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Giovanni Terrosu, Marco Brizzolari, Sergio Intini, Federico Cattin, Vittorio Bresadola, Dino De Anna

Azienda Ospedaliero-Universitaria "S. Maria della Misericordia" of Udine, General Surgery Unit, Udine School of Medicine, Italy

Morgagni Hernia: technical variation in the laparoscopic treatment

INTRODUCTION: Morgagni hernia is a rare entity that accounts for 3-5% of diaphragmatic hernias. They are mostly asymptomatic and discovered incidentally. Surgical treatment is indicated once diagnosis is made. Abdominal or thoracic accesses are possible using open or minimally invasive technique.

METHODS: We report two cases of laparoscopic assisted repair of Morgagni hernia conducted by primary closure of the diaphragmatic defect with extracorporeal nonabsorbable sutures anchoring the diaphragmatic edge at the muscular fascia of the abdominal wall.

RESULTS: Both patients had an uneventful postoperative recovery. The operative time was 90 and 60 minutes and the postoperative hospitalization was 4 and 2 days respectively.

CONCLUSIONS: Laparoscopic intervention for Morgagni hernia repair is easy, safe and less invasive compared to the open one, with reduced hospitalization time. Primary closure of the diaphragmatic defect with extracorporeal nonabsorbable sutures is an effective technique for Morgagni hernia; defects larger than 20-30 cm² should be repaired using a prosthetic patch.

KEY WORDS: Laparoscopy, Morgagni hernia

Introduction

Diaphragmatic hernia is a stable migration of abdominal viscera into the chest cavity through a congenital or acquired diaphragmatic orifice¹. Among diaphragmatic hernias the least common are Bochdalek type (0.17-6%)² and Morgagni-Larrey type (3-5%)³.

Anteromedial diaphragmatic hernia, called Morgagni hernia, is facilitated by a lack of fusion of the pars costalis and the pars sternalis of the septum transversum⁴.

Hernias of this type have a hernial sac protruding into the anterior mediastinum. They are often incidentally discovered while performing examinations for other reasons. The diagnosis is usually made by performing a chest radiograph (which often shows the presence of retrosternal air bubbles or air-fluid levels), possibly carried out with a double contrast barium enema and confirmed by CT. Once diagnosis of Morgagni hernia is made, surgical treatment is indicated because of the risk of incarceration or strangulation of herniated viscera^{5,6}.

Different surgical accesses such as laparotomy or laparoscopy, thoracotomy or thoracoscopy are recommended to repair hernias of this type. Moreover, interventions are possible by primary closure of the diaphragmatic defect or by affixing a prosthesis to repair the same defect.

Here follows the report of our experience carried out with two patients suffering from Morgagni hernia who had laparoscopic hernia repair by primary closure of the hernial porta.

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Correspondence to: Marco Brizzolari, MD, General Surgery Unit, Udine School of Medicine, Azienda Ospedaliero-Universitaria "Santa Maria della Misericordia", Piazzale Santa Maria della Misericordia 15, 33100 Udine, Italia (E-mail: marcobrizzolari@yahoo.it)

Materials and methods

PATIENT 1

A sixtyseven year old male, who came to our observation for abdominal distension, intestinal meteorism and dyspepsia, reported that fifteen years ago, during control chest CT after a laryngeal polyp resection, a Morgagni hernia was discovered, which had remained asymptomatic until the time of our observation. Physical examination showed a decreased thoracic expansibility together with reduced vesicular murmur of lung bases; there were no more pathological findings on physical examination of the abdomen. Blood tests and electrocardiogram were normal. The patient's chest X-ray performed showed the rise of the right diaphragmatic side with likely interposition of bowel loops. Once confirmed the diagnosis of Morgagni hernia, the patient had laparoscopic intervention. Firstly a trocar was settled in the peri-umbilical region, then the camera was inserted, which discovered a retrosternal diaphragmatic hernia containing part of the omentum and transverse colon. Two more trocars settled (one in the upper left quadrant, the other on the right side), we reduced the abdominal hernial content dissolving adhesions between the peritoneum and the diaphragm. Then we repaired the diaphragmatic defect with nonabsorbable monofilament sutures in separate stitches. After a small right subcostal incision of cutaneous and subcutaneous planes, we anchored the stitches at the costal margin and muscular fascia with video-assisted technique, placing the nodes at subcutaneous level.

PATIENT 2

A seventy-four-year- old female came to our observation for abdominal pain, predominantly in the upper quadrants, which persisted for about a week, with no more symptoms. The patient reported constipation and laparotomic appendectomy at the age of thirty. Physical examination showed slightly painful treatable abdomen on palpation in the epigastrium and mesogastrium, with peristalsis. All the rest was up to the standard. Chest radiograph showed a transparent area in the anterior paracardiac region, due to herniated colonic segment, while abdomen radiograph showed marked gaseous distension of bowel loops, particularly of transverse, splenic flexure and descending colon, without any air-fluid levels. We considered it appropriate to perform thoraco-abdominal CT, which confirmed the rise of a portion of transverse colon and mesenteric adipose tissue into the chest cavity through a gap in the diaphragm, in the right paramedian retrosternal region (Fig. 1 A, B).

Therefore, an urgent laparoscopic intervention was performed. Once introduced a camera (after having settled a trocar in the left flank) a massive diaphragmatic retrosternal hernia, was evident on the left of the falciform ligament, partially reduced in the abdomen probably because of the combined effect of curarization and pneumoperitoneum. Two more trocars settled (one in the upper left quadrant, the other immediately above the left iliac crest), we reduced hernia in the abdomen. Then a 2-cm transverse incision of cutaneous and subcutaneous planes was performed about 2 cm below the xiphoid process of the sternum, on the hernial porta. This access was used to perform a video-assisted ernioplasty with

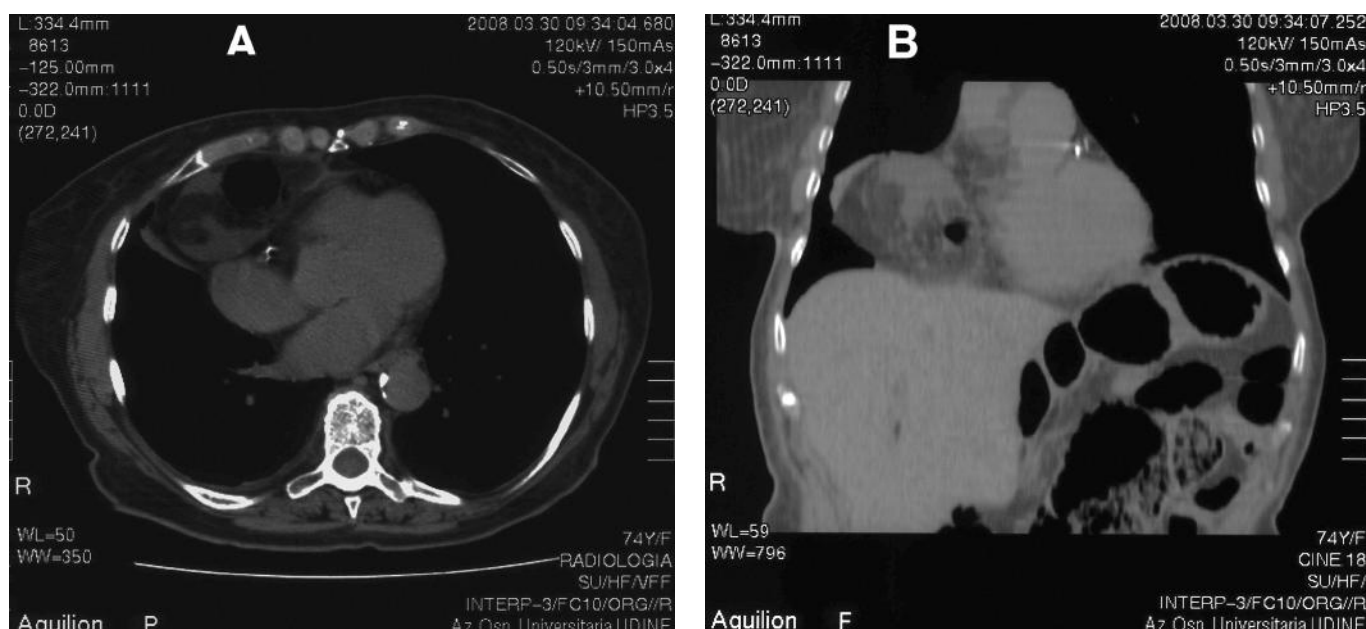


Fig. 1: (A, B) CT showing hernial content within the thorax.

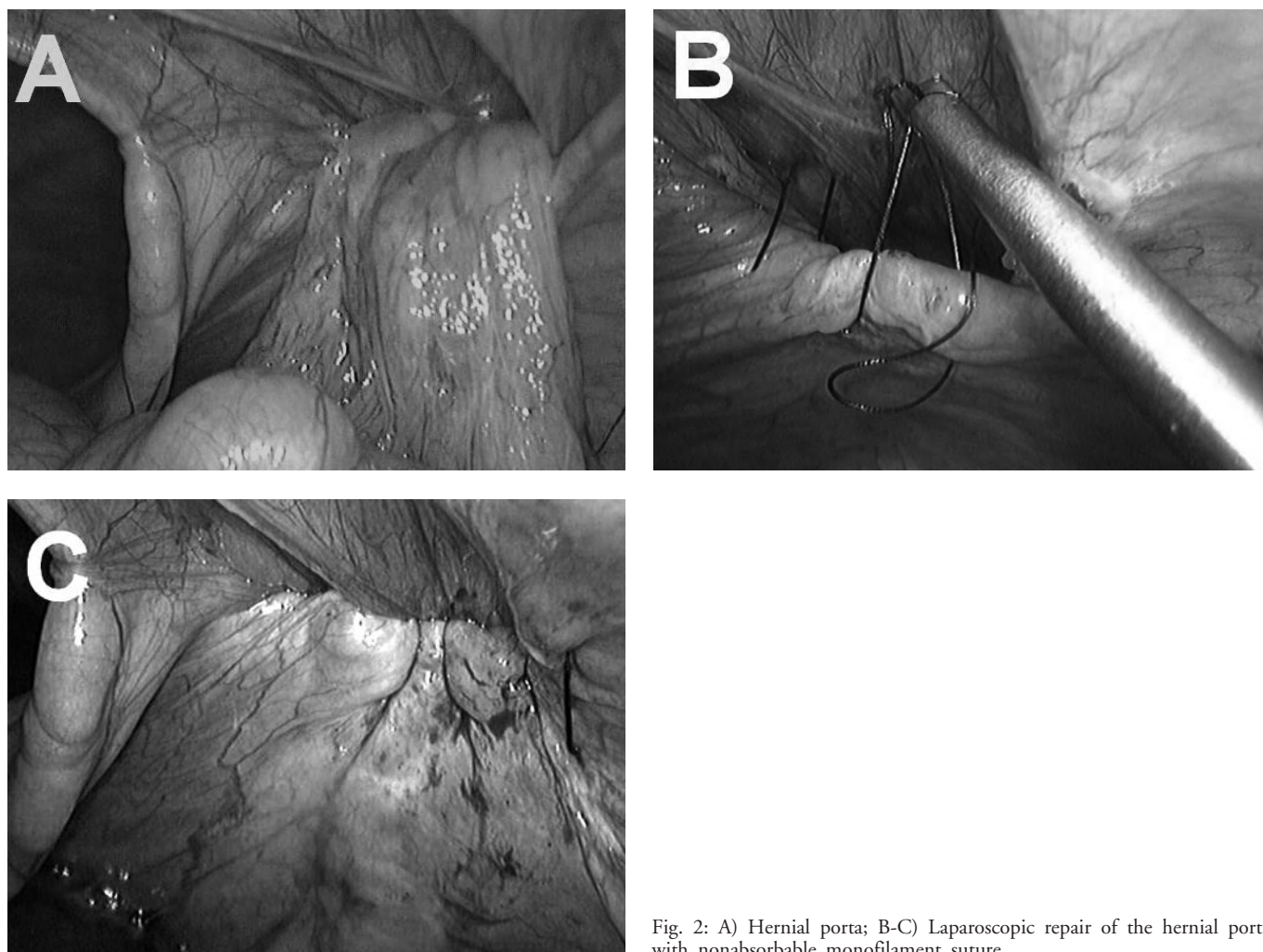


Fig. 2: A) Hernial porta; B-C) Laparoscopic repair of the hernial porta with nonabsorbable monofilament suture.

nonabsorbable monofilament suture in separate stitches passing through the subxifoideal incision, the hernial edge and again through the subxifoideal incision. The suture was anchored at muscular fascia with nodes at subcutaneous level (Fig. 2 A-C). The total operative time was 60 minutes.

Results

In both instances there were no intra or peri-operative complications. Control chest radiograph which was performed on the day after surgery showed the resolution of diaphragmatic hernia. The first patient was discharged on the fourth postoperative day, while the other on the second day, both in good conditions, regularly channeled to feces and gas, on a free diet (Table I).

Discussion

Among the diaphragmatic hernias, Morgagni type (anterior-medial) is the least common, that accounts for 3-5%³.

TABLE I - Comparison between Patient 1 and Patient 2

	Patient 1	Patient 2
Gender	M	F
Age	67	74
Symptoms	Yes	Yes
Operative time (min)	90	60
Intra-operative complications	No	No
Post-operative complications	No	No
Hospitalization (days)	4	2

Some authors have found out a possible association of this type of hernia with other pathological conditions such as Down syndrome, Turner syndrome, Prader Willi syndrome, tetralogy of Fallot, ventricular septal defects and omphalocele⁷⁻⁸. Pregnancy, trauma, obesity, constipation or chronic cough are possible predisposing conditions to the development of Morgagni hernias⁹⁻¹². Morgagni hernias more frequently (90%) develop on the right side, while only 2% occur on the left and in the remaining 8% are bilateral^{13,14}. The barrier formed by the pericardial sac on the sterno-costal trigone may

explain the rare development of Morgagni hernias on the left side. Colon, omentum, stomach, liver and small intestine are the most frequently herniated organs. As in most cases, both our patients developed retrosternal hernia on the right, and the content consisted of transverse colon and omentum.

Symptoms vary from asymptomatic cases in life to cases with epigastric pain, nausea, vomit and possible occlusive crises with or without respiratory disorders. Abdominal pain was a common symptom in both patients, while one of them suffered also from dyspepsia. Particularly in the first case it was fifteen years since the patient suffered from hernia but symptoms had got worse recently.

The diagnosis, which may be occasional during examinations for other reasons, is usually made by performing chest radiograph (it often shows retrosternal air bubbles or air-fluid levels), possibly with a double contrast barium enema and is confirmed by CT. Also in our cases, direct X-rays and CT have proved to be essential to confirm the clinical suspicion of diaphragmatic hernia. Once the diagnosis of Morgagni hernia is made, surgical treatment is necessary to avoid the risk of incarceration or strangulation of herniated viscera^{5,6}.

Different techniques may be used to repair Morgagni hernias. More specifically, surgical accesses are possible by way of laparotomy or laparoscopy, thoracotomy or thoracoscopy; interventions may consist in primary closure of the diaphragmatic defect or in the repair of the same by affixing a prosthetic patch. The choice of the right technique greatly depends on the careful assessment of the size of the hernial porta/rim and the characteristics of surrounding tissues¹⁵. The use of a prosthesis is especially indicated for large diaphragmatic defects or weakness in muscular structures¹⁶. Some authors recommend to make use of a prosthesis for defects with an area which is larger than 20-30 cm² to avoid suture tension¹⁷. The prosthesis can be used directly to close the diaphragmatic defect or as reinforcement of the repair by primary closure of the same defect^{3,18}.

Thoracic access is preferably used in cases of doubtful differential diagnosis with mediastinal masses of different origin or lung cancer¹⁵. Moreover, some authors consider posterolateral thoracotomy the best solution for the patients who do not have symptoms of acute abdomen, bilateral Morgagni hernia, or for the patients who have not already had laparoscopic interventions¹⁵. Thoracic access has the advantage of getting an easier dissection of the hernial sac from mediastinal structures and the pleura¹⁹.

Other authors observe that at present preference is given to laparoscopic access since it allows an excellent view of the surgical field with minimally invasive technique and reduced time of hospitalization²⁰. Besides, thoracic access limits a thorough exploration of the abdominal cavity, which is crucial especially in case of incarcerated hernia, or strangulation of herniated viscera²¹.

Conventional surgical treatments either by abdominal or thoracic access with open or video-assisted technique provide for the reduction of hernial contents with possible resection of the bag (suggested by some authors²², but discouraged by others for the risk of pneumothorax, pleural effusion or injury of the pericardium²³⁻²⁵). The subsequent repair of hernia by abdominal access can be performed by primary closure of the defect (with continuous or interrupted sutures^{22,26}), or by affixing a prosthetic patch; other authors suggest an association of both techniques^{3,18}.

In a review of the year 2008 the authors proved that thoracotomic surgical access is the most widely used one (49%), while laparoscopic approach is getting more and more agreements²⁷. Moreover, in laparoscopic approaches the diaphragmatic defect is more frequently repaired by affixing a prosthesis (64% of cases compared to 29% of repair by primary closure and 7% with combined techniques) and the hernial sac is removed only for 31% of cases²⁷. Finally, laparoscopy is the surgical access that most reduces the hospital stay (average 3 days instead of 11 of laparotomy, 8 of thoracotomy, and 14 of thoracoscopy)²⁷. Encouraging results, have been achieved up to now by minimally invasive surgery with laparoscopic "single-port" technique²⁸ and robotic surgery²⁹⁻³⁰.

In both our patients, who had laparoscopic repair by primary extracorporeal closure of the hernial porta anchoring the diaphragmatic edge at muscular fascia, we observed a complete clinical and radiological recovery. What is more, both patients had an uneventful postoperative recovery and hospitalization time was in the average according to the results reported in literature²⁷.

Even if in the described interventions trocars were settled differently by the two operators according to their personal choice, the surgical technique they used for the repair of the diaphragmatic defect was the same. Particularly in the first case, trocars were settled by the operator with a disposition which is like the one used for cholecystectomy in the French position. In the second case, trocars were settled by the operator with the same technique as in interventions for laparocoele, according to his personal experience in the surgical treatment of the disease.

The surgical technique we described is partially similar to the one reported by other authors^{31,32}; however, in the second case, trocars were settled in a different way.

The main advantages of the technique consist in quick safe interventions and better calibrated sutures rather than interventions with mere laparoscopic technique, as reported also in literature^{33,34}.

Consequently, we think that such a technique should be considered a valid therapeutic choice for small and medium-size Morgagni hernias without any doubt of differential diagnosis with other thoracic diseases. It allows to get satisfactory as well as effective, safe results. However, the use of a prosthesis is preferable to repair a large diaphragmatic defect to avoid the risk of carrying out sutures exposed to excessive tension.

Conclusions

Laparoscopic intervention for Morgagni hernia repair is safe and less invasive compared to the open one with reduced hospitalization time. Small and medium-sized diaphragmatic defects, like the ones we have examined so far, can be efficiently repaired by direct suture of the defect itself, with nodes placed in subcutaneous after performing a small skin incision. This surgical option is simple and rapidly executable, and avoids any risk of adhesions or infection of the stitch node sites, as they are into the subcutaneous layer of the abdominal wall. Larger lesions need a prosthesis as reinforcement of sutures, or more frequently as a closure of the gap if it remains non approachable with traction; also this kind of treatment may be carried out with laparoscopic technique.

Riassunto

L'ernia di Morgagni-Larrey costituisce il 3-5% di tutte le ernie diaframmatiche. Questo tipo di ernia si sviluppa in sede retrosternale, e può essere riscontrato occasionale o provocare una sintomatologia legata al passaggio di parte del contenuto addominale nella cavità toracica. Una volta posta la diagnosi, è indicato il trattamento chirurgico per il rischio di incarcerazione o strangolamento dei visceri erniati. L'intervento può essere condotto per via laparotomica o laparoscopica, toracotomica o toracoscopica. L'intervento può consistere in una riparazione per sutura diretta del difetto diaframmatico, o nel posizionamento di una rete protesica.

L'accesso laparoscopico consente un'eccellente visione del campo operatorio e riduce i tempi di ospedalizzazione. Presentiamo una variante alla tecnica laparoscopica tradizionale, che abbiamo eseguito su due pazienti giunti alla nostra attenzione per ernia diaframmatica. Tale variante consiste nell'eseguire una sutura diretta extracorporea videoassistita della porta erniaria, ancorando il margine diaframmatico alla fascia muscolare della parete addominale previa esecuzione di una miniincisione cutanea sottocostale di servizio.

Riteniamo che questa tecnica consenta di eseguire l'intervento in sicurezza ed ottenendo un miglior controllo della tenuta dei punti di sutura. Di conseguenza riteniamo che questa tecnica debba essere considerata una valida opzione terapeutica nel trattamento dell'ernia di Morgagni di piccole e medie dimensioni.

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