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Simultaneous Operation in a Patient with Coronary Heart Disease, Abnormal Orifice of Coronary Arteries, Morgagni Hernia, Atrial Septal Defect, and Pericardial and Pleural Agenesis

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ABSTRACT

A 68-year-old male patient with acute coronary syndrome was referred to our center. He also received a diagnosis of diaphragmatic hernia after a clinical examination. The patient underwent a simultaneous aorta coronary bypass operation and repair of the congenital diaphragm hernia. During the operation, the patient was observed to have an atrial septal defect. Our handling of the case is discussed in light of the literature.

INTRODUCTION

Morgagni hernias are an uncommon congenital diaphragmatic hernias, 2% to 4% of which are seen in adulthood [Mineci 2004]. Such hernias are due to the nondevelopment of sternal and costal diaphragmatic crura. The Larrey cleft or foramen of Morgagni is triangular in shape and located between diaphragmatic muscles originating in the xiphisternal area and extending from the ribs.

Hernias originating from the Larrey cleft are usually located on the right side and are more common in female individuals [Bragg 1996; Fell 1998]. Left-sided hernia occurs rarely, and intact pericardium does not allow hernia formation. It is commonly seen with pericardial defects. If there is a pericardial defect, abdominal organs can easily pouch up into the thoracic cavity through the less-resistant part of the diaphragm in left-sided hernia [Mineci 2004].

Most of these hernias are asymptomatic, but the pressure of abdominal organs in the thoracic cavity may lead to dyspnea, strangulation and incarceration, and, rarely, pericardial tamponade. Surgical repair is required even if the hernia is asymptomatic [DeFonseca 1987]. Chest radiography and barium enema are the first simple tools to use in diagnosing Morgagni hernia. In cases of only the omentum pouching up into the thorax, computed tomography (CT) is the most useful diagnostic tool.

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Congenital pericardial defects commonly occur on the left side and are classified as complete or incomplete. They are usually discovered incidentally. Suspicion of a pericardial defect comes to mind during diagnosis, and there are no exact diagnostic methods that can be used routinely. Incomplete defects may be repaired or enlarged. A complete defect does not require an operation.

CASE REPORT

A 68-year-old male patient was admitted to our center with complaints of angina and dyspnea. A chest radiograph revealed large consolidated areas in the left lung, and a severe restrictive respiratory pattern was found in the respiratory

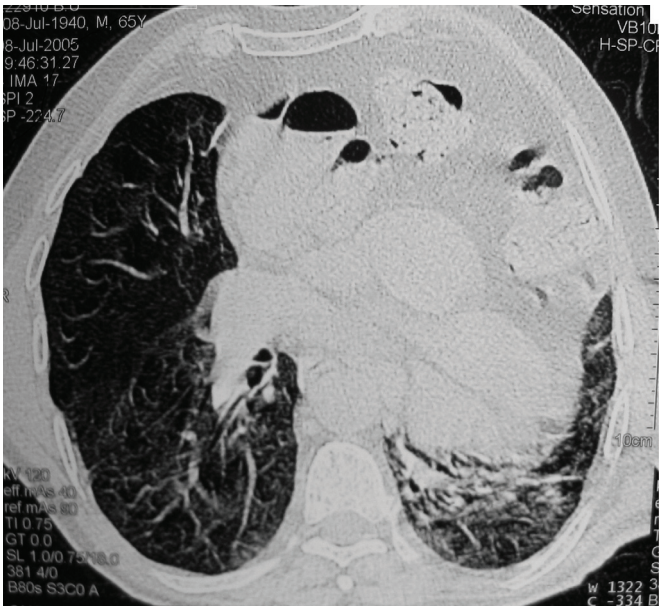

Figure 1. Preoperative computed tomography (CT) scan. Abdominal organs (transverse and descending colon, omentum, and gastric fundus) are seen filling the thoracic cavity and anterior mediastinal area. The heart and great vascular structures are displaced to the posterior mediastinum by the pressure of the abdominal organs. Atalectatic lower-lobe segments of the left lung are seen in the CT scan.

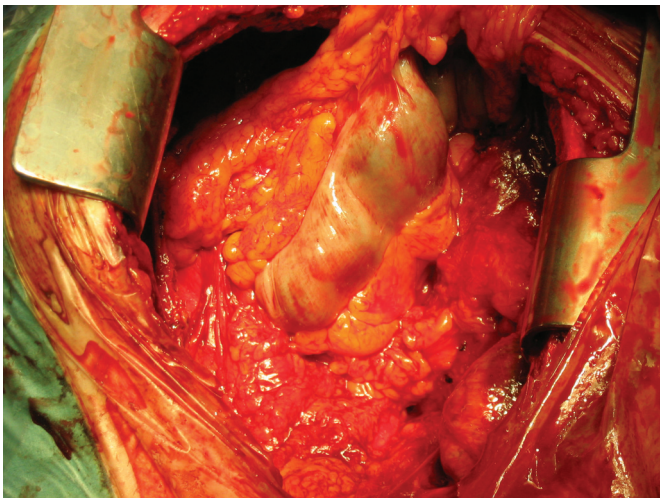

Figure 2. Abdominal organs covered with peritoneum are seen in the mediastinal cavity and lying over the heart. The heart was moved to the posterior mediastinum and was hidden by abdominal organs. The heart and major vascular structures are not seen. The transverse colon and a portion of the descending colon are seen in the middle of the image; gastric structures and the great omentum are seen in the lower part of the photograph.

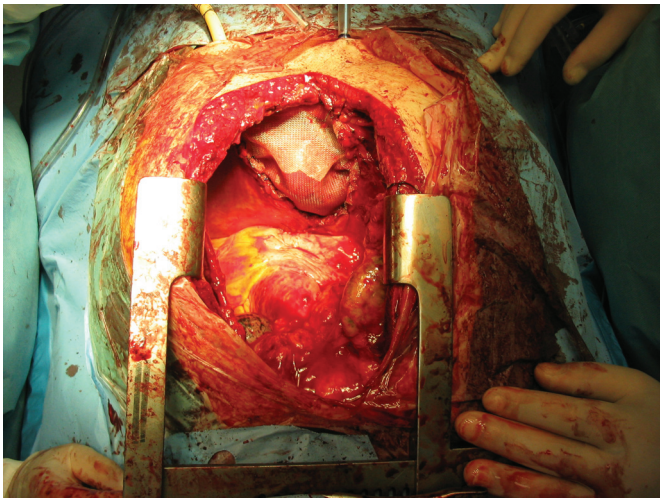

Figure 3. After the open heart surgery and repair of the large diaphragmatic hernia with Prolene mesh. On the left side are seen the saphenous vein bypass graft and only the right ventricle portion of the heart.

function test. A shift of abdominal organs into the thoracic cavity through a Morgagni hernia and consolidated left lung areas were observed in a CT scan (Figure 1). Critical stenosis in left anterior descending (LAD) and circumflex (Cx) arteries and an abnormal origin of the Cx artery at a different orifice were detected in an angiography evaluation.

Perioperatively, abdominal organs covered with peritoneum were seen in the anterior mediastinum. The heart was totally shifted in the left hemithorax, and the apex was nearly in the posterior mediastinum. The lower lobe of the left lung had collapsed (Figure 2).

The abdominal organs were relocated to the abdominal cavity, and the diaphragmatic defect (10 × 15 cm) was repaired with Prolene mesh (Figure 3). During cardiopulmonary bypass (CPB) cannulation, arterial blood was seen in the 2-stage venous cannula. We decided to use a bicaval cannulation technique for CPB because of the possibility of the presence of a left-to-right intracardiac shunt.

An internal mammary artery (IMA) was not used because of the long distance between the IMA and the target area of the LAD artery. We therefore considered the saphenous vein as the most available conduit to use. After performing a right atriotomy, we found a 3-cm secundum atrial septal defect, which we repaired with a Gore-Tex patch. An additional curved mediastinal drain was placed between the diaphragmatic surface of the heart and the mesh graft to drain all of the blood and to restrict the flow of blood into the abdominal cavity.

The patient was supported by a respirator because of his low PaO_2 until the third postoperative day. He was taken to the clinic on the fifth postoperative day and was discharged from the hospital uneventfully on day 12. At the first-year follow-up, the patient reported no complaints, and his effort capacity reached the 10 metabolic equivalents level in the treadmill test.

DISCUSSION

The association of congenital pericardial defects with diaphragmatic hernia is uncommon. The embryologic development of pericardial defects is not well understood. An interruption of the developmental process of the transverse septum and the pleuropericardial membrane is believed to be an etiologic factor [Nguyen 2001]. The most common symptom is chest pain, which may be explained by the impression of coronary arteries by a fibrous pericardial rim, torsion of the great vessels, a loss of the cushioning effect of the pericardium, and the sensation of tension-dependent adhesions of the pleuropericardium [Lajos 1970]. Beside these mechanisms, coronary symptoms can also be a cause of chest pain in older patients, as was the case for the patient described in this report [Rusk 1999].

In a complete pericardial defect, movement of the heart and great vessels to new positions may lead to impairment of heart functions. Heart strangulation, myocardial infarction, and sudden death are possible complications of incomplete defects. In such cases, surgery is preferred [Salem 1985].

A Morgagni hernia, also known as anterior parasternal diaphragmatic hernia or subcostosternal diaphragmatic hernia, must be repaired, even if it is asymptomatic, because of the risk of strangulation and incarceration [Bragg 1996]. Usually, the transverse colon and omentum (and rarely gastic and intestinal structures) pouch up into the chest cavity through the Larrey cleft.

Transabdominal and transthoracic approaches are primarily used to repair the defect. Because of the necessity of CABG in the present case, a midsternal approach was preferred. We supposed that this approach had some benefits because of the large diaphragmatic defect with filling of the

anterior mediastinum and excessive deviation of the heart to the posterior mediastinum. This approach provided a good surgical exposure for the repair of the diaphragmatic defect and for performing the heart operation safely. It also easily permitted the performance of life-saving procedures in the event of emergency cardiac problems and facilitated the maintenance of pain relief postoperatively. Thus, a median sternotomy may be used routinely for isolated repair of left diaphragm hernia.

Discussions of surgical procedures requiring simultaneous operations always bring up arguments about what to do first. The hernia repair was performed first because the heart might have become vulnerable because of all of the manipulations that occurred during the repair of the defect. It might be difficult to maintain hemodynamic stability if the hernia repair were performed after CPB, and the blood loss might have been much greater because of the adverse effects of CPB. In addition, performing the hernia repair after CPB would have meant a longer closure time, which could have led to a higher risk of infection than if the hernia repair were performed first.

Normally, a simultaneous operation is more risky than a staged operation, but in this particular case, leaving the hernia alone without repairing it might have affected respiratory, hemodynamic, and cardiac stability postoperatively. Adhesions, especially to the heart, might lead to some adverse events in the subsequent hernia repair. The situation is different for right-sided hernias, however. Staged operations may be more appropriate for these patient groups. Thoracotomy and laparotomy are the best available methods to obtain a good surgical exposure in right-diaphragm hernias.

CONCLUSIONS

Although a simultaneous CABG operation on a patient with a left Morgagni hernia and a congenital left pericardial defect increases the morbidity, a median sternotomy is the best approach for the repair of these types of defects and for heart operations. It may have many advantages in routine uses of this alternative method for isolated left diaphragmatic defects.

Staged operations should be preferred only when right-sided hernia repair is to be performed. In patients with a left-sided hernia and a pericardial defect requiring CABG, the choice of an arterial graft, especially a left IMA, has a limited use. A saphenous vein graft should be preferred because of the long distance between the left IMA and the LAD artery anastomosis.

REFERENCES

Bragg WD, Bumpers H, Flyan W, Hsu HK, Hoover EL. 1996. Morgagni hernias: an uncommon cause of chest masses in adults. Am Fam Physician 54:2021-4.

DeFonseca JMB, Davies MRQ, Bolton KD. 1987. Congenital hydropericardium associated with the herniation of part of the liver into the pericardial sac. J Pediatr Surg 22:851-3.

Fell SC. 1998. Surgical anatomy of the diaphragm and the phrenic nerve. Chest Surg Clin N Am 8:281-94.

Lajos TZ, Bunnel IL, Schimert G. 1970. Coronary artery insufficiency secondary to congenital pericardial defect. Chest 58:73-6.

Mineci PC, Deans KJ, Kim P, Mathisen DJ. 2004. Foramen of Morgagni: Changes in diagnosis and treatment. Ann Thorac Surg 77:1956-9.

Nguyen DQ, Wilson RF, Bolman RM 3rd, Park SJ. 2001. Congenital pericardial defect and concomitant coronary artery disease. Ann Thorac Surg 72:1371-3.

Rusk RA, Kenny A. 1999. Congenital pericardial defect presenting as chest pain. Heart 81:327-8.

Salem DN, Hymanson AS, Isner JM, Bankoff MS, Kontsam MA. 1985. Congenital pericardial defect diagnosed by computed tomography. Cathet Cardiovasc Diagn 11:75-9.