Concomitant Diaphragmatic Hernia Repair with Coronary Artery Bypass Grafting Surgery

Abstract
Congenital Bochdalek diaphragmatic hernia (DH) is often diagnosed incidentally in adulthood. It is recommended that all cases of DH be repaired immediately at diagnosis since acute presentation after the complications have already developed has higher morbidity and mortality. A 47-year-old male presented with Grade III angina and dyspnea. A routine chest radiograph revealed bowel shadows in the right thorax, and subsequent computerized tomography (CT) scan confirmed the same. Coronary angiogram revealed coronary artery disease which needed surgery. Off-pump coronary artery bypass grafting followed by DH repair under one-lung ventilation.

Keywords: Bochdalek hernia, coronary artery bypass surgery, diaphragmatic hernia

Introduction
Congenital diaphragmatic hernia (DH) is common in the neonates and infants, routinely presenting with respiratory distress due to the pulmonary hypoplasia and pulmonary hypertension. We present a rare case of an adult patient undergoing elective coronary artery bypass grafting (CABG) and DH repair in the same sitting.

Case Report
A 47-year-old male patient weighing 79 kg presented with Grade III dyspnea and angina on exertion. He had a history of old anterior wall myocardial infarction 1 year ago. The patient had undergone a percutaneous transluminal coronary angioplasty 5 months ago at another hospital for the occluded left anterior descending (LAD) artery with suboptimal results.

On evaluation, electrocardiogram showed qS pattern in V1-4. His chest X-ray showed bowel shadows in the right hemithorax. The echocardiogram revealed a dysfunctional left ventricular function with ejection fraction 38% and regional wall motion abnormalities in basal and mid anterior and anteroseptal segments. Computerized tomography scan revealed a 5.3 cm × 9.3 cm defect in the right hemidiaphragm with herniation of colon and omental fat into the thorax with right basal atelectasis [Figure 1]. Coronary angiogram revealed LAD artery stenosis, and in view of the nature of the lesion and failed earlier attempt, CABG surgery was offered as the better option of treatment.

The patient was induced with intravenous midazolam, fentanyl, and vecuronium. A 37 Fr size left endobronchial double-lumen tube was used and position confirmed with fiber-optic bronchoscopy. Rapid sequence induction was not used since the patient had no gastrointestinal symptoms, stomach was not a part of hernia content, and patient bowel prepared as for colonic surgery with surgery being elective. Anesthesia was maintained with inhalational isoflurane-oxygen-air mixture besides intravenous midazolam and fentanyl.

Sternotomy was done and left internal mammary artery harvested. After adequate anticoagulation with heparin, off-pump CABG grafting was done to the LAD artery. Reversal of heparin with protamine was done. Double-lung ventilation was converted to single-lung ventilation to facilitate the right-sided hernia repair. The defect contained part of transverse colon, mesocolon with omentum herniating into the thorax. The hernia contents were reduced, and a right posterolateral meshplasty with a 5 cm × 10 cm polypropylene mesh was done. At the end of surgery, the tube was exchanged to a normal cuffed endotracheal tube for elective ventilation.

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The endotracheal tube was extubated after 6 h and bowel sounds appeared on the 2nd postoperative day. He had an uneventful postoperative period and was discharged on the 6th postoperative day [Figure 2].

Discussion

DH is of five types.
1. Bochdalek hernia - it is the most common type with roughly 80% occurring on the left and 20% on the right
2. Morgagni - it is very rare (<2%). It is anterior and either retrosternal or parasternal
3. Eventration of diaphragm
4. Herniation through central tendon of diaphragm
5. Hiatus hernia.

Bochdalek hernia may be diagnosed in adulthood, either incidentally during investigating for other illness or during presentation with gastrointestinal symptoms. The management of hernia includes reducing the abdominal contents and repairing the defect. Surgical approach with or without mesh has been associated with low morbidity and mortality and excellent long-term results. Both thoracic and abdominal approaches have been advocated. People who advocate thoracic approach state, it is convenient to separate adhesions between the contents and hernia sac. However, 60%–90% do not have a hernia sac. Those advocating laparotomy say that it is better for dealing with any malrotation, obstruction, strangulation, or perforation of the intestine. Minimally invasive techniques with laparoscopy and thoracoscopy have also been reported in literature. We used one-lung ventilation with double-lumen tube for a better surgical field for the surgery to be done through the sternotomy itself.

A case of an 81-year-old patient who had a central tendon defect has been reported. He had successful hernia reduction of omentum, CABG, and aortic valve replacement. DH has unusual ways of presenting too. A 33-year-old had repetitive pancreatitis, and eventually, the etiology was found out to be the intermittent ischemia as the principal mechanism of repetitive pancreatitis, precipitated by traction of structures to the thorax. Delayed presentation such as acute gastric volvulus secondary to DH has been reported in more than 25 cases. DH has presented mimicking pneumonia in an elderly patient. Bochdalek hernia can be misdiagnosed as pleural effusion, pneumonia, tension pneumothorax, lung cysts, and atelectasis. Bochdalek hernia can also simulate neoplastic disease, pulmonary sequestration, foreign material aspiration, or pleuritis.

The mortality with elective repair has been around 4% but in acute presentations can be as high as approximately 32% when complications have already developed. Timely intervention of repairing the hernia is advantageous and avoids potentially serious complications which can occur in the future.

Since the DH is asymptomatic, there is a debate and tendency to plan a corrective repair of the hernia at a later date. There is a tendency to postpone the repair of diaphragmatic repair to a later elective date after an intervening period. However, considering the risks of misdiagnosis or delayed diagnosis and potential complications, it is advisable to treat it at the earliest. Thus, the advantage of repairing it concurrently in the same sitting far outweighs the risk of postponing the hernia correction.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.
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