopic closure of the internal ring.

3.3. Complicated Incisional and Spigelian Hernias

Incisional hernias are a type of postsurgical hernia, usually entrapping greater omentum and the small bowel; rarely do other viscera form part of their contents. A case has been reported where a jejunojejunal intussuscepted segment was found within the hernia sac [36]. As with any hernia containing intestine, there is a risk of strangulation.

Spigelian hernias are uncommon lateral wall hernias, accounting for 1-2 % of all abdominal wall hernias. They have a high rate of incarceration/strangulation of their content, which can involve organs such as the vermiform appendix, sigmoid colon, small intestine, or omental pedicle[2,17]. In such cases, strangulation might be of the Richter's type affecting the luminal organs. For complicated cases, a CT scan (or MRI) can aid in diagnosis ,and emergent surgical repair is required.

3.4. Complicated canal of Nuck hernias

The canal of Nuck, a patent processus vaginalis, is the persistent outpunching of parietal peritoneum through the inguinal canal to the labia majora. This occurs due to the failure of

its obliteration during the development of the organs of the urinary and reproductive tract (12th week of gestation) [2,37,38]. A canal of Nuck hernia is a rare entity which is often difficult to distinguish or diagnose [37]. This condition can result in indirect groin hernia formation, commonly containing bowel and ovary/fallopian tube (especially in girls <5years or those born prematurely), and/or communicating hydrocele [31,37,38]. Other contents reported are various cysts, uterus, round ligament varices, endometrioid carcinoma, peritoneal pseudomyxoma or mesothelioma and ectopic pregnancy[31]. Clinically, this hernia may present with pelvic or groin pain, a compressible or non-compressible mass, localized labial swelling, and tenderness without erythema or induration [38]. Herniation of organs through this path may lead to incarceration, strangulation and ovarian torsion, all of which are serious complications and require emergent surgery to prevent necrosis [9,31,38]. Diagnosis must be guided by the patient's age and ability to cooperate (e.g., Valsalva maneuver). Imaging ,particularly U/S (color Doppler) and even MRI ,is essential for timely diagnosis [38]. Management of symptomatic cases typically involves surgical intervention, with both open and laparoscopic approaches available [31]. In cases where malignancy is suspected , wide local excision with clear margins is recommended to ensure complete tumour removal [31].

Other hernias of the abdomen, such as lumbar, obturator, sciatic and certain primary perineal, hernias, which are notable for their rare locations and the challenging surgical access they require and not their content itself, are beyond the scope of this work.

4. COMPLICATED PARAESOPHAGEAL HERNIA DUE TO DISTAL GASTROINTESTINAL OBSTRUCTION AND LARGE MORGAGNI'S HERNIA

4.1. Complicated Paraesophageal Hernia Due To Distal Gastrointestinal Obstruction

The recognition of the unique characteristics of PEHs, as opposed to the much more common sliding hiatal hernia (which accounts for 95 % of cases), is a fundamental yet challenging diagnostic step [14,39]. The PEHs are extreme forms of hiatal hernias, characterized by the protrusion of abdominal organs - the stomach and possibly other viscera -

into the thoracic cavity, often without displacement of the gastroesophageal junction through the hiatus [1,14]. The driving force leading to the gradual development of sliding hiatal hernias, as well as of the PEHs and Morgagni's hernias, is the increase in the intraabdominal pressure combined with the negative pressure normally present in the thoracic cavity (the transdiaphragmatic or gastroesophageal pressure gradient) [14]. Contributing factors include conditions like gastrointestinal (GI) obstruction, chronic obstructive pulmonary disease, obesity, vomiting and previous laparoscopic surgery [14,15].

In chronic PEH cases, presenting symptoms can be vague and variable, often including gastroesophageal reflux disease symptoms and dyspnea [14]. Many patients have significant comorbidities [29]. The incidence of acute symptoms in large PEH cases is reported to be 30-40 % [14,15,29]. A considerable number of such cases is recognized when gangrene of the gastroesophageal junction or of a portion of the stomach (gastric volvulus) has occurred [14,29,39]. In practice, timely diagnosis of the acutely presented PEHs remains challenging. The clinical findings of the "Borchardt's triad", namely the presence of abdominal epigastric pain and distension, unproductive retching and the inability to insert a nasogastric tube, are classic for incarceration within the hernia sac and total gastric obstruction [14]. Chest-abdomen radiographies (contrast media esophagogram) and CT scan are helpful for diagnosis and occasionally reveal a distal site of GI obstruction (Fig. 2, 3). In non-septic patient, upper GI endoscopy may occasionally achieve gastric decompression, providing time for scheduling a semi-emergent intervention [14,39].

In acute cases, prominent GI conditions distal to chronic large PEHs -such as the incarceration of an incisional hernia with bowel content, an obstructive prepyloric malignant lesion, or a strangulated volvulus of a dolichosigmoid loop- occasionally with the help or contribution of concomitant MGM abnormalities, may trigger further migration of viscera through the PEH sac and into the chest, causing it to become wedged at the hiatus. This can lead to acute life-threatening complications [14,15]. These distinct conditions may cause severe destructive events involving portion(s) or the entire stomach (intrathoracic or upside-down stomach), and the transverse colon entrapped

into the diaphragmatic hernia, resulting in organoaxial(gastric) volvulus, incarceration, strangulation, gangrene and perforation or rupture [14,15]. Current guidelines of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) [39] recommend timely surgical repair for large PEHs, even in asymptomatic patients. However, no single approach is suitable for all complicated PEH cases [14].

In emergencies, if a nasogastric tube is successfully inserted, the majority of stable patients respond well to resuscitation and improve with decompression; their further management depends on CT scan and gastroscopy findings [14,29]. If there are signs of persistent obstruction of the gastric outlet and gastric wall compromise after conservative treatment, immediate laparoscopic or open surgery is warranted [14,15,29]. For the minority of clinically unstable septic patients who do not respond to resuscitation in the Intensive Care Unit and suffer from gastric compromise, gastroesophageal junction necrosis, and/or perforation, emergent open or even laparoscopic surgery is mandatory. In these cases, resection of the necrotic organ(s) and tissues is unavoidable, either followed by reconstruction of the GI continuity and repair of the diaphragmatic defect (which can be up to 10 cm), or consisting only damage-control surgery [14,15,29,39]. Neglected disease is associated with higher morbidity and mortality rates.

4.2. Large Morgagni's Hernia

Morgagni's hernia is a rare condition, accounting for about 2-3 % of surgically treated diaphragmatic hernias [40]. This type of hernia involves the direct intrathoracic herniation of abdominal organs through the antero-medial foramen of Morgagni (space of Larrey), typically enclosed by a peritoneal sac [26]. It constitutes 1 % - 6% of the congenital diaphragmatic hernias and is rarely seen in adults, with a predominant occurrence on the right side (90 %) [26]. The underlying causes and mechanisms of enlargement are similar to those observed in PEHs, primarily due to disturbances in the intrathoracic /intraabdominal pressure gradient [14]. Common contents that herniate include the omentum and transverse colon, with less frequent involvement of the liver and stomach; even the caecum, ascending colon and terminal ileum have been described as contents in Morgagni's hernias [28]. Accordingly,

Berman et al [28] found that the coexistence of Morgagni's hernia and MGM in children is frequent. In infants with large Morgagni's hernia severe respiratory symptoms are often present. Adults with large hernias usually experience recurrent symptoms, predominantly from the respiratory and/ or cardiovascular systems, and the GI tract [26,40]. Occasionally, these hernias may present with complications such as gastric or colonic volvulus, or incarceration/strangulation of the greater omentum or bowel (Fig .4). Diagnostic tools like chest x-rays, sonography, CT scan or MRI may aid in diagnosis [28,40]. Asymptomatic hernias (incidentally discovered) in children or symptomatic hernias regardless of age should be surgically corrected to prevent the risk of future strangulation of the hernia contents [40]. A variety of abdominal or thoracic approaches, open or endoscopic, have been used; the abdominal approach may offer the advantage of addressing coexisting MGM abnormalities and treating bilateral hernias [26,40]. Laparotomy is the most common approach and is often used in emergent cases [40]. A major postoperative concern in adult patients with large Morgagni's hernias is the timely and proper expansion of the chronically atelectatic lung, which requires multidisciplinary care, either in the Intensive Care Unit or on the ward.

5. EMERGING HERNIA MGM MANIFESTATIONS

The MGM condition is the congenital abnormality that occurs as a result of failure of the normal midgut rotation and/or fixation process during the embryologic development [14,25,26,32,41]. In the adulthood, milder forms of MGM, compared to infancy and childhood, occur with a prevalence lesser than 0.2 % - 0.5 % [25 ,32,41].

The diagnosis of MGM in adults is challenging because of its rarity and asymptomatic course [25] . In symptomatic cases, diagnosis may aided by plain x-rays, (contrast-enhanced) CT scan and MRI [15,25] (Fig.5). Complicated cases can present with obstruction an ischaemia associated with GI volvulus or abdominal/epigastric pain [14,15,32,41]. Right colon volvulus or necrotic torsion(found in less than 1% of cases with acute bowel obstruction in western countries) represents the more severe complication of MGM and an absolute indication for emergent surgery [14].

Accordingly, organoaxial malrotation of the herniated stomach into a symptomatic PEH may lead to incarceration and obstructive volvulus [14]. Rarely, complicated MGM may involve acute manifestations of the bowel content trapped into external or internal or diaphragmatic hernias, for example, the caecum with the vermiform appendix in an irreducible scrotal mass [16], an inflamed Meckel's diverticulum with abscess in the subumbilical space [10,32], a transmesocolic hernia [25] or a PEH with a co-incarcerated gastric fundus and a portion of the transverse colon [15] .

In most acute adult cases, emergent surgical intervention is warranted, often before full resuscitation and optimization. No single approach can be universally applied to this group of patients [14]. Emergent open (usually) or laparoscopic abdominal surgery, tailored to the specific congenital abnormalities and findings, is performed to manage these complicated conditions [25,32,41]. In many adult cases, the Ladd's procedure is incorporated into a larger operation [25].

6. NEIGHBORING ORGAN HERNIATION (ENTEROCELE) ACCOMPANYING ADULT RECTAL PROLAPSE OR HAEMORRHOIDAL DISEASE

Rectal prolapse (RP) refers to the full-thickness rectorectal intussusception of varying degrees, beginning well above the pelvic floor. It may protrude outside the anal canal (external/ complete rectal prolapse, CRP) or remain inside (internal RP, IRP). This condition can occur spontaneously or be triggered by the Valsalva maneuver or physical activity, and may occasionally be accompanied by conditions such as enterocele (Fig .6), rectocele , or cystocele [42]. The primary cause of any form of pelvic organ prolapse is increased pressure of the pelvic floor ,often due to chronic constipation, chronic cough or bronchitis, heavy lifting or obesity [43]. RP has a prevalence of 0.5% in the general population, and up to 1% in adults (especially women) over 65years old [44,45].The anatomical features of the RP are the rectorectal intussusception, the absence of firm fixation of the rectum to the sacrum (mobile mesorectum), the redundant rectum and sigmoid colon , weakness of the pelvic floor and/ or the anal sphincters, as well as a deep cul-de-sac [42-44]. In case of prolapse (CRP or IRP), whether reducible or irreducible, the small bowel, particularly the ileum, may become sequestered or trapped in

the cul-de-sac, acting as a sliding perineal hernia; this enterocele is rarely associated with MGM manifestations (0.1% of cases) [42,43,46]. Very rarely, transanal small bowel evisceration due to thinning of rectal/rectosigmoid wall (perforated RP) has been reported [46,47]. Diagnosis can be confirmed through patient's history, physical examination, clinical symptoms, laboratory tests, and imaging techniques, including rectoscopy, low abdominal CT scan or MRI, dynamic MRI defecography and rectal manometry [42-45].

Patients with CRP, or those with symptomatic IRP who failed conservative treatment, experiencing functional complaints (such as obstructed defecation and/or fecal incontinence), or who have an associated enterocele or cystocele, should be considered for surgical repair [42,43]. Surgical options include abdominal or perineal repairs, either elective or emergent, which may involve resection or fixation of the movable colon (though rarely is repair of the MGM defect required), and the restoration of a strong and functional pelvic floor [42,43,45]. There are no precise guidelines for the best repair option for concurrent pelvic prolapses (e.g., small bowel, bladder, vagina or uterus), but a multidisciplinary approach is essential for complicated cases [42,43].

Perineal repairs of CRP are generally reserved for older debilitated patients or those with significant comorbidities, as well as for cases with irreducible/strangulated RP; these repairs can also address concurrent enterocele or rectocele [42,43,45]. Their most catastrophic intraoperative pitfall is the inadvertent resection, suturing, or stapling of a portion of small bowel trapped in the colanal anastomosis after the rectosigmoidectomy, which may lead to massive haemorrhage requiring urgent abdominal exploration [42,43]. This rare complication underscores the need for vigilance to promptly identify and exclude any deep enterocele. Similarly, the unrecognized entrapment of a deep enterocele at the time of firing of the stapler to treat haemorrhoidal disease (e.g., Procedure for Prolapse and Haemorrhoids PPH / Stapled Rectal Mucosectomy, Stapled Transanal Rectal Resection STARR) can transform a routine procedure for a benign

condition into a surgical disaster [48,49]. Factors like the patient's individual stature (e.g., deep Douglas pouch, multiparous female with rectocele) may be overlooked during such surgical procedures. In this case, technical errors, such as placing the stapler too high (resulting in its upper part being intraperitoneal) or stapling removing too much full-thickness rectal wall tissue, may rarely cause severe complications, including intraperitoneal haemorrhage, retroperitoneal bleeding, and sepsis (peritonitis, fistula to other structures, infection of the haemorrhagic collection) [48,49]. Urgent exploratory laparotomy for haemorrhage is often inevitable to save the patient's life [48]. Therefore, it is emphasized that, these procedures should only be performed by specialized surgeons with careful attention to exclude any deep enterocele.

7. CONCLUSIONS

The contents of an abdominal hernia can vary significantly. These hernias may sometimes present with unexpected contents, making them a rare source of surprise, and can also pose challenges in terms of timely diagnosis and management due to their complexity. Severe complications, such as incarceration, strangulation/necrosis of the hernia contents, or gastrointestinal obstruction, are commonly associated with their nature. Occasionally, a causal relationship may exist between the hernia and an underlying acute or subacute distal condition or an obscured gastrointestinal deformity. In the emergent setting, understanding the implicated underlying mechanisms and making a prompt diagnosis are critical, and they can lead to a more tailored and effective approach to management.

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9. CONFLICT OF INTEREST

The author declares no conflict of interest.

10. INFORMED CONSENT / ETHICAL APPROVAL

Written informed consent was obtained from patients included in the study (figure

Figure Legends

Fig1. Emergent abdominal CT scan of a 77-year old man (sagittal / axial planes): large bowel obstruction (thick arrow) with megasigmoid loop strangulated in right inguinal hernia (thin arrow). In surgery , Hartmann's procedure and inguinal ring suturing were performed .



Fig2. Emergent chest / abdominal CT scan (axial / sagittal views) of a 78-year old woman depicting incarcerated incisional hernia (thick arrow) and strangulated PEH (thin arrow). She underwent emergent gastrectomy (damage-control).

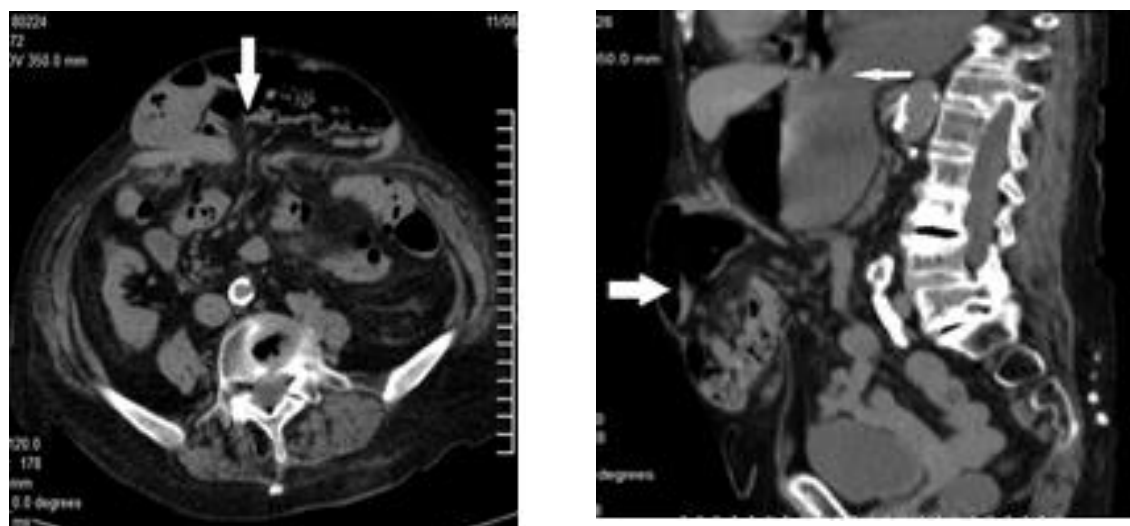
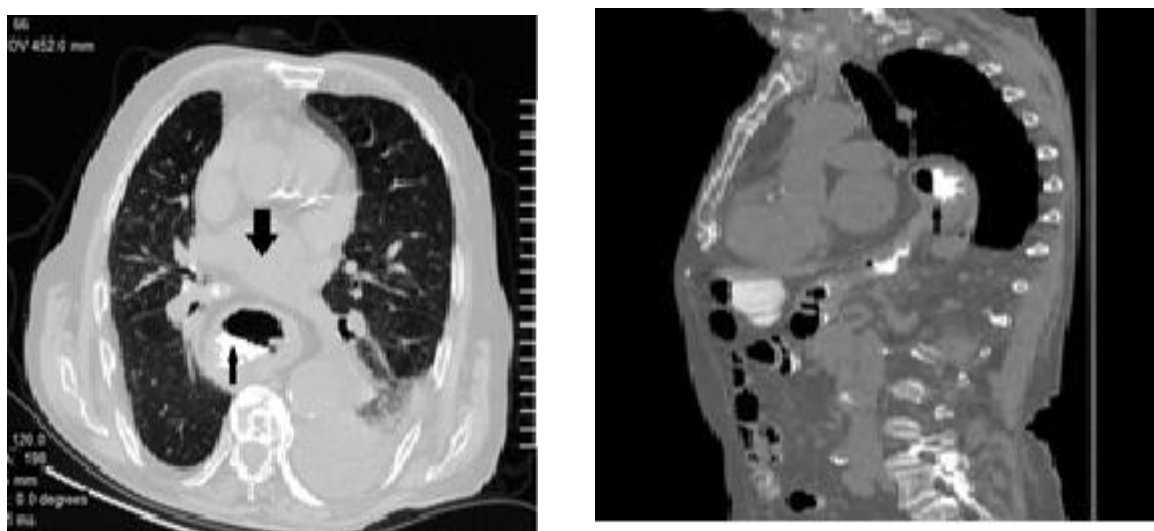


Fig3. Emergent chest / abdominal CT scan (axial /sagittal views) of a 88-year old man, depicting PEH (thin arrow) and cardiovascular deviation (thick arrow : pulmonary trunk). He underwent emergent gastrectomy.



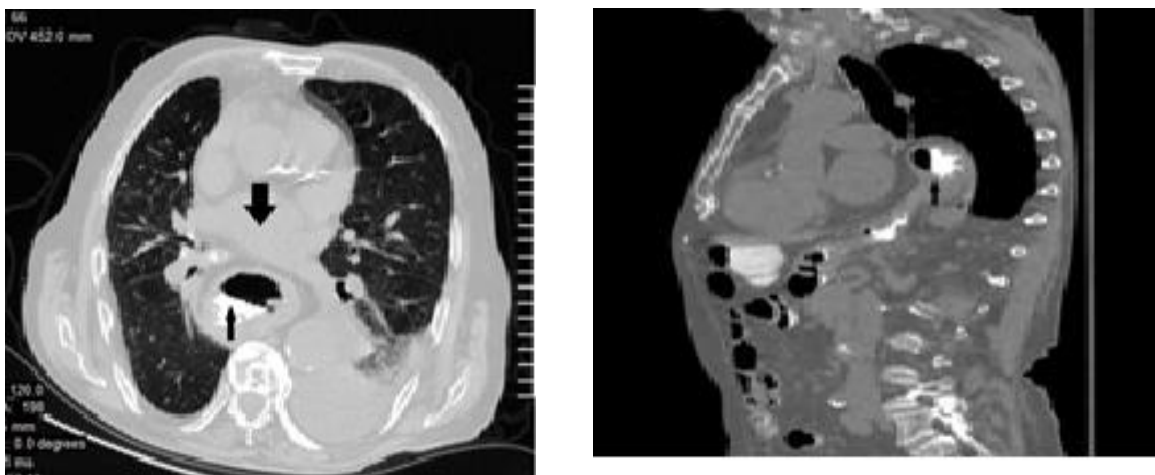


Fig4. GI imaging (contrast media) in a 65-year old woman : giant Morgagni's hernia including mobile right colon with vermiform appendix (not shown), ileal loops and greater omentum (thin arrows).The diaphragm is indicated with a thick arrow. The patient had a successful transabdominal repair involving colopexy .

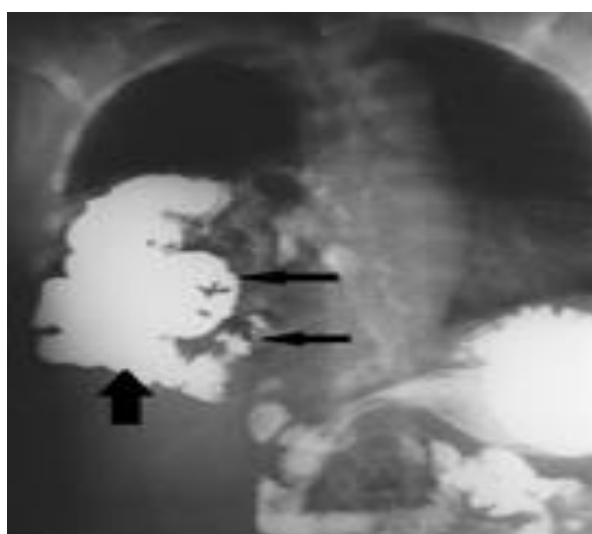
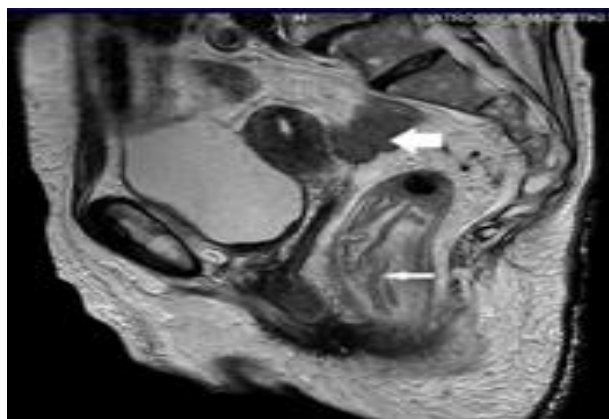
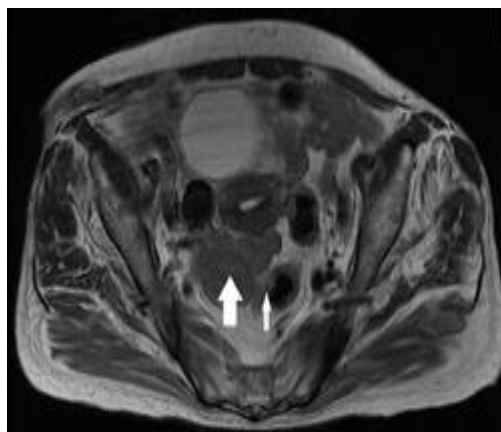


Fig . 5. Emergent chest /abdominal CT scan (sagittal view) of a 78-year old man : right and transverse mobile colon (MGM) dilatation (thick arrow) due to co-incarceration of gastric fundus and transverse colon (thin arrow) in hiatal hernia .



Fig. 6. Pelvic MRI of a 78-year old woman (axial /sagittal views) : CRP (thin arrow) associated with enterocele (thick arrow) and rectocele (not shown) . She underwent successful Altemeier's rectosigmoidectomy.



REFERENCES

- [1] Scott DJ, Jones DB. Hernias and abdominal wall defects. In : Norton JA, Randal Bollinger R, Chang AE, Lowry SF, Mulvihill SJ, Pass HI, Thomson RW (eds). *Surgery. Basic Science and Clinical Evidence*. International Edition. Springer -Verlag New York, Inc;200:787-823.
- [2] Deveney KE. Hernias and other lesions of the abdominal wall. In: Way LW, Doherty GM,(eds.).*Current surgical diagnosis & treatment*. International 11th Edition. Lange Medical Books/McGraw-Hill, USA; 2003: 783-796.
- [3] Boormans JLH, WLEM, Teune TM, Plaisier PW. Carcinoma of the sigmoid presenting as a right inguinal hernia . *Hernia* 2006; 10: 93-6. doi:10.1007/s10029-005-0019-5
- [4] Bali C, Tsironis A, Zikos N, Mouselimi M, Katsamaki N. An unusual case of a strangulated right inguinal hernia containing the sigmoid colon. *Int J Surg Case Rep* 2011 ; 2: 53-55. doi:10.1016/j.ijscr.2011.01.005
- [5] Goyal S, Shrivastara M, Verma RK, Goyal S. “Uncommon contents of inguinal hernia sac” :A surgical dilemma. *Indian J Surg* 2015; 77(Suppl2): 305-9 . doi:10.1007/s12262-013-0806-7
- [6] Avgoustou C, Tsanakalis E. Strangulated obstruction of megasigmoid loop in right inguinal hernia. *Chirurgia (Edizioni Minerva Medica)* 2018;31:704. doi:10.23736/S03949508.17.04742-8
- [7] Yang Q, Gao Y. Incarcerated recurrent inguinal hernia as a cause of secondary torsion of the greater omentum: a rare case report and literature review. *J Int Med Res* 2019; 47:5867-72. doi:10.1177/0300060519878372
- [8] Kumar VSC, Mani KK , Alwakkaa H, Shina J. Epiploic appendagitis: an often misdiagnosed cause of acute abdomen. *Case Rep Gastroenterol* 2019; 13:364-368. doi:10.1159/000502683
- [9] Zhou P, Jin C-H, Shi Y, et al. Omental fibroma combined with right indirect inguinal hernia masquerades as a scrotal tumor: A case report. *World J Clin Cases* 2024; 12: 988-994. doi:10.12998/wjcc.v12.i5.988
- [10] Khandelwal S, Kaur A, Singh S, Ghosh A. Amyand’s hernia: a case of right inguinoscrotal hernia with appendiceal content. *Ann Med Surg (Lond)* 2024;86:37913795. doi:10.1097/MS9.0000000000002137
- [11] Fiordaliso M, Ahmd S, Simic S, Zoubi H, Karaorman M. A case of incarcerated inguinal hernia: Amyand’s hernia with adenocarcinoma tumor. *Int J Surg Case Rep* 2021;8. doi: 10.1016/j.ijscr.2021.105716
- [12] Essobivou TB, Pali E, Keheou AP, Issa M, Dosseh ED. Unusual form of inguinal hernia: A case report of Littre’s hernia strangled. *Int JSurg Case Rep* 2022;98. doi: 10.1016/j.ijscr.2022.107570
- [13] Răcăveanu M, Preda SD, Preda A, et al. Management of Littre hernia -Case report and systematic review of case reports. *J Clin Med* 2023 ; 12. doi:10.3390/jcm12113743
- [14] Landrenaou RJ, Del Pino M, Santos R. Management of paraesophageal hernias. *Surg Clin N Am* 2005 ; 85: 411-432.
- [15] Avgoustou C, Theodoropoulos D, Fagrezos D, Avgoustou E, Giannousis D. Emergent management of complicated paraesophageal hernia due to distal gastrointestinal obstruction : three case series . *J Gastric Surg* 2020; 2 :92-97. doi:10.36159/jgs.v213.54
- [16] Ghafoun A, Anbara T, Foroutankia R. A rare case report of appendix and caecum in the sac of left inguinal hernia (left Amyand’s hernia). *Med J Islam Repub Iran* 2012; 26: 94-95.
- [17] Ba-shammakh SA, Alrayes B, Almasarweh SA, Alseragi MA, Rabadi DK. Complicated Spigelian hernia presenting with sigmoid colon strangulation: A unique clinical report. *Int J Surg Case Rep* 2024; 120. doi:10.1016/j.ijscr.2024.109833
- [18] Matsumoto G, Ise H, Inoue H, Ogawa H, Suzuki N, Matsuno S . Metastatic colon

- carcinoma found within an inguinal hernia sac :report of a case .*Surg Today* 2000; 30: 74-7. doi:10.1007/ PL00010052
- [19] Slater R, Amatya U, Shorthouse AJ . Colonic carcinoma presenting as strangulated inguinal hernia: report of two cases and review of the literature. *Tech Coloproctol* 2008; 12 :255-8. <https://doi.org/10.1007/s10151-007-0388-0>
- [20] Sakorafas GH, Peros G . Obstructing sigmoid cancer in a patient with a large, tender, non-reducible inguinal hernia:the obvious diagnosis is not always the correct one . *Eur J Cancer* 2008; 17 :72-3. doi:10.1111/j.1365-2354.2007.00811.x
- [21] Elbanna KY, Alzahrani HA, Azzumeea F, Alzamel HA. Neuroendocrine tumor of the appendix inside an incarcerated Amyand's hernia. *Int J Surg Case Rep* 2015; 14: 152-155 . doi: 10.1016/ijscr.2015.07.038
- [22] Sabra H ,Alimoradi M, El-Helou E, Azaki R, Khairallah M, Kfoury T. Perforated sigmoid colon cancer presenting as an incarcerated inguinal hernia: A case report . *Int J Surg CaseRep*2020;72:108111.doi:10.1016/ijscr.2020.05.067
- [23] Mithi MT, Deshpande SH, Mithi TA, Deshpande SH. Ruptured left ovarian teratoma as an irreducible right inguinal hernia. *SurgJ(NY)*2022;8:e52-e55. doi:10.1055/s-0041-1736667
- [24] Crispin-Trebejo B, Robles-Cuadros MC, Orendo-Velasquez E, Andrade FP . Internal abdominal hernia : intestinal obstruction due to transmesenteric hernia containing transverse colon . *Int J Surg Case Rep* 2014 ; 5: 396-98. doi:10.1016/j.ijscr.2014.01.013
- [25] Danial AK, Brimo Alsaman MZ, Zazo R, et al. A unique case of congenital transmesocolic hernia with malrotation in an 25-year-old femal: a case report. *J Surg Case Rep* 2019 (10): rjz280.doi:10.1093/jscr/rjz280
- [26] Cullen ML, Klein MD, Philippart AI. Congenital diaphragmatic hernia. *Surg ClinNam* 1985; 65:1115-38. doi:10.1016/s0039-6109(16)43732-1
- [27] Johns Hopkins Medicine (Health). Congenital diaphragmatic hernia (CDH). [https://www.hopkinsmedicine.org/health\(2024\)](https://www.hopkinsmedicine.org/health(2024)) .
- [28] Berman L, Stringer D, Ein SH, Shandling B .The late-presenting pediatric Morgagni hernia: a benign condition.*J Pediatr Surg* 1989;24:9702.doi:10.1016/s00223468(89)80193-9
- [29] Hang HM, Johnson E, Mala T, Forland DT, Sevik TT, Johannessen HO . Incarcerated paraesophageal hernia complicated by pancreatic damage and unusual comorbidity:Two retrospective case series . *Int J Surg Case Rep* 2019 ; 54:75-78. doi:10.1016/ijscr.2018.11.064
- [30] Recuenco CB, Garcia JG-Q, Martin MC, et al. De Garengot's hernia: Case report and literature review . *Int J Surg Case Rep* 2019 ; 64: 58-61.doi:10.1016/ijscr.2019.09.037
- [31] Tilva H, Tayade S, Kanjiya A . Contemporary review of masses in the canal of Nuck . *Cureus* 2023;15: e367222 . doi: 10.7759/cureus.36722
- [32] Avgoustou C, Manatakis D. Acute surgical abdomen as presentation of undiagnosed midgut malrotation in adults. *Hellenic J Surg* 2017 ;89:97-105. doi: 10.1007/s13126-017-0391-5
- [33] Christodoulou IM, Angelopoulos A, Siaperas P, et al. Leiomyoma of the round ligament of the uterus mimicking inguinal hernia . *Case RepSurg*2018;2018.doi:101155/2018/6702494
- [34] Chern TY, Tay YK, Perera DS. A rare case of ascending colon adenocarcinoma incarcerated in an inguinoscrotal hernia: case report and literature review. *Surg Case Reports* 2018;4 :18.<https://doi.org/10.1186/s40792-018-0457-9>
- [35] Grigorean VT , Sevescu R, Anica A, et al . Spindle cell rhabdomyosarcoma of the inguinal region mimicking a complicated hernia in the adult -an unexpected finding . *Medicina(Kaunas)*2023;59:1515.doi:10.3390/medicina59091515
- [36] Wani I. Adult intussusceptions in hernia sac: a case report. *J Clin Med Res* 2009; 1:119-120. doi:10.4021/jocmr2009.06.1243
- [37] Lao OB, Fitzgibbons RJ Jr, Cusick RA. Pediatric inguinal hernias, hydroceles, and undescended testicles. *Surg Clin N Am* 2012;92:487-504.doi:10.1016/j.suc.2012.03.017
- [38] Chan D, Kwon JK, Lagomarsino EM, Veltkamp JG, Yang MS, Pfeifer CM. Canal of Nuck hernias. *Acta Radiol Open* 2019 ; 8 . doi: 10.2058460119889867
- [39] Kohn GP ,Price RR , De Meester SR ,et al . SAGES Guidelines Committee . Guidelines for the management of hiatal hernia .*Surg Endosc*2013;27:4409-28.doi:10.1007/s00464-013-3173-3
- [40] Mohamed M ,AI-Hillan A, Shah J, Zurkovsky E, Asif A, Hossain M.Symptomatic congenital Morgagni hernia presenting as a chest pain:a case report. *J Med Case Rep* 2020;14 :13.doi:10.1186/s13256-019-2336-9
- [41] Matzke GM, Dozois EJ, Larson DW, et al. Surgical management of intestinal malrotation in adults: comparative results for open and laparoscopic Ladd procedures. *Surg Endosc* 2005 ; 19: 1416-19.
- [42] Van der Shans EM, Paulides TJC, Wijffels NA, Consten ECJ. Management of patients with rectal prolapse: the 2017 Dutch guidelines.*Tech Coloproctol* 2018; 22: 589-596 . doi:10.1007/s10151-018-1830-1
- [43] Jacobs LK, Lin YJ,Orkin BA .The best operation for rectal prolapsed . *Surg Clin N Am*

- 1997;77:4970.doi:10.1016/s00396109(05)70532-6
- [44] Cannon JA .Evaluation ,diagnosis and medical management of rectal prolapse. *Clin Colon Rectal Surg* 2017 ;30:16-21.doi:10.1055/s-0036-1593431
- [45] Alwahid M, Knight SR, Wadhawan H, Campbell KL , Ziyaie D, Koch SMP. Perineal rectosigmoidectomy for rectal prolapse-the preferred procedure for the unfit elderly patients? 10 years experience from a UK tertiary centre. *TechColoproctol* 2019; 23:1065-1072.doi:10.1007/s10151-019-02100-z
- [46] Agarwal N, Kumar P, Gupta N. Synchronous rectal prolapse and midgut volvulus presenting as complete small bowel gangrene. *Pol Przegl Chir* 2022; 94 :82-84. doi:10.5604/01.3001.0014.1735
- [47] Lee HJ, Hendricks D, Rangaka T, Elrahan AA .Trans-anal small bowel evisceration in a patient with a perforated rectal prolapse . *S Afr J Surg* 2023; 61: 150-152. <https://doi.org/10.36303/SAJS.3998>
- [48] Pescatori M . PPH stapled hemorrhoidectomy-a cautionary note .*Dis Colon Rectum* 2003 ; 46 :131.doi:10.1097/01.DCR.0000044725.73789.97
- [49] Aumann G , Petersen S , Pollack T , Hellmich G, ludwig K. Severe intra-abdominal bleeding following stapled mucosectomy due to enterocele: report of a case . *Tech Coloproctol* 2004; 8: 41-3 .doi: 10.1007/s10151-004-0050-z

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