

Management of a Patient with Unstable Angina, Left Main Coronary Artery Disease, and Respiratory Insufficiency Due to Eventration of the Diaphragm

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ABSTRACT **The incidence of eventration of diaphragm before cardiac surgery is rare. We describe the management of a patient with eventration of the diaphragm who underwent a coronary artery bypass grafting (CABG) for left main coronary artery disease followed by left diaphragm plication with video-assisted thoracic surgery (VATS) for the postoperative respiratory insufficiency.** doi: 10.1111/jocs.12169 *(J Card Surg 2013;28:517–519)*

The incidence and prevalence of diaphragmatic eventration before cardiac surgery is rare. Diaphragmatic palsy causes further deterioration of pulmonary function in patients with poor cardiopulmonary reserve and may lead to secondary hypoxemia, prolonged ventilator use, pneumonia, and atelectasis leading to increased intensive care unit and hospital stay as well as increased morbidity and mortality. We describe the management of a patient who had critical coronary artery disease with diaphragm eventration.

PATIENT PROFILE

(Institutional Review Board permission was obtained to report this case.)

A 71-year-old male presented with complaints of chest pain and dyspnea on exertion. Coronary angiogram revealed an 80% ostial left main lesion, an 80% left anterior descending artery (LAD) lesion, a 99% left circumflex lesion, and a total occlusion of the right coronary artery (Fig. 1). A posteroanterior chest radiograph showed haziness in the left lower half of the chest and displacement of the mediastinum to the right (Fig. 2). His echocardiogram revealed an ejection fraction of 55%. The diagnosis of eventration of the diaphragm was confirmed with a computed tomographic scan. Pulmonary function tests were not performed in view of the tight left main stenosis.

In view of his coronary anatomy, we decided to do coronary artery bypass grafting (CABG) initially and diaphragm plication afterwards.

Through a standard midline sternotomy a CABG with vein grafts to LAD, obtuse marginal and posterior descending artery was performed on the beating heart. A left internal mammary artery was not used because of diffuse LAD disease and severely compromised respiratory function. He was extubated on the first postoperative day. Postextubation his arterial blood gas showed high partial pressure of carbondioxide ($PaCO_2$ $>$ 50 mmHg). He was tachypneic and needed intermittent noninvasive ventilation. Despite stable cardiac function, good renal function, infection control, and weaning from mechanical ventilation, the patient had persistent respiratory distress, having an oxygen saturation of $<$70% when breathing room air. Therefore, it was decided to proceed with surgical repair of the diaphragmatic eventration.

Under general anesthesia, uniportal VATS-assisted left diaphragm plication was performed (Fig. 3) and the lung was expanded. He was extubated on the first

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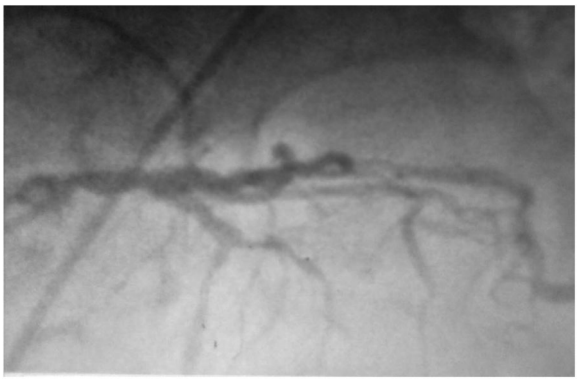

Figure 1. *Coronary angiogram showing ostial tight left main.*

post-op day. Postextubation arterial blood gas after diaphragm plication showed normal partial pressure of carbon dioxide. Adequate respiratory function was soon established, and chest radiography (Fig. 4) was dramatically improved (normal left hemi-diaphragm position). After mobilization and rehabilitation the patient was discharged on the seventh day after plication.

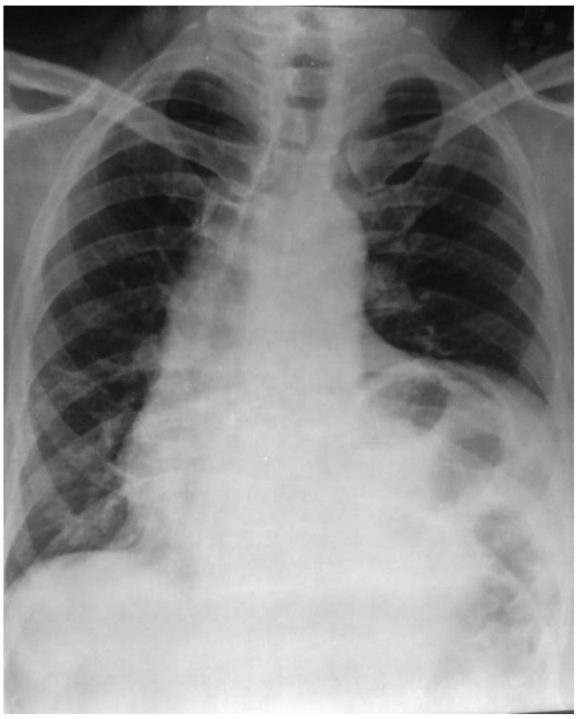

Figure 2. *Preoperative chest X-ray showing eventration of left diaphragm.*

DISCUSSION

Diaphragmatic palsy before cardiac surgery is uncommon and can cause deterioration of pulmonary function and lead to pulmonary complications. The choice of therapy for patients with concomitant coronary artery disease and diaphragmatic eventration includes three options. The first is coronary angioplasty and or stent placement before the diaphragm plication. The second option is CABG followed by diaphragm plication and the third is simultaneous CABG and diaphragm plication. Coronary angioplasty, if feasible, should be the first choice of therapy for these patients.[1] Those with coronary lesions that are not suitable for angioplasty as in this case can be treated by combined or staged surgical procedures. There is a divergence of opinion about the timing and sequencing of these procedures. Some studies suggest that staged operations are preferable because of shorter operation time and less technical complexity; accordingly, only patients who cannot tolerate a second operation should undergo a combined procedure.[2] In this case, the patient required an urgent CABG and performing the CABG with a diaphragmatic plication was difficult.

In conclusion, although CABG with diaphragmatic plication can be done *as a single procedure*, in the case

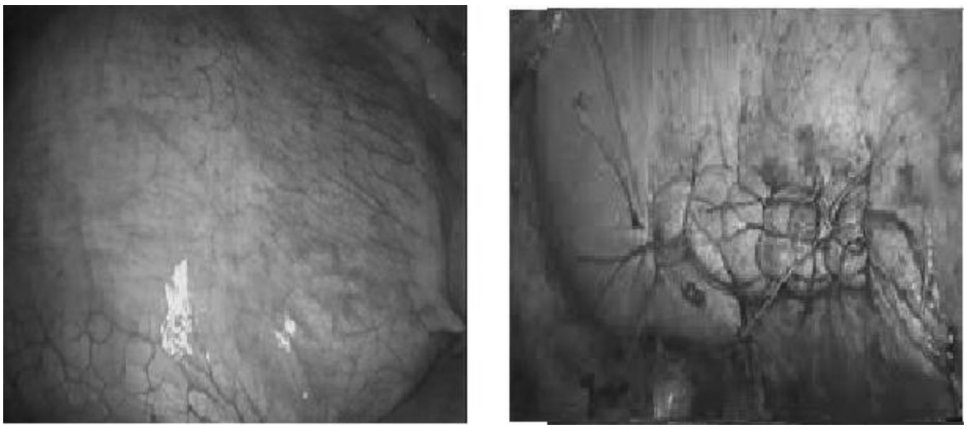

Figure 3. *Preoperative and postoperative pictures of VATS-diaphragm plication.*

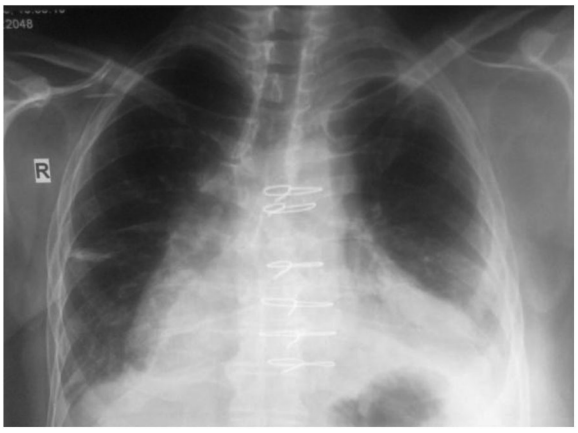

Figure 4. *Postoperative chest X-ray showing expanded left lung.*

of an emergency situation such as a critical left main lesion, an initial CABG may be a safer option and diaphragmatic plication may be done at a later date. Sequencing the procedures may reduce postoperative morbidity and mortality.

REFERENCES

1. Foster ED, Davis KB, Carpentier JA, et al: Risk of noncardiac operation in patients with defined coronary disease: The Coronary Artery Surgery Study (CASS) Registry Experience. Ann Thorac Surg 1986;41:42–50.
2. Miller DL, Orszulak TA, Pairolero PC, et al: Combined operation for lung cancer and cardiac disease. Ann Thorac Surg 1994;58:989–993.