

Morgagni hernia repair in adult obese patient by hybrid robotic thoracic surgery

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Abstract: Morgagni hernia is a relatively uncommon congenital diaphragmatic hernia in which abdominal contents protrude into the chest through the foramen of Morgagni. It usually occurs on the right side of the chest but may occur on the left side or in the midline. In adults, it commonly presents with non-specific symptoms such as dyspnea, cough, gastroesophageal reflux disease and other. Surgical repair should be always performed to prevent the risk of hernia incarceration. Transthoracic approach has been proposed especially in cases with indeterminate, anterior pericardial masses. We believe that in adult obese patients with Morgagni hernia and voluminous hernial sac containing only omentum, the transthoracic approach can represent a valid alternative to transabdominal approach. The use of hybrid robotic thoracic surgery can be strongly recommended because it allows, through robotic instruments, to perform delicate surgical maneuvers in difficult to reach anatomical areas and, with the final extension of a port-site incision, to remove voluminous specimens from the thoracic cavity, avoiding the chest wall discomfort that follow the thoracotomy access.

Keywords: Morgagni hernia; adult patient; robotic thoracic surgery

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Introduction

Morgagni hernia occurs as a herniation of abdominal contents into the thorax through a congenital defect found in the anterior aspect of the diaphragm with retrosternal or parasternal location (1). It often develops in the right hemithorax but also can be found on the left or on both sides (2) and accounts in adults for only 3% of all surgically treated diaphragmatic hernias (3). It usually contains omentum, transverse colon and less commonly stomach, small bowel or liver (4). Predisposing conditions have been documented and include: trauma, obesity, pregnancy, weight lifting or other causes of increased intra-abdominal pressure (1,4). Although most remain asymptomatic, some adults develop non-specific symptoms such as dyspnea, cough, sternal pain, dyspepsia and rarely may present with gastric volvulus, bowel obstruction or even strangulation (5). Chest X-rays, barium enema, computed tomography

(CT) and magnetic resonance imaging (MRI) studies are helpful in diagnosis (6). In patients with Morgagni hernia, surgical treatment is indicated to avoid future complications such as visceral obstruction or strangulation (7). Repair has traditionally been performed by open transthoracic or transabdominal approach and more recently, with the advent of minimally invasive surgery, via laparoscopic and thoracoscopic approach (8).

Case presentation

A 51-year-old man was admitted to our hospital with chronic sternal pain and breathing discomfort on exertion for more than two months. The patient, with Class 1 obesity (BMI: 31.3), had a medical history of hypertension and obstructive sleep apnea. The chest X-ray showed an abnormal shadow on the right hemithorax. Computed tomography (CT) of thorax and upper abdomen was done for further investigation

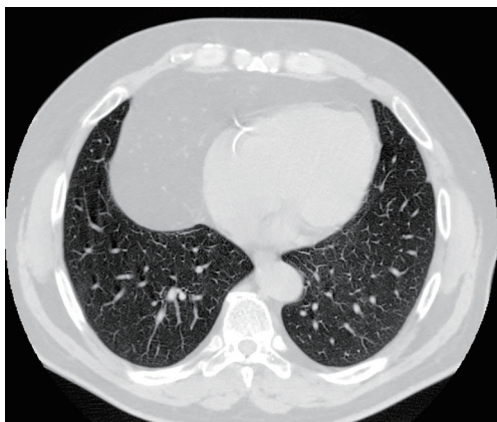


Figure 1 Preoperative CT scan shows a pericardial homogeneous fatty mass.

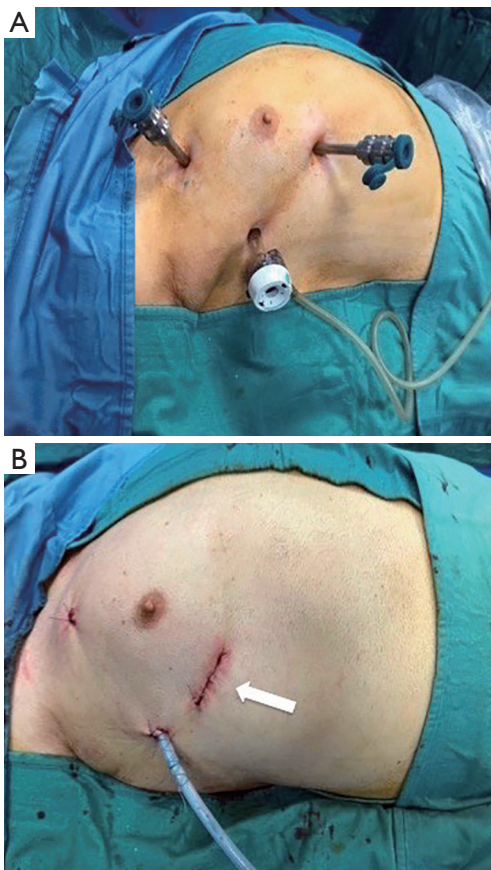


Figure 2 Trans-thoracic approach. (A) Three-port access via tiny thoracic incisions; (B) extension of a port-site incision (white arrow) for specimen retrieval.

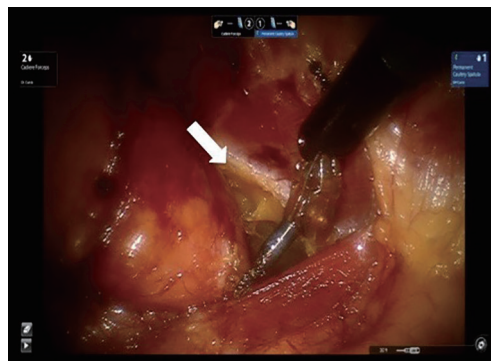


Figure 3 Defect found in the anterior aspect of the right hemidiaphragm with retrosternal location (white arrow).

and a fat density mass was observed in the right substernal cardiophrenic angle (*Figure 1*). The lesion was suspected to be either a mediastinal lipoma or a Morgagni hernia and because a definite preoperative diagnosis could not be made, we preferred a transthoracic approach using a minimally invasive technique through the da Vinci robot system. The operation was performed under general anesthesia with a double lumen endobronchial tube. The patient was positioned supine on the operating table with the right hemithorax elevated by a roll placed from the patient's hip to the level of the tip of scapula. The camera was inserted through a 12-mm port placed on the anterior axillary line in the 5th intercostal space and, after pleural space insufflation with carbon dioxide gas, a mass in the right cardiophrenic angle was found. Two additional ports (*Figure 2A,B*) were placed for the insertion of dissecting instruments and, after lysis of adhesions between the pericardial fat pad in the substernal cardiophrenic angle and the mass, a retrosternal diaphragmatic defect was identified (*Figure 3*). A voluminous hernial sac protruded through this defect and the hernial content was inspected to exclude the presence of viscera. Since the volume of the herniated omentum was too much to be pushed down into the abdomen of the obese patient, the sac was resected with bipolar dissector after lysis of adhesions.

The diaphragmatic defect was closed by reapproximating the diaphragmatic edges, beginning from the cardiophrenic angle, with several interrupted 0 polypropylene sutures and fixing then the edges to the retrosternal tissue with a continuous 3-0 polypropylene suture tied within the thorax using robotic instruments (*Figure 4A,B*). The voluminous sac containing only omentum was taken out of the pleural cavity with final extension of a port-site incision (*Figure 5A*). A 28-Fr chest tube was left in place with closure of the two remaining thoracic incisions.

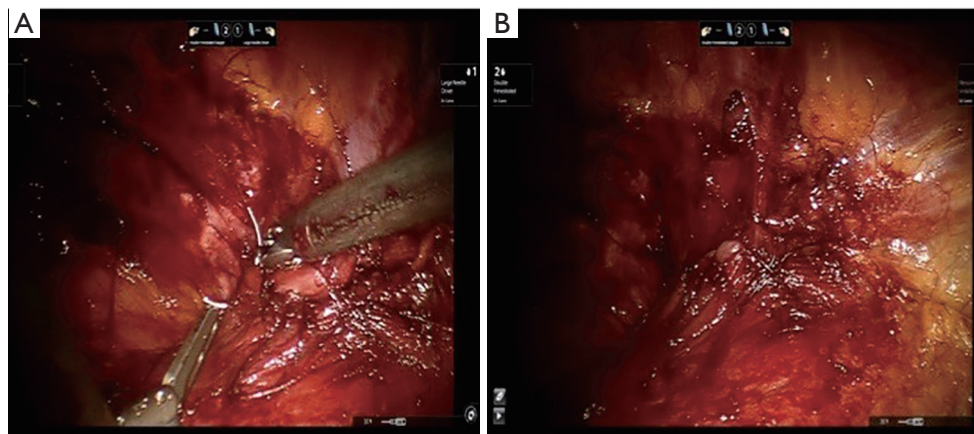


Figure 4 Primary closure of the retrosternal diaphragmatic defect using multiple interrupted sutures performed with robotic instruments.

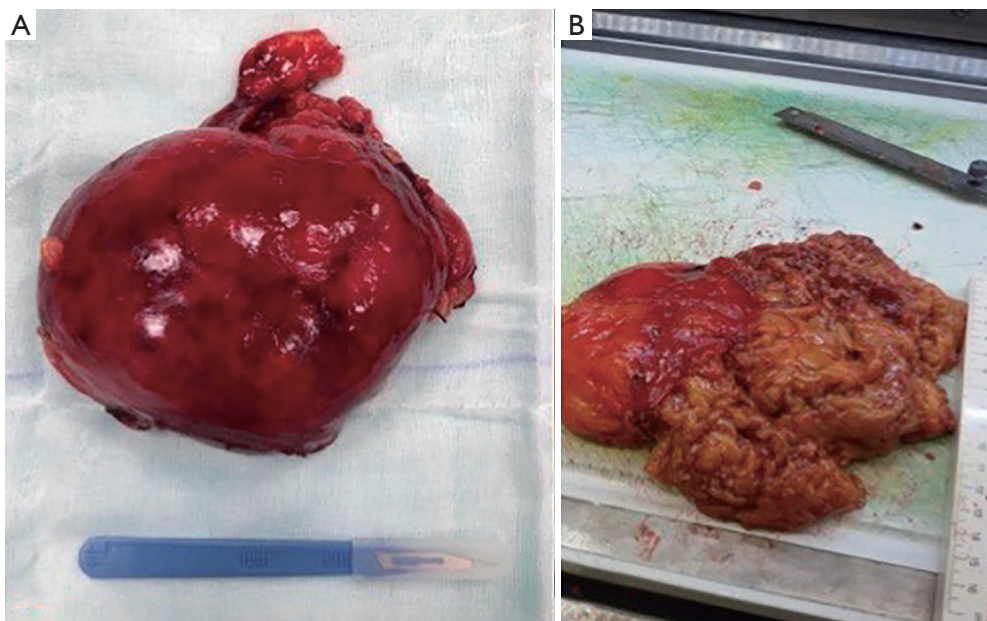


Figure 5 Hernial sac removed. (A) Surgical specimen consisting of voluminous hernial sac containing omentum; (B) macroscopic examination of omentum by the surgical pathologist, after opening the hernial sac.

The patient had an uneventful postoperative course and was discharged home on the fourth postoperative day. Six-month follow-up showed that the patient is in good condition and without any evidence of recurrence.

Discussion

The abdominal approach has been widely used to repair Morgagni hernia for several advantages including easier reduction into the abdomen of the hernial contents,

evaluation of intra-abdominal pathology and inspection of the contralateral diaphragm for additional defects (9). However, some authors argue that the thoracic approach is more advantageous than the transabdominal approach in the management of adult patients with Morgagni hernia and severe adhesions, allowing easier dissection of the hernial sac off the thoracic structures with reduced chance of iatrogenic injuries (2,4). In our case we preferred a transthoracic approach because the patient showed an indeterminate anterior pericardial mass. In fact, when

CT scan doesn't show air and fluid-filled structures in the anterior cardiophrenic angle, the diagnosis of Morgagni hernia can be challenging and the differential diagnosis could include lipoma, liposarcoma, pleural mesothelioma, anterior chest wall tumors and other (2,4,10). It emerges from this report that in the treatment of adult obese patients with Morgagni hernia and voluminous hernial sac containing only omentum (*Figure 5B*), the transthoracic approach is preferable to the transabdominal approach since it allows to resect the herniated omental fat overcoming the challenge of repositioning into the peritoneal cavity. In this case the radiologic imaging plays a key role in the preoperative planning excluding the presence of air- and fluid-filled structures in the chest and it is strongly recommended to make sure during the surgical procedure that the hernial sac is free of viscera. The use of robotic system in the surgery of anterior mediastinal pathologies has been increasing worldwide and many authors have demonstrated the advantages of robotic technology that allows to work easily in narrow spaces, such as the anterior mediastinum, thanks to instruments with 7 degrees of freedom as the human hand (11). We are of the opinion that these robotic instruments, through their features, are very useful also to perform delicate surgical maneuvers in difficult to reach anatomical areas, such as cardiophrenic angle and substernal region, allowing for more precise suturing. The hybrid robotic thoracic surgery used in this case consists of a thoracic procedure performed completely under endoscopic vision through minimally invasive accesses and followed by final extension of a port-site incision to retrieve the voluminous specimen. This approach allows a meticulous dissection in anatomic narrow regions during all steps of the procedure and, at the same time, it offers the advantages of less postoperative pain and earlier return to physical activity than open surgery.

Conclusions

In line with other authors we believe that when a definite preoperative diagnosis cannot be made in patients with an indeterminate anterior pericardial mass, the transthoracic approach appears extremely useful (12). This report demonstrates further that in the surgical treatment of adult obese patients with Morgagni hernia and voluminous hernial sac containing only omentum, the transthoracic approach can represent a valid alternative to transabdominal approach. In this case the hybrid robotic thoracic surgery can be highly recommended because it allows via tiny

thoracic incisions to perform delicate maneuvers, such as dissection or precise suturing, in remote anatomic areas during all steps of the procedure. Through the final extension of a port-site incision, for removing the voluminous specimen, this approach also allows to limit pain and discomfort that follow the thoracotomy access. To our knowledge, this is the first reported case of hybrid robotic thoracic surgery performed for Morgagni hernia repair in adult obese patient.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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