

CASE REPORT

Minimally Invasive Surgical Approach for Adult Morgagni Hernia Repair Using Mesh Reinforcement

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Abstract: Morgagni hernia represents a rare anterior diaphragmatic defect, accounting for approximately 2-3% of all congenital diaphragmatic hernias, presenting unique surgical challenges in adult patients. A 63-year-old female presented with right hypochondrial pain and respiratory symptoms. Computed tomography revealed herniation of the omentum and transverse colon through a right-sided anteriomedial diaphragmatic defect measuring 4×4 cm. The surgical repair was performed laparoscopically using a three-port technique under general anesthesia. The hernia contents were reduced, and the defect was primarily closed using V-lock sutures, reinforced with a 15×15 cm composite mesh. The postoperative course remained uneventful, with complete resolution of symptoms and no recurrence at six-month follow-up. The laparoscopic approach demonstrated significant advantages, including excellent visualization of the surgical field, reduced postoperative pain, shorter hospital stay, and rapid recovery. Early diagnosis and surgical intervention are crucial to prevent potential complications such as incarceration or strangulation of herniated contents. The successful outcome highlights the efficacy of minimally invasive techniques in managing adult Morgagni hernias.

Keywords: Adult Morgagni hernia; Laparoscopic repair; Diaphragmatic hernia; Mesh reinforcement; Minimally invasive surgery.

1. Introduction

Morgagni hernia (MH), first described by Giovanni Morgagni in 1761, represents a congenital defect in the anterior diaphragm resulting from incomplete fusion of the septum transversum [1]. These hernias occur through the sternocostal triangles (Morgagni-Larrey space), with approximately 90% presenting on the right side due to the protective effect of the pericardial sac on the left [2]. Despite their congenital nature, many cases remain asymptomatic until adulthood, when they are often discovered incidentally or become symptomatic due to complications. The embryological basis of Morgagni hernia stems from the incomplete fusion between the sternal and costal portions of the diaphragm during fetal development.

This anatomical defect typically occurs in the anterior mediastinum, posterior to the sternum and xiphoid process [3]. While these hernias account for only 2-3% of all diaphragmatic hernias, their clinical significance lies in the potential for serious complications, including bowel obstruction and strangulation. Recent advances in minimally invasive surgery have revolutionized the approach to Morgagni hernia repair. The laparoscopic technique, first reported for MH repair in 1992, has emerged as the preferred surgical approach due to its numerous advantages [4].

These benefits include superior visualization of the anatomical defect, reduced postoperative pain, shorter hospital stays, and improved cosmetic outcomes compared to traditional open surgery. The anatomical considerations in laparoscopic repair are crucial for successful outcomes. The surgeon must thoroughly understand the relationship between the hernia defect and surrounding structures, including the pericardium, pleura, and major vessels. The presence of a hernial sac, which occurs in approximately 95% of cases, and its contents significantly influence the surgical approach and technique [5].

Contemporary surgical management has evolved to include various techniques for defect closure, ranging from primary suture repair to mesh reinforcement. The choice of repair method depends on several factors, including defect size, tissue quality, and patient characteristics [6]. The increasing adoption of prosthetic materials has significantly reduced recurrence rates, particularly in larger defects exceeding 3 cm in diameter.

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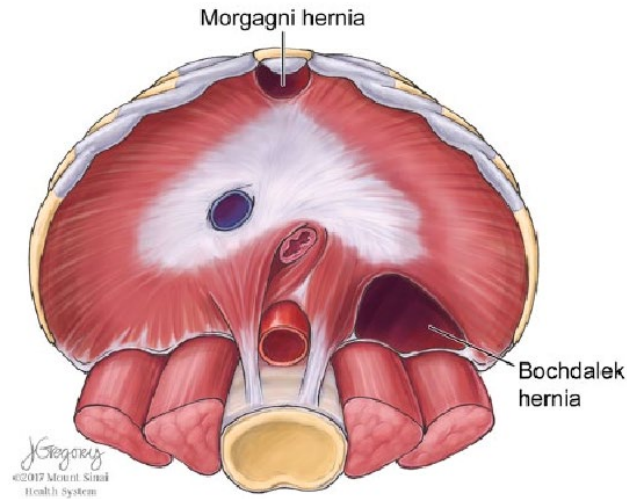


Figure 1. Anatomical illustration of Morgagni hernia showing the typical location of the defect and its relationship to surrounding structures (Image credit: Gregory ©2017 Mount Sinai Health System)

2. Case Presentation

A 63-year-old female patient presented to the surgical department with a three-month history of progressive right hypochondrial pain and intermittent dyspnea. Her medical history was significant for hypertension and type 2 diabetes mellitus, both well-controlled with medication. The patient reported no previous abdominal surgeries or trauma.

2.1. Clinical Examination

Physical examination revealed decreased breath sounds in the right lower chest with dullness to percussion. Abdominal examination demonstrated tenderness in the right hypochondrium without signs of peritonitis. Vital signs were stable with oxygen saturation of 96% on room air. Body mass index was 27.8 kg/m².

2.2. Diagnosis

Initial chest radiography revealed an abnormal right cardiophrenic angle opacity. Subsequent computed tomography (CT) of the chest and abdomen with contrast demonstrated a right-sided anterior diaphragmatic defect measuring 4×4 cm. The hernia sac contained omental fat and transverse colon, with no evidence of obstruction or strangulation. The defect was noted to be abutting the right atrium and superior vena cava.

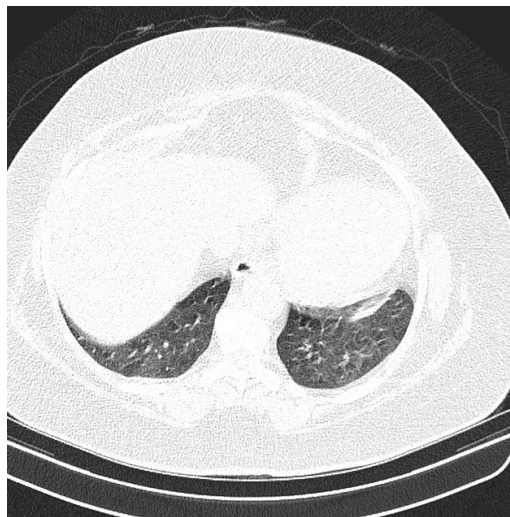


Figure 2. CT scan images showing the right-sided homogeneous opacity over the lower part of right lung and the herniated contents

2.3. Preoperative Preparation

After thorough preoperative assessment, including cardiac evaluation and pulmonary function tests, the patient was scheduled for laparoscopic repair. Preoperative antibiotics were administered according to institutional protocol, and appropriate thromboembolic prophylaxis was initiated.

2.4. Surgical Technique

Under general anesthesia with endotracheal intubation, the patient was positioned supine with split legs in a modified Trendelenburg position. A three-port technique was employed:

- 10 mm camera port at the supraumbilical position
- 5 mm working ports in the right and left midclavicular lines

The pneumoperitoneum was established using the Veress needle technique, maintaining an intra-abdominal pressure of 12-14 mmHg. Initial laparoscopic exploration confirmed the CT findings. The herniated contents were carefully reduced into the abdominal cavity after adhesiolysis. The hernia sac was preserved to avoid pleural injury.

The diaphragmatic defect was repaired using V-lock (barbed) sutures in a continuous fashion. A 15×15 cm composite mesh was placed over the repair and secured with 2-0 non-absorbable sutures and tackers, ensuring adequate overlap of the defect margins.

3. Post-operative course

The immediate postoperative period was uneventful. A chest radiograph performed on postoperative day one showed normal findings with complete expansion of the right lung. The patient's respiratory parameters remained stable, and she reported significant improvement in her previous symptoms. Oral intake was initiated on the first postoperative day, and the patient was mobilized early.

Pain management was achieved effectively using multimodal analgesia, with minimal requirement for opioid medications. The patient was discharged on postoperative day three with appropriate instructions for activity modification and wound care.

3.1. Follow-up

During the first follow-up visit at two weeks, the patient reported complete resolution of preoperative symptoms. Physical examination and chest radiography showed normal findings. Subsequent follow-up at three and six months demonstrated no evidence of recurrence, with the patient maintaining normal activities without restrictions.

Table 1. Timeline of Patient's Clinical Course

Time Point	Clinical Events and Findings
Presentation	Right hypochondrial pain, dyspnea
Diagnosis	CT confirmation of Morgagni hernia
Surgery	Laparoscopic mesh repair
POD 1-3	Uneventful recovery
2 weeks	Complete symptom resolution
6 months	No recurrence

4. Discussion

The management of adult Morgagni hernia presents unique challenges requiring careful consideration of various factors [7]. The increasing adoption of laparoscopic approaches has significantly improved surgical outcomes, offering several advantages over traditional open surgery [8]. This minimally invasive technique provides excellent visualization of the diaphragmatic defect and surrounding structures, facilitating precise repair.

4.1. Anatomical Considerations

Understanding the embryological development and anatomical relationships is crucial for successful repair. The sternocostal triangles, where Morgagni hernias occur, are bordered by the diaphragm, sternum, and costal margin [9]. The proximity to vital structures, including the pericardium and major vessels, necessitates meticulous dissection and careful mesh placement.

4.2. Technical Aspects:

The choice of surgical approach depends on various factors, including defect size and location, patient characteristics, presence of complications and surgeon expertise

The debate regarding management of the hernia sac continues, with some advocating complete excision while others prefer preservation to avoid pleural injury [10]. Our approach of preserving the sac aligns with recent literature suggesting reduced postoperative complications with this technique.

4.3. Mesh Selection and Fixation

The use of prosthetic mesh in Morgagni hernia repair has significantly reduced recurrence rates [11]. The choice between different mesh types (composite, polypropylene, or biological) should be individualized based on specific patient factors. Adequate mesh overlap and appropriate fixation technique are crucial for preventing recurrence.

5. Conclusion

Laparoscopic repair of Morgagni hernia represents a safe and effective surgical approach in adult patients. The successful outcome in our case reinforces the advantages of minimally invasive surgery, including superior visualization, reduced postoperative pain, and shorter hospital stay. The use of mesh reinforcement, combined with proper surgical technique and understanding of anatomical relationships, is crucial for optimal results. Early diagnosis and intervention prevent potential complications, while systematic follow-up ensures long-term success. As surgical techniques continue to evolve, the laparoscopic approach stands as the current gold standard for adult Morgagni hernia repair, offering excellent outcomes with minimal morbidity.

Compliance with ethical standards

Conflict of interest statement

The authors declare that they have no conflict of interest. None of the authors has any financial or personal relationships with other people or organizations that could inappropriately influence or bias this work. No funding was received for the preparation of this manuscript. The mesh and surgical instruments used in this case were part of standard hospital inventory with no commercial sponsorship.

Statement of ethical approval

This case report was reviewed and approved by the Institutional Ethics Committee of GSL Hospital, Rajamahendravaram. The treatment provided was in accordance with institutional protocols and current surgical standards of care. All procedures performed were in accordance with the ethical standards of the institutional research committee (Approval number: IRB-2024-0127) and with the 1964 Helsinki Declaration and its later amendments.

Statement of informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor of this journal. The patient was informed about the surgical procedure, potential complications, and the intention to publish the case for educational purposes. The patient's identity has been protected, and no identifying information is included in this report

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