

Repair of Diaphragmatic Eventration by Plication and Post Operative Physiotherapy

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ABSTRACT

We report a case of 40 years old man with congenital left diaphragmatic eventration. The Patient presented with fever, dyspnoea, mild cough and intermittent gastrointestinal symptoms. Posterolateral thoracotomy with plication repair of left diaphragm was done. Post operative physiotherapy care was given for 2 weeks and his respiratory function was improved. In this report, we describe a case of repair of congenital diaphragmatic eventration by plication and post operative physiotherapy.

Keywords: Diaphragmatic eventration, plication, post operative physiotherapy

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INTRODUCTION

Diaphragmatic eventration is defined as an abnormal elevation of the whole diaphragm or some part of it, caused by paralysis, aplasia or atrophy of muscular fibers of the diaphragm. Diaphragmatic eventration is an uncommon condition in adults^[1]. Congenital diaphragmatic eventration in an elderly is a rare anomaly (incidence < 0.05%)^[2,3]. Eventration can be unilateral or bilateral, partial or complete. It is more common in males, and involves more often the left hemidiaphragm^[3]. Eventration results in diaphragmatic elevation (cephalad displacement). Most adults are asymptomatic and the diagnosis is incidentally made by chest radiography. The

commonest symptom in the adults is dyspnoea, while orthopnoea, mild hypoxemia, tachypnoea, respiratory alkalosis, palpitations, and non specific gastrointestinal symptoms may be present^[6].

CASE REPORT

A 40 years old man presented with history of dyspnoea, cough, fever, chest pain and abdomen pain since last 15 days. There was no history of diabetes, smoking and hypertension. There was no history of any trauma. On examination, his respiratory rate 29 breaths per/ minute, pulse rate 82 per/minute, blood pressure 120/90 mmHg, and temperature was 99°F. His weight 51kg and height 177cm.



Figure: 1 Chest radiograph (posterior anterior view) reveals a remarkable degree of elevation of the left hemidiaphragm



Figure: 2 Post operative chest radiograph shows normal position of left dome

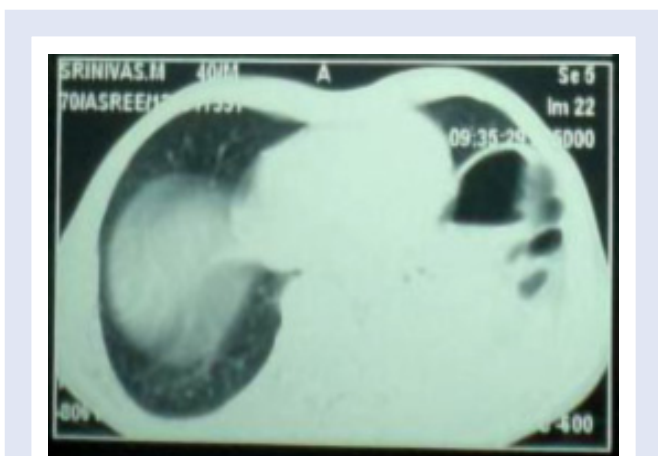


Figure: 3 Preoperative thoracic computed tomography showing left diaphragmatic eventration with superior displacement of bowel loops in to left hemithorax.

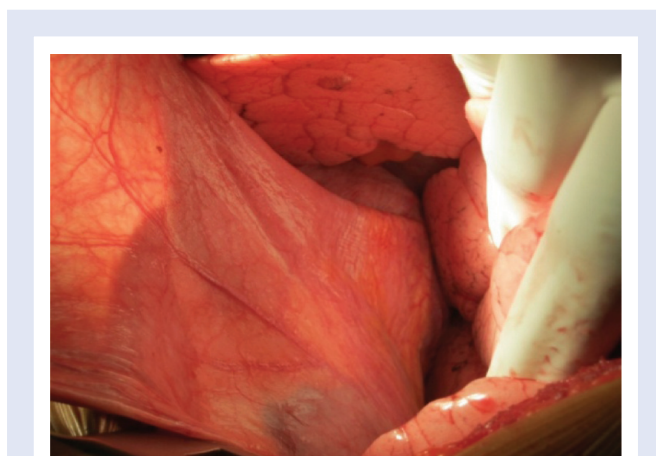


Figure: 4 Thinned out, elevated left dome

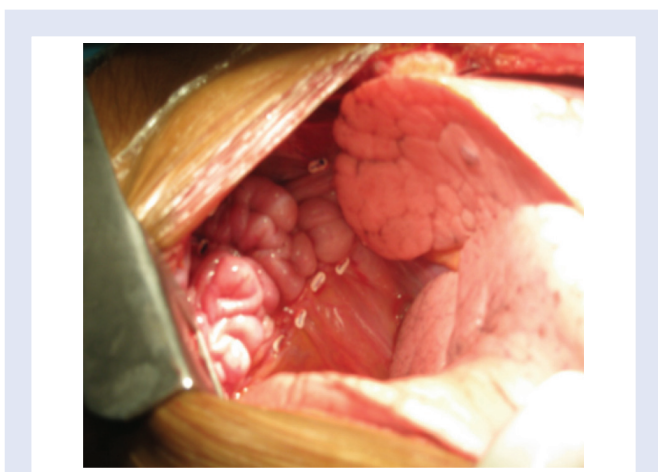


Figure: 4 Left dome after open chest plication



Figure: 5 Left posterolateral thoracotomy through 6th intercostal space

On examination of respiratory system, auscultation revealed decreased vesicular breath sounds on left side. Chest radiograph of posterior anterior view (fig.1) showed left eventration of the diaphragm. The case was further investigated with computerized tomography which showed left diaphragmatic eventration with superior displacement of bowel loops into left hemithorax and few small thin walled cysts in the left lung. Electrocardiogram and echocardiogram are normal. Ultrasound abdomen scan also normal. His preoperative laboratory parameters are normal limits. Preoperative pulmonary function test (PFT) revealed the forced vital capacity (FVC) 3.83L, forced expiratory volume 1 [FEV1 2.47L (079%)] and dyspnoea index (according to the guidelines of the American thoracic society (ATS) = Grade 3).

Posterolateral thoracotomy under general endotracheal anesthesia with single lung ventilation using double lumen endotracheal tube, patient kept on left lateral position (fig.3). Posterolateral thoracotomy performed through 6th intercostal space. Left hemidiaphragm was found elevated and thinned out. It was plicated from medial to lateral by eight parallel sutures (2-0 polytetrafluoroethylene sutures) with teflon pledgets. The use of larger sutures were avoided, since cases not diagnosed early, the diaphragm becomes very thin, causing rupture at the suture line preventing the tightening of the diaphragm. In addition, pledgets sutures to avoid cut through in the diaphragm (fig.4, 5). Pain control was achieved with a thoracic epidural catheter using 0.5% bupivacaine for 48 hours. Post operative period was uneventful. Chest tube removed on third postoperative day, the patient was discharged after 15 days.

Patient underwent postoperative physiotherapy started on second day. Post operative chest physiotherapy treatment included deep breathing and coughing exercises, spirometer exercise, passive and active limb exercise, assistance with ambulation and a progressive shoulder and thoracic cage mobility exercise were given for 15 days. Post operative Chest radiographs show normal position of left dome [figure: 2]. Post operative Pulmonary function test parameters showed [FVC 02.98L (078%), FEV1 02.98L (096%)] and dyspnoea index is 1. He was discharged from our hospital on 15th post operative day.

DISCUSSION

Eventration of the diaphragm is a rare congenital malformation consisting of failure of muscular development of all or part of the diaphragm. It is more common in men. Complete eventration is almost always left sided, whereas partial eventration is more common on the right. The term eventration has become

synonymous with long standing elevation of the diaphragm from any cause, although strictly speaking the term should be reserved for the congenital malformation. On chest roentgenogram, eventration is apt to be confused with a diaphragmatic hernia or pleuropericardial cyst.

In adult, the abnormality is frequently discovered as an incidental roentgenographic finding. Individuals are usually asymptomatic; however, with obesity considerable respiratory compromise may be noted. In neonates involvement of an entire diaphragm can lead to severe respiratory and cardiac compromise from thoracic compression by displaced abdominal contents. This constitutes a surgical emergency⁽⁷⁾.

In this case patient was symptomatic and underwent left thoracotomy with plication of hemidiaphragm. Open plication is more effective than video assisted thoracoscopic surgery (VATS). Recurrence is also common after 2 years with VATS procedure which require secondary repair using nylon or marlex mesh which gives additional strength.

Respiratory physiotherapy is essential in the treatment of pulmonary complications such as atelectasis, pneumonia, and pleural effusion in an attempt to accelerate the recovery of lung function that occur normally only 15 days after surgery⁽⁴⁾.

In our case results showing, the patient dyspnoea index was relieved grade 3 to grade 0. Radiologically the level of the diaphragm attained the normal position (below the level of right dome) and pulmonary function tests improved in FVC and FEV1.

CONCLUSION

Conclusively, the open plication through thoracotomy can achieve very good results in terms of dyspnoea score, radiological and pulmonary function test improvement when combined with effective early post operative chest physiotherapy.

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REFERENCES

1. Arensman RM, Bambini DA. Congenital diaphragmatic hernia and eventration. In: Ashcraft KW, Murphy JP, Sharp RJ, Sigalet DL, Snyder CL, editors. *Pediatric Surgery*. 3rd ed. Philadelphia: WB. Saunders: 2000, p: 300-17.

2. Christensen P. Eventration of the diaphragm. *Thorax* 1959; 14: 311-9.
3. Reeve J, Denehy L, Stiller K (2007). The physiotherapy management of patients undergoing thoracic surgery: a survey of current practice in Australia and New Zealand. *Physiotherapy Research International* 12: 59- 71.
4. Reeve JC, Nicol K, Stiller K, McPherson KM, Birch P, Gordon IR, Denehy L. Does physiotherapy reduce the incidence of postoperative pulmonary complications following pulmonary resection via open thoracotomy? A Preliminary randomized single –blind clinical trial. *Eur J Cardiothorac Surg* 2010; 37: 1158-66.
5. Groth SS, Andrade RS. Diaphragmatic plication for eventration or paralysis: a review of the literature. *Ann Thorac Surg* 2010; 89: S2146-50.
6. Romanini W, Andrea MP, Carvalho KAT de, Olandoski M, Faria-Net JR, Mendes LF, et al. Os efeitos da pressao positive intermitente e espirometria de incentivo bo pos- operatorio de cirurgia de revascularizacao do miocardio. *Arq Bras Cardiol* 2007; 89(2):94-9.
7. Andrew L, Ries , David M, Burns. Diaphragmatic disorders. Richard AB et.al. *Manual of clinical problems in pulmonary* edition, 6th edition, 2006,p:432.