Emergency surgery for a Morgagni hernia causing respiratory failure

Yoshitsugu Tsukamoto, Takeharu Enomoto, Takehito Otsubo, Kenta Katsumata, Natsuko Kamei, Jin Shimada, Shinya Mikami

Division of Gastrointestinal and General Surgery, Department of Surgery, St. Marianna University School of Medicine

ABSTRACT

Reports of emergency surgical repair of a retrosternal hernia causing respiratory failure in an adult are rare. We treated an 82-year-old man who had been suffering breathlessness upon exertion, some speech difficulty, and, most recently, visual hallucinations. He had consulted a physician who ordered an arterial blood gas test, which revealed hypoxemia, and thoracoabdominal computed tomography (CT), which revealed a hernia that was compressing the pulmonary parenchyma. Over the next 30 days, the hernia worsened, acute respiratory failure developed, and the patient was transferred to our hospital by ambulance. The patient presented to us not only with respiratory failure but also a decreased level of consciousness. CT performed upon admission revealed prolapse of the transverse colon from the posterior surface of the sternum to the right thoracic cavity, left deviation of the mediastinum, and compression of the pulmonary parenchyma, which we believed to be the cause of the hypoxemia. With the hernial orifice appearing to be on the right, a Morgagni hernia was diagnosed. Emergency surgery was deemed necessary. An epigastric midline laparotomy incision was placed, and we observed a retrosternal hernia, with an enlarged foramen of Morgagni measuring 70mm × 50 mm as the hernial orifice. The hernia contained portions of the greater omentum and transverse colon. We returned the contents to the peritoneal cavity manually closed the hernia orifice by simple suturing and reinforced the repair with a mesh patch. With signs of cardiac failure developing, temporary noninvasive positive-pressure ventilation was instituted from postoperative day 5 to postoperative day 11, but the patient’s general condition improved thereafter, and he was discharged on postoperative day 29.
Introduction

Although reports of surgical repair of retrosternal hernias exist, few describe emergency repair in cases in which the hernia causes respiratory failure. We experienced such a case, which we describe in detail herein and discuss in light of the existing literature.

Case report

The patient was an 82-year-old man who had experienced visual hallucinations and thus consulted a physician. He had been experiencing breathlessness upon exertion and had begun to show signs of an articulation disorder. The physician ordered an arterial blood gas test, which revealed hypoxemia, and thoracoabdominal computed tomography (CT), which revealed a hernia in the foramen of Morgagni that was compressing the pulmonary parenchyma. At the time of the visit, the patient’s height was recorded as 130 cm, weight as 49.9 kg, and body mass index (BMI) as 29.2. Thus, he was obese. Chest auscultation performed upon physical examination revealed attenuated breath sounds on the left, and the patient’s level of consciousness was decreased. Blood tests showed the white blood cell (WBC) count not to be elevated, indicating absence of infection, and blood gas testing revealed a pH of 7.24, pO₂ of 72.2 mmHg, pCO₂ of 75.6 mmHg, and HCO₃ of 30.4 mmol, indicating respiratory acidosis. Chest radiography showed decreased transparency in the right middle to lower lung field, and the mediastinum was deviated to the right (Figure 1). Over the next 30 days, the hernia worsened, acute respiratory failure developed, and the patient was transferred to our hospital by ambulance.

The patient presented with respiratory failure and a decreased level of consciousness. Upon his admission to our hospital, CT was performed, which revealed prolapse of the transverse colon from the posterior surface of the sternum to the right thoracic cavity. The hernial orifice appeared to be on the right, so a Morgagni hernia was definitively diagnosed (Figures 2-1, 2-2). The patient’s condition prompted emergency surgery.

Surgery and findings: The patient was placed in the supine position, general anesthesia was induced, and an epigastric midline laparotomy incision was placed. No ascites was seen. A hernial orifice of approximately 70 × 50 mm was observed on the posterior surface of the sternum (Figure 3-1). The hernia contained greater omentum and a portion of the transverse colon, and we were able to manually return the contents to the peritoneal cavity. We closed the hernial orifice with non-absorbable sutures and reinforced the repair with Gore Preclude MVP Dura Substitute (W.L. Gore and Associates, Flagstaff, AZ, USA) and concluded the surgery (Figure 3-2).

Postoperative clinical course: Signs of cardiac failure were observed on postoperative day 5, so we initiated bilevel positive airway pressure (BiPAP) ventilation and administered milrinone. The patient’s general condition subsequently improved, and the BiPAP was discontinued on postoperative day 11. The subsequent clinical course was good, and the patient was discharged on postoperative day 29.
Figure 1 Chest radiography performed as part of the patient’s initial consultation showed decreased transparency in the right middle to lower lung field, and the mediastinum was deviated to the right.

Figure 2-1 Axial computed tomography image obtained when the patient was admitted to our hospital revealed protrusion of the greater omentum and transverse colon through the diaphragm at the posterior aspect of the sternum.
Figure 2-2 Coronal computed tomography image upon which the Morgagni tumor was confirmed. The hernia orifice is visible on the right.

Figure 3-1 Intraoperative image obtained upon reduction showing a large (70 × 50 mm) hernia orifice the posterior aspect of the sternum.
Table 1 Reports of emergency surgery for retrosternal hernia involving incarceration or respiratory failure 1990 through 2019.

<table>
<thead>
<tr>
<th>First author</th>
<th>Year</th>
<th>Patient’s age (yr)/sex</th>
<th>Presenting signs/symptoms</th>
<th>Reason for surgery</th>
<th>Approach</th>
<th>Hernia orifice size (cm)</th>
<th>Hernia contents</th>
<th>Surgery</th>
<th>Reported outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furuya</td>
<td>1990</td>
<td>82/F</td>
<td>Abdominal pain, vomiting blood</td>
<td>Incarceration, perforation</td>
<td>Laparotomy</td>
<td>6x4</td>
<td>Transverse colon</td>
<td>Simple closure</td>
<td>Death (3 months)</td>
</tr>
<tr>
<td>Onoda</td>
<td>1996</td>
<td>88/F</td>
<td>Abdominal pain</td>
<td>Incarceration, perforation</td>
<td>Laparotomy</td>
<td>5x5</td>
<td>Transverse colon, greater omentum</td>
<td>Simple closure</td>
<td>Reduction, POD unknown</td>
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<tr>
<td>Tohno</td>
<td>2004</td>
<td>89/F</td>
<td>Fever, abdominal pain, vomiting</td>
<td>Incarceration</td>
<td>Laparoscopy</td>
<td>Not noted</td>
<td>Transverse colon, greater omentum</td>
<td>Mesh</td>
<td>Reduction, POD 12 discharge</td>
</tr>
<tr>
<td>Jinbo</td>
<td>2007</td>
<td>85/M</td>
<td>Left chest pain, vomiting</td>
<td>Incarceration, ileus</td>
<td>Laparotomy</td>
<td>5x4</td>
<td>Lower small intestine, Greater omentum</td>
<td>Simple closure</td>
<td>Reduction, POD 17 discharge</td>
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<tr>
<td>Nakajima</td>
<td>2009</td>
<td>79/F</td>
<td>Respiratory difficulty</td>
<td>Respiratory failure</td>
<td>Laparotomy</td>
<td>Not noted</td>
<td>Transverse colon</td>
<td>Simple closure</td>
<td>Reduction</td>
</tr>
<tr>
<td>Abe</td>
<td>2011</td>
<td>82/F</td>
<td>Constipation, abdominal pain</td>
<td>Incarceration</td>
<td>Laparoscopy</td>
<td>4x3</td>
<td>Transverse colon</td>
<td>Simple closure</td>
<td>Reduction, POD 10 discharge</td>
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<tr>
<td>Saito</td>
<td>2011</td>
<td>80/F</td>
<td>Epigastric pain</td>
<td>Incarceration</td>
<td>Laparoscopy</td>
<td>2x4</td>
<td>Transverse colon</td>
<td>Mesh</td>
<td>Reduction, POD 3 discharge</td>
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<tr>
<td>Shimada</td>
<td>2012</td>
<td>88/F</td>
<td>Anorexia, vomiting</td>
<td>Incarceration</td>
<td>Laparotomy</td>
<td>Not noted</td>
<td>Transverse colon, greater omentum, jejunum</td>
<td>Simple closure</td>
<td>Transferred to another hospital (POD 43)</td>
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<tr>
<td>Hirooka</td>
<td>2012</td>
<td>74/F</td>
<td>Vomiting</td>
<td>Gastric volvulus</td>
<td>Laparoscopy</td>
<td>Not noted</td>
<td>Greater omentum</td>
<td>Simple closure</td>
<td>Reduction, POD 51 discharge</td>
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<tr>
<td>Sasaki</td>
<td>2013</td>
<td>97/M</td>
<td>Upper abdominal pain</td>
<td>Incarceration</td>
<td>Laparotomy</td>
<td>3x3.5</td>
<td>Transverse colon, greater omentum</td>
<td>Simple closure</td>
<td>Reduction, POD 32 discharge</td>
</tr>
<tr>
<td>Tone</td>
<td>2014</td>
<td>79/F</td>
<td>Chronic respiratory failure, Altered consciousness</td>
<td>Respiratory failure</td>
<td>Laparoscopy</td>
<td>7x5</td>
<td>Not noted</td>
<td>Simple closure</td>
<td>Death (respiratory failure)</td>
</tr>
<tr>
<td>Momose</td>
<td>2017</td>
<td>80/F</td>
<td>Altered consciousness</td>
<td>Respiratory failure</td>
<td>Laparotomy</td>
<td>3</td>
<td>Stomach</td>
<td>Simple closure</td>
<td>Reduction, POD 36 discharge</td>
</tr>
<tr>
<td>Namekawa</td>
<td>2017</td>
<td>81/F</td>
<td>Altered consciousness</td>
<td>Incarceration</td>
<td>Laparotomy</td>
<td>3</td>
<td>Transverse colon</td>
<td>Simple closure</td>
<td>Reduction, POD 14 discharge</td>
</tr>
<tr>
<td>Tsukamoto*</td>
<td>2019</td>
<td>85/M</td>
<td>Dyspnea on exertion</td>
<td>Respiratory failure</td>
<td>Laparoscopy</td>
<td>7x5</td>
<td>Transverse colon, greater omentum</td>
<td>Simple closure, Mesh</td>
<td>Reduction, POD 29 discharge</td>
</tr>
</tbody>
</table>

*Reports found on ICHUSHI (http://www.jamas.or.jp) or PubMed (http://www.ncbi.nlm.nih.gov/sites/entrez) with use of the following search terms: parasternal hernia, incarceration, respiratory failure, Retrosternal hernia, incarceration or respiratory failure, surgery. POD = postoperative day. **Our case.
Discussion

A Morgagni hernia is the protrusion of an intraabdominal organ through a sternocostal triangle or foramen of Morgagni into the anterior mediastinum. The sternocostal triangles lie between the sternal and costal attachments of the thoracic diaphragm and are attended by a poorly resistant muscle layer [1,2]. A Morgagni hernia occurring to the right of the falciform ligament tends to be referred to as a Morgagni hernia, whereas such a hernia occurring to the left of the falciform ligament tends to be referred to as a Larrey hernia, although Morgagni hernia is ordinarily used to refer to any hernia occurring in the foramina of Morgagni [3].

A congenital Morgagni hernia generally manifests during childhood, whereas an acquired Morgagni hernia generally manifests during adulthood and not until the sixth decade of life or later. Adult cases are often female cases, and increased intraabdominal pressure due to obesity or pregnancy appears to be a causative factor [4]. As noted above, our patient was considered obese.

Gastrointestinal symptoms, vomiting for example, are common. A Morgagni hernia can also produce thoracic symptoms such as dyspnea and chest pain. The symptoms are usually nonspecific, and it is difficult to use them to help determine the most likely diagnosis. Moreover, a Morgagni hernia discovered during adulthood is commonly asymptomatic and is thus detected incidentally during a routine health examination or during detailed examination for another disease condition. In addition, prolapse of the herniated organ is not observable unless tests can be performed when the patient is symptomatic, and cases for which a definitive diagnosis is not obtained are often followed up as cases of an unidentified complaint [1,5].

In cases of Morgagni hernia, there is always some concern regarding the possibility of intussusception, even in the absence of gastrointestinal symptoms, or of ischemia, necrosis, or intestinal perforation, each of which is an indication for surgery. Surgery should be considered in all cases, once the diagnosis is made. When oxygenation is poor, consciousness is decreased, or intestinal perforation or ischemia associated with intussusception is present, emergency surgery should be performed without hesitation [5,6].

The surgery is performed via transabdominal or transthoracic approach, each with its own benefits. Transabdominal surgery obviates the need for differential lung ventilation and allows for evaluation of the intestinal tract under direct vision and for treatment of intestinal necrosis or perforation if they are observed. Bilateral hernias or other diaphragmatic hernias can also be treated concomitantly [2,6-8]. Transthoracic surgery allows for safe, confident dissection of adhesions from the prolapsed hernial contents within the thoracic cavity, simultaneous direct vision of the lungs and pericardium, and return of the organs to the peritoneal cavity. The hernial orifice can be identified confidently via the transabdominal approach, which is one advantage, but differential lung ventilation and a
postoperative chest tube drainage are required [2,6,8].

In searching PubMed and Igaku Chuo Zasshi for reports of retrosternal hernia requiring emergency surgery for incarceration or because of respiratory failure, we found 14 such cases, which, along with our case, are shown on Table 1. Two of the 14 cases were complicated by respiratory failure. The hernia contents were as follows: a portion of the transverse colon in 9 patients, greater curvature of the stomach in 1 patient, a portion of the small intestine in 2 patients, and greater omentum in 1 patient. Laparotomy was performed for 9 patients, and laparoscopic surgery was performed for 5. The transthoracic approach was not applied to any patient undergoing emergency surgery. The postoperative clinical course of 12 of the 14 patients was good. Two patients died, but whether the postoperative deaths are directly related to the hernias or hernia repair is unclear. All patients were elderly. Surgical mesh was used for the repair in 3 patients. In light of the possibility of surgical site contamination resulting from bowel perforation, we believe that, as a rule, simple closure is preferable. Overall, it is clear that surgical treatment is definitely required for cases in which respiratory failure develops and cases in which the hernia is incarcerated.

When acute respiratory failure due to compression of the pulmonary parenchyma develops as a result of a hernia in the foramen of Morgagni, or when altered consciousness due to hypoxemia results, life-saving laparotomy is required. In our case, neither intestinal ischemia nor perforation was observed, and only the omentum and transverse colon were herniated. We returned these hernia contents to the abdomen manually, closed the hernial orifice with non-absorbable sutures, and reinforced the repair with mesh. There were no complications other than the heart failure.

The good postoperative courses lead us to believe that laparoscopic surgery will gain popularity for treatment of Morgagni hernia, although indications need to be determined on a case-by-case basis. It appears to us that laparoscopic surgery would have been appropriate in our case. However, in cases similar to ours in which a respiratory disorder developed, the pulmonary compression was eliminated by early resolution of the hernia by means of open surgery, and the patient’s general condition stabilized, so we chose to perform laparotomy.

**Conclusion**

A retrosternal hernia, i.e., Morgagni hernia, is a relatively rare clinical entity. When such a hernia is encountered, surgical repair should be performed as soon as possible, as long as the patient’s general condition is stable. Laparoscopic repair appears to be a safe surgical option in many cases.

**References**


2. Sasaki K, Sakamoto T, Matsui S, Saito M. A case


