G Chir Vol. 41 - n. 1 - pp. 99-102
January-February 2020

clinical practice

Spontaneous transdiaphragmatic intercostal hernia: clinical considerations and management

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SUMMARY: **Spontaneous transdiaphragmatic intercostal hernia: clinical considerations and management.**

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Most diaphragmatic ruptures are due to the traumatic or penetrating injury, while the spontaneous diaphragmatic rupture is considered uncommon. The spontaneous transdiaphragmatic hernia is a consequence of violent coughing, vomiting that increase the thoracoabdominal pressure causing the diaphragmatic rupture. Even rarer is the concomitant prolapse of abdominal viscera into the thoracic subcutis through the chest wall, a condition known as spontaneous transdiaphragmatic intercostal hernia. Herein, we present a rare case of spontaneous transdiaphragmatic intercostal hernia presenting as a thoracoabdominal emergency.

KEY WORDS: Transdiaphragmatic intercostal hernia - Bochdalek hernia - Intercostal hernia.

Introduction

The transdiaphragmatic hernia (TDIH) is a rare condition characterized by the herniation of abdominal contents through the diaphragm and intercostal muscles. This is due to the simultaneous presence of a diaphragmatic and chest wall defect that permit the prolapse of abdominal viscera up to reach the thoracic subcutis (1). The alterations of the diaphragm anatomy are usually due to the traumatic or penetrating injury or can be the consequence of a congenital defect, during the embryonic development (2). The congenital diaphragmatic hernias (CDH) are typically diagnosed in the pediatric age because of the early respiratory symptoms, even if rarely they can remain unknown for several years. The classification of the diaphragmatic hernia is based on the location on the diaphragm, the most common (Bochdalek hernias) are the posterior lateral hernias and they represent about 70–75%, mainly occurring on the left side (85%) or on the right side (13%) or rarely, bilateral (2%). The anterior diaphragmatic defects, also known as Morgagni hernias, are less frequent (23–28%), followed by the rarer central hernias (2–7%) (3). On the other hand, spontaneous transdiaphragmatic hernias are very uncommon and they are usually a consequence of violent coughing, vomiting that increase the thoracoabdominal pressure causing the diaphragmatic rupture. On the contrary, the intercostal hernias are caused by a weakness in the thoracic wall musculature, resulting in herniation of fascia layers between adjacent ribs. The majority of intercostal hernias result from blunt injury, penetrating injury, rib fractures, or prior surgery, while seldom, they occur spontaneously or with congenital syndromes (4, 5). Herein, we report a rare case of combined spontaneous transdiaphragmatic and abdominal intercostal hernia presented as a thoracoabdominal emergency.

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Case report

A 69-year old obese male presented with dyspnea, acute abdominal pain and a sore bulge over the left chest. He denied any history of fever, asthma or pulmonary disease, or other previous gastrointestinal symptoms. There was no history of trauma or prior abdominal or thoracic surgery. His symptoms progressed over two weeks with increasing of the thoracic mass. On arrival, his blood pressure was 165/80 mm Hg, pulse rate 88 beats per minute, respiratory rate 20 breaths per minute and body temperature 36.7°C. Blood analysis was regular except for an increase of WBC ($22\times10^3/\mu L$), whereas the other markers were unremarkable. The physical examination of the respiratory system revealed decreased breath sound in left hemithorax in the presence of a not reducible soft swell under the skin. Thoracoabdominal computed tomography (CT) scan revealed a large left lateral transdiaphragmatic intercostal hernia. In particular, it was evidenced the disruption of the left diaphragm (Bochdalek hernia), with herniation of the stomach and bowel into the left thoracic cavity, and left lower lobe atelectasis (Figure 1 A). Moreover, the CT scan also showed the presence of a significant tract of the small intestine, through the ribs (intercostal hernia) (Figure 1 B). The patient was immediately taken to the operating room for emergency surgery. We performed a laparotomy, revealing an extensive herniation of the small intestine through the diaphragmatic defect (Figure 2 A) passing through the ribs in the chest wall (Figure 2 B). We reduced the herniated organs to their anatomical position and performed a partial resection of the necrotic small intestine incarcerated between the ribs. The thoracic defect was surgically corrected with multiple sutures of 1-0 Vicryl and was covered with the serratus anterior muscle while a biological mesh was used to repair the Bochdalek hernia. The patient stayed in the intensive care unit for 7 days, the post-operative days were uneventfully and the patient was discharged three weeks later.

Discussion

The Bochdalek hernia is a congenital defect of the posterolateral portion of the diaphragm caused by the incomplete closure of the pleuro-peritoneal membrane during embryonic development (6). The Bochdalek hernia is typically diagnosed in the pediatric age because of the early respiratory symptoms. In fact, the herniation of the abdominal contents into the thoracic cavity can cause pulmonary hy-

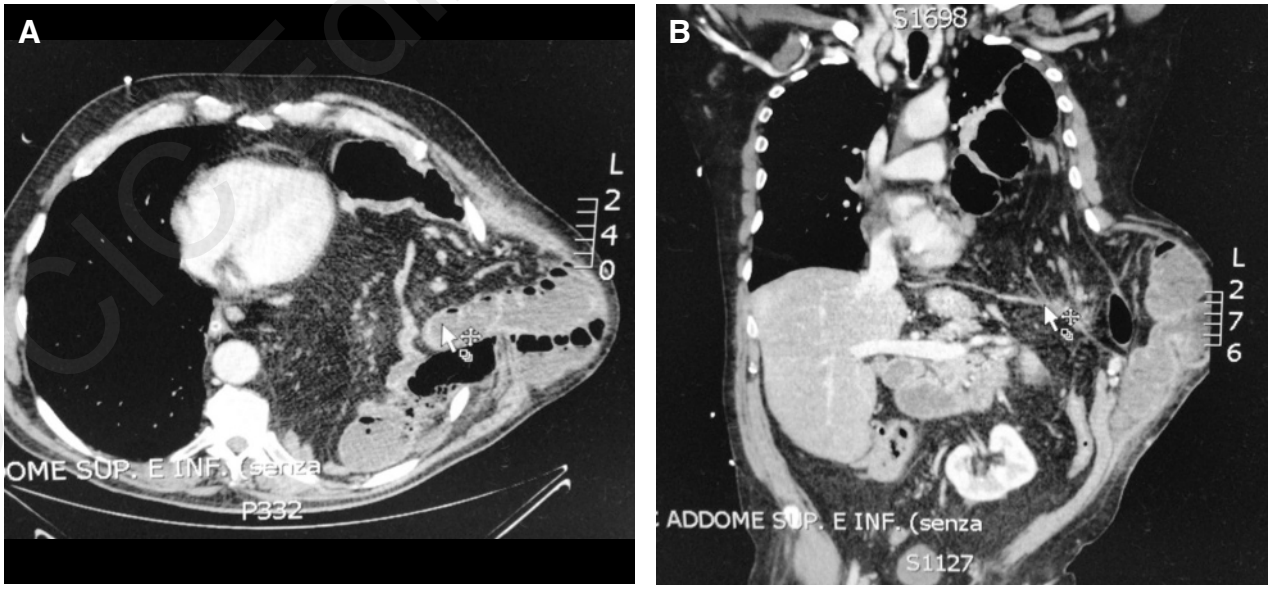

Figure 1 - A) Herniation of the stomach and bowel into the left thoracic cavity, B) in the presence of a significant tract of the small intestine through the ribs.

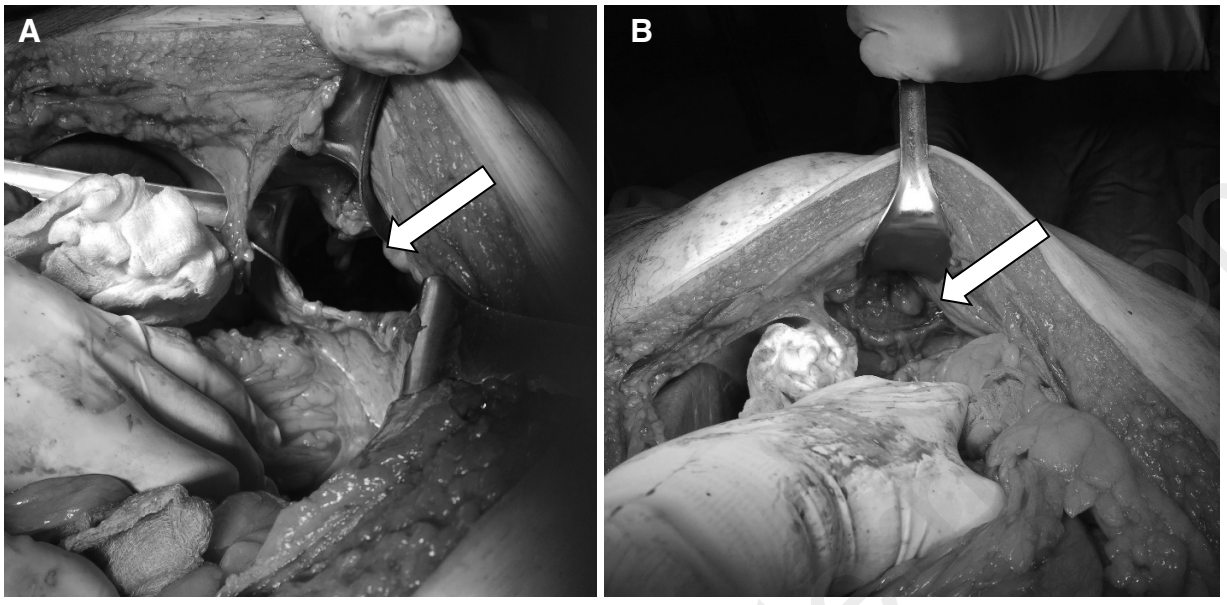

Figure 2 - A) The left diaphragm defect (Bochdalek hernia). B) The intercostal defect in the chest wall.

poplasia, persistent pulmonary hypertension (7) or smaller left-sided heart structures (8). The structures usually involved are oment, colon, stomach, small intestine, spleen, pancreas (9-11). Bochdalek hernia in adults is uncommon and, in the majority of cases, it is asymptomatic or paucisymptomatic and found incidentally. However, the symptoms are variable and depend on the size and content of the hernia; in fact, it could also be present upper abdominal or thoracoabdominal pain, dyspnea, cough or vomiting. The primary digestive complications are represented by the incarceration and volvulus of the involved organs. Moreover, rarer but potentially more severe complications are severe pancreatitis (12, 13), following to the strangulation of the body of the pancreas and the strangulation of the vascular pedicle of the spleen, that can result in the splenic rupture (14). In our case, the simultaneous presence of an intercostal hernia is an unusual case and it is due to the concomitant presence of a defect in the chest wall. The rib fractures or the lack of the intercostal muscles can cause thoracic wall defect, leading to the separation of the ribs and creating a way for the prolapse of the organs. These rare and particular cases are described by Authors as TDIH (15). TDIH has been documented to occur acutely or over several months or years (16, 17) and it should be taken into account in all patients presenting with mechanical ileus and a chest bulge (18). The continuous movement of the diaphragm and the negative thoracic pressure contrast the healing process and can explain the chronic occurrence of TDIH. The CT scan quickly shows the typical characteristics of this disease which represents a surgical emergency. An early surgical approach is the only one able to save the organs involved, mainly in the case of volvulus or strangulation and for these reasons it must be performed as soon as possible. In our case, notwithstanding the surgery was performed immediately, the bowel resulted necrotic and it was necessary the resection and the anastomosis of the bowel. The patient's symptoms progressed over two weeks, too many days to preserve the functionality of a suffering bowel. The surgical approach is usually represented by laparotomy or by a thoracoabdominal exploration and it depend on the size and content of the hernia, even if recently, the laparoscopic (19, 20) and robotic surgery (21) have found space in the treatment of these defects.

Even tough, the best surgical techniques to repair the diaphragmatic defect are still debated, it is generally accepted that in small defect, the repair with non-absorbable sutures is sufficient. On the other hand, when the defect is large, the use of a mesh seems to be the best way for a successful repair. Nowadays, many materials are in use for the surgi-

cal repair of the hernias (22). In particular, biologic meshes seems to be an ideal material, for their peculiarity to reduce inflammation and adhesion and improve biocompatibility, moreover the biological meshes show an higher resistance to infections and lower risk of displacement (23, 24).

Conclusion

The spontaneous TDIH is a rare condition that can occur acutely or chronic over the years. It represents a surgical emergency and it must be suspected in all patients presenting with a chest swell and intestinal obstruction. The primary complications related to TDIH are the volvulus, the strangulation or the perforation of the organs involved. The only therapeutic weapon is represented by the early surgical treatment, which is the unique way to preserve the functionality of the organs. The surgical approach can be various, such as the abdominal o thoracoabdominal open surgery or the laparoscopic or robotic surgery and it depends on the size and content of the hernia and surgeons' skills.

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