

A Rare Case of Eventration of Diaphragm

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Abstract: A 64 years old male presented to the department of Cardio Thoracic Vascular Surgery (CTVS) with complaints of dyspnoea on exertion which increases after food intake for a duration of 8 months. He is a known hypertensive with history of CABG 5 years ago and is presently on post operative medication. On presentation, there were decreased breath sounds in the left hemithorax. Chest X Ray findings showed elevation of left hemidiaphragm and mediastinal shift to the right. The patient was undertaken for plication of diaphragm to relieve the patient of his symptoms and arrest any further complications that may arise as a result of the eventration.

Keywords: Diaphragmatic Eventration, Cardio Thoracic Vascular Surgery, CTVS

1. Introduction

Diaphragmatic eventration is the abnormal elevation of a portion or entire hemidiaphragm due to lack of muscle or nerve function while maintaining its anatomical attachments. The abnormality can be congenital or acquired. The diaphragm is a dome-shaped muscle that plays a strong role in the inspiratory phase of respiration and acts as a barrier between the thoracic and abdominal cavities. Diaphragm is innervated by phrenic nerves originating from the C3, C4 and C5 spinal nerve roots. Impaired development or injury to this nerve can lead to diaphragmatic paralysis and diminished lung expansion. In both congenital and acquired eventration, a portion of the diaphragm is weakened and thinned out causing reduced function. Depending on the severity, patients may be asymptomatic or may present with respiratory symptoms. Diagnosis is confirmed by radiographic imaging, and treatment usually consists of supportive care, and in some cases, surgical plication is required.

2. Case Report

A 64-year-old male patient weighing 76 kgs was presented with complains of dyspnoea on exertion, increased after food intake for 8 months. He was a known case of hypertension for 6 years, post CABG 5 years back with left internal mammary artery and vein grafts. A known smoker for 50 years stopped 5 years back.

On examination:

On general examination patient was overweight, adequately hydrated, no pallor, icterus, cyanosis, clubbing, lymphadenopathy and oedema. Patient was conscious, coherent and vitals were within normal limits. On airway examination Mallampati grade-II with 3 finger mouth opening was present, edentulous. On systemic examination decreased breath sounds in the left hemithorax.

Investigations:

Chest X ray findings showed elevation of left hemidiaphragm and mediastinal shift to right (figure 1). 2D-

echocardiogram showed concentric LVH, no regional wall motion abnormality, good LV function, mild tricuspid regurgitation, mild pulmonary artery hypertension, no mitral regurgitation or aortic regurgitation, Left Ventricle Ejection Fraction-57%, Right Ventricle Systolic Pressure-38 mm of Hg ECG showed sinus rhythm with T-inversion in V2, V3, V4, V5

Blood investigations revealed Hb: 15.4 gm/dl, WBC: 9200/c ml, platelets: 2.34 lakhs/c ml, Blood group: 'O' positive, RBS: 87 mg/dl, Blood urea: 30 mg/dl, Serum creatinine: 1.1 mg/dl CT scan of abdomen and thorax was done and showed "Total eventration of left hemidiaphragm" with collapse of underlying lung and extension of abdominal contents into left hemithorax (figure 2). All other routine investigations were within normal limits.

Patient was posted for plication of eventration of left dome of the diaphragm with "one lung ventilation under General anaesthesia with Double lumen tube"

3. Procedure

After nasogastric tube (NGT) placement and auscultation to confirm placement of tube. Air gush noted in epigastric and 5th intercostal space (midclavicular line)

Under general anaesthesia with rapid sequence intubation with double lumen ET (endotracheal) tube, the chest was opened by the left posterior thoracotomy at 6th intercostal space. Pleura opened, eventration of diaphragm noted with parchment thin diaphragmatic layer. The stomach extends until the 4th intercostal space. Multiple 3-0 prolene pledgeted sutures taken from the posterior aspect to the anterior aspect and tied sequentially (figure-3a and 3b). Neat plication of the dome obtained with '9' sutures in toto. Haemostasis achieved. Pleural cavity washed with saline. Intercostal chest drain (ICD) placed in pleura, following intercostal (IC) block with 2% xylocaine, pericostal sutures were taken, rib cage closed and rest of the wound closed in layers. Patient extubated on the table and shifted to intensive care unit (ICU) in a stable condition. He was discharged after 4 days and advised for spirometry exercise,

chest physiotherapy and arm exercises. On last follow up he was back to work and asymptomatic.

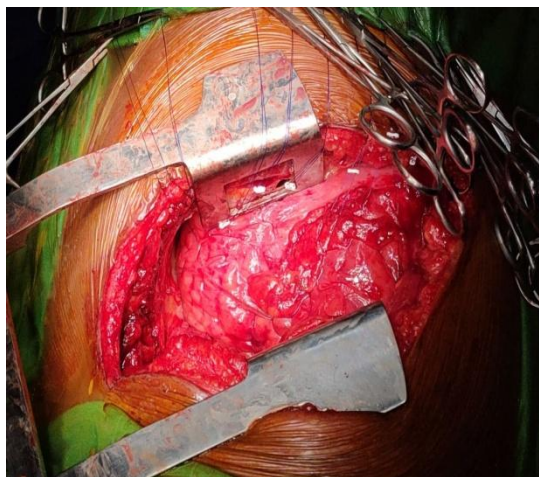


Figure 3 (a) and 3 (b): Intra operative view of plication of diaphragm.

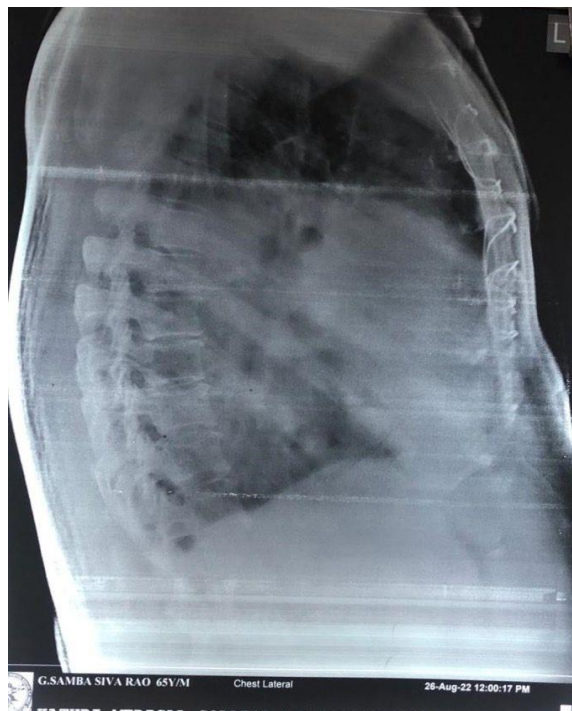


Figure 1b: Pre operative X-ray showing eventration of diaphragm (Lateral view).

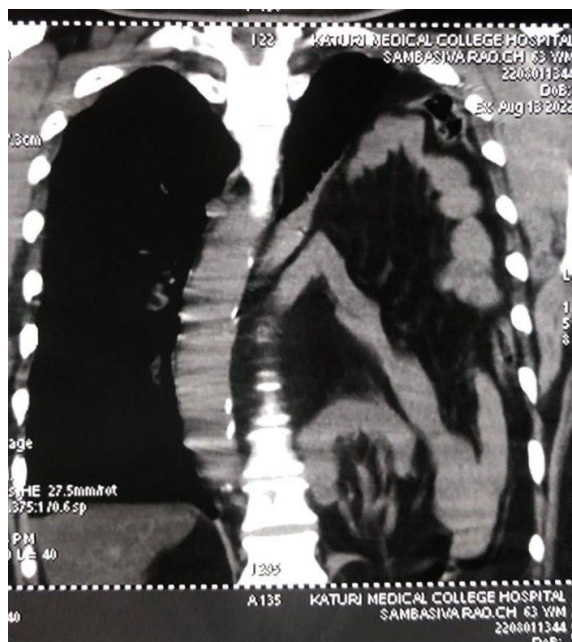


Figure 2: Pre operative CT-Scan showing bowel loops in thorax.



Figure 1 (a): Pre operative X-ray showing eventration of diaphragm.

4. Discussion

Diaphragmatic eventration is an abnormal elevation of a portion or entire hemidiaphragm due to lack of muscle function or nerve function with normal anatomical attachments. The abnormality can be congenital or acquired, thus presenting in both the paediatric and adult populations. The diaphragm is innervated by the phrenic nerve, which originates from the C3, C4, and C5 spinal nerve roots. Patients are asymptomatic and eventration is noted incidentally on imaging. Symptomatic patients typically present with dyspnoea on exertion and orthopnoea due to the elevated diaphragm and ventilation-perfusion mismatch

as well as impaired ventilation.¹ Non-specific gastrointestinal symptoms such as dyspepsia, epigastric pain, belching and nausea may also be present.² Plication of Diaphragmatic eventration is a safe and feasible treatment that improves respiratory function. Unlike diaphragmatic hernias, no risk of incarceration or obstruction exists and asymptomatic eventration can be observed. There are several case reports in the literature describing similar circumstances, where an eventration was not suspected and ultimately diagnosed at surgery.^{3,4} A diagnostic laparoscopy is an appropriate surgical approach for both diaphragmatic eventration and hernia, with successful repairs described for both. Furthermore, even though eventration is relatively uncommon, one must consider this among the differential diagnoses of diaphragmatic hernia prior to surgery (especially intraoperatively, when things are not clear cut). The diagnosis can be made during laparoscopy if performed by an experienced surgeon.

Alternatively, when there is high suspicion for diaphragmatic eventration, a thoracoscopy can be carried out to confirm the diagnosis and prevent unnecessary abdominal dissection. The preferred treatment for diaphragmatic eventration is plication of the diaphragm. A variety of plication techniques - either from a thoracic or abdominal approach-may be performed, such as thoracotomy, laparotomy, laparoscopy and video assisted thoracic surgery for plication can be administered, either from a thoracic or abdominal approach.^{5,6} Regardless of the technique used, diaphragmatic plication repositions and flattens the diaphragm to its normal position during inspiration while pushing back the abdominal organs to their usual location in the abdomen to allow lung expansion.

Internal mammary artery harvesting for Coronary artery bypass grafting is a routine procedure and diaphragmatic paresis from phrenic nerve injury during Left Internal Mammary Artery harvesting is rare.

However, care has to be taken to avoid the same. The possible causes of phrenic nerve injury during LIMA harvesting are

- a) During excision of left lobe of thymus
- b) Excessive use of diathermy during LIMA harvesting
- c) Having a thick pedicle of LIMA, especially at the upper part of the origin
- d) Avoiding phrenic nerve injury during the creation of a pericardial groove for proper lie of LIMA graft after anastomosis.
- e) Sometimes phrenic nerve injury can occur if the extrapleural harvest of the LIMA has been done. (Without opening the left pleura)

Provided these precautions are taken, phrenic nerve injury can be avoided.

5. Conclusion

This case has been presented due to the abnormally late presentation of an eventration, following coronary artery bypass grafting done 5 years ago. The patient was asymptomatic in the early post operative period as far as eventration of diaphragm is concerned. This indicates a

partial/complete injury to the left phrenic nerve, following which diaphragmatic paresis progressed to paper thin diaphragm (atrophy) leading to eventration of the ipsilateral dome. A proper diagnosis with correct surgical repair does much to alleviate the symptoms associated with eventration and prevents further rupture of the paper-thin diaphragm, resulting in herniation into the thorax and associated complications.

References

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