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Managing a left pleural effusion after aortic surgery

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Abstract. – BACKGROUND: During the first 48 hours after open-heart surgery, patients are at high risk of developing atelectasis and pleural effusions. Reduced lung ventilation in the postoperative period contributes to the development of critical conditions that can be managed with noninvasive respiratory support.

AIM: In this case report, we describe the postoperative treatment of a left pleural effusion that occurred in a patient who had undergone aortic surgery.

MATERIALS AND METHODS: A 68-year-old man with aortic valve regurgitation and a thoracic aorta aneurysm who previously underwent surgery for coronaropathy was admitted to the cardiac department. He underwent aortic valve, ascending aorta, and arch replacement and the frozen elephant trunk technique with an E-vita open prosthesis in the descending aorta. Forty-eight hours postoperatively, a left pleural effusion was observed. Pulmonary CT performed on the same day confirmed almost complete atelectasis of the left lung due to compression phenomena resulting from secretions and pleural effusion. Intravenous diuretic therapy and antibiotic coverage were started. The patient was encouraged to sit as soon as possible. The EzPAP® System (Smiths Medical, St. Paul, MN, USA) with a mouthpiece was used with the patient sitting.

RESULTS: A marked difference was observed in the imaging studies: those obtained on the third day showed a decrease in the opacity of the left lung, which was completely white on admission.

CONCLUSIONS: In our case, the use of EzPAP® allowed lung expansion and mucus clearance using only one instrument.

Key Words:
Airway obstruction, Cardiac surgical procedures, Mucus, Pleural effusion, Postoperative complications, Respiratory therapy.

Introduction

During the first 48 hours after open-heart surgery, patients are at high risk of developing atelectasis and pleural effusions[1]. Reduced lung ventilation in the postoperative period contributes to the development of critical conditions that can be managed with noninvasive respiratory support[2]. Positive-pressure devices are used widely to manage atelectasis or oxygenation impairment or when performing other breathing exercises, and eliminating pulmonary secretions is difficult after cardiac surgery[3]. In this case report, we describe the postoperative treatment of a left pleural effusion that occurred in a patient who had undergone aortic surgery.

Clinical Case

A 68 year-old man with aortic valve regurgitation and a thoracic aorta aneurysm who previously underwent surgery for coronaropathy was admitted to the cardiac department. He had a history of hypertension. Subsequently, he underwent an evaluation with echocardiography and computed tomography (CT). The trans-thoracic echocardiography showed moderate aortic regurgitation and dilatation of the ascending aorta and aortic root. CT confirmed the aortic root and ascending aorta dilatation (maximum diameter 52 mm), showing dilatation of the arch (diameter 44 mm) and descending thoracic aorta (diameter 90 mm). Consequently, he underwent aortic valve, ascending aorta, and arch replacement and the frozen elephant trunk technique with an E-vita open prosthesis in the descending aorta[4]. Forty-eight hours postoperatively, a left pleural effusion was observed (Figure 1). At admission to the cardiac ward, he was supported with the extra delivery of humidified O_2 via a facial mask plus nasal goggles because of the difficulty maintaining the peripheral O_2 saturation above 90%. Pulmonary CT performed on the same day confirmed almost complete atelectasis of the left lung due to compression phenomena resulting from secretions and pleural effusion. Intravenous diuretic therapy and antibiotic coverage were started. The patient was encouraged to sit as soon as possible, even

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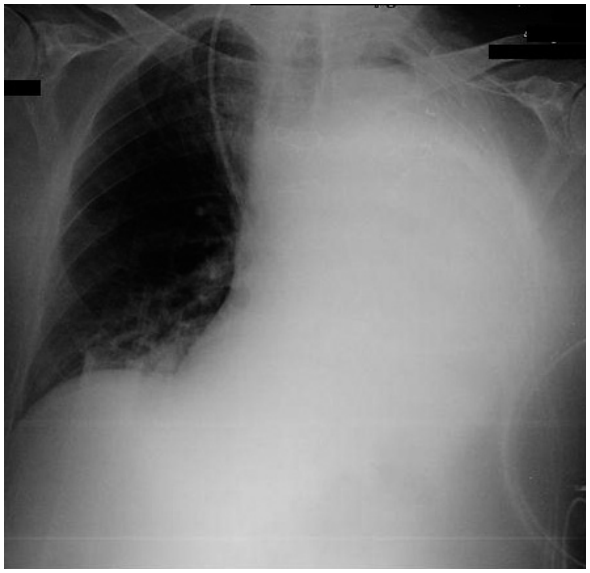

Figure 1. Complete opacity of the left hemithorax.

with thoracic drains present. Then, the EzPAP® System (Smiths Medical, St. Paul, MN, USA) with a mouthpiece was used with the patient sitting. The small size of the device makes it practical. It is connected to a flow of oxygen, and the patient is asked to inhale using normal breathing, retaining the mouthpiece firmly between his lips. This is followed by an equally normal expiration, which occurs against the resistance provided by the gas flow. The initial flow rate was 5 L/min. Based on the patient's response, the flow rate was increased gradually to 10 L/min. The EzPAP® was administered by a physiotherapist. The session, including breathing exercises and manual chest therapy, lasted 30 minutes and was repeated twice in the afternoon on the first day of admittance to the cardiac ward. During the second session on the same day, the patient was encouraged to cough. A large amount of mucus was expectorated at one time. A marked difference was observed in the imaging studies: those obtained on the third day (Figure 2) showed a decrease in the opacity of the left lung, which was completely white on admission (Figure 1). At follow-up 56 days later, total resolution was observed (Figure 3).

Discussion

As described in the Introduction, pulmonary complications may develop after cardiac surgery. Our therapeutic approach was both manual and instrumental: the patient was stimulated with early mobilization, and the left lung effusion was treated immediately after he was admitted to the cardiac ward. A literature review found that respiratory physiotherapy for preventing pulmonary complications after cardiac surgery remains unproven compared with incentive spirometry, continuous positive airway pressure, physical therapy, intermittent positive-pressure breathing (IPPB), blow bottles, inspiratory resistance with a positive-expiratory-pressure mask, and noninvasive ventilatory support with bi-level positive airway pressure and a positive-expiratory-pressure mask[5]. The EzPAP® System delivers positive pressure throughout the breathing cycle[6,7]. The main difference between the EzPAP® and IPPB is the possibility of maintaining a constant pressure throughout the breathing cycle, improving alveolar recruitment. Previous studies found that the EzPAP® System gave encouraging results in postoperative cardiac patients[8,9]. Our patient was stimulated with early mobilization, and on third postoperative day, he was free of mucus and breathed without assistance. Both, the mucus clearance and therapeutic exercise with the device produced a major benefit, with improvement clinically and on imaging studies. The EzPAP® System was effective in improving both mucus clearance and the pleural effusion. The lack of evidence supporting one technique over another in respiratory therapy is the subject of continuing discussion[10].

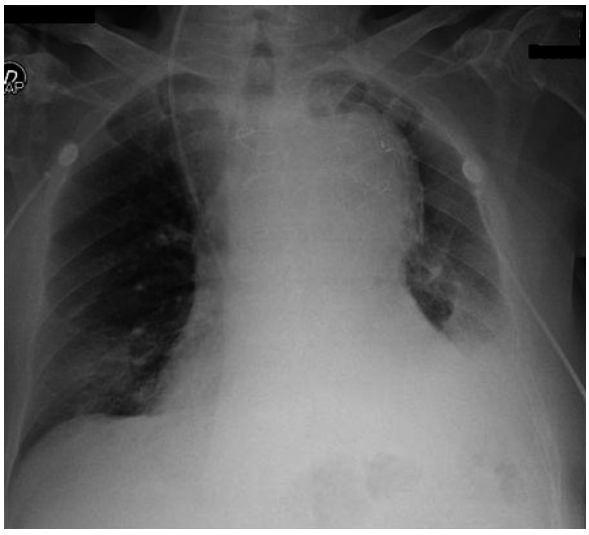

Figure 2. Significant reduction of the pleural effusion with partial re-ventilation of the ipsilateral lung. Disventilatory notes can be appreciated in the right base.

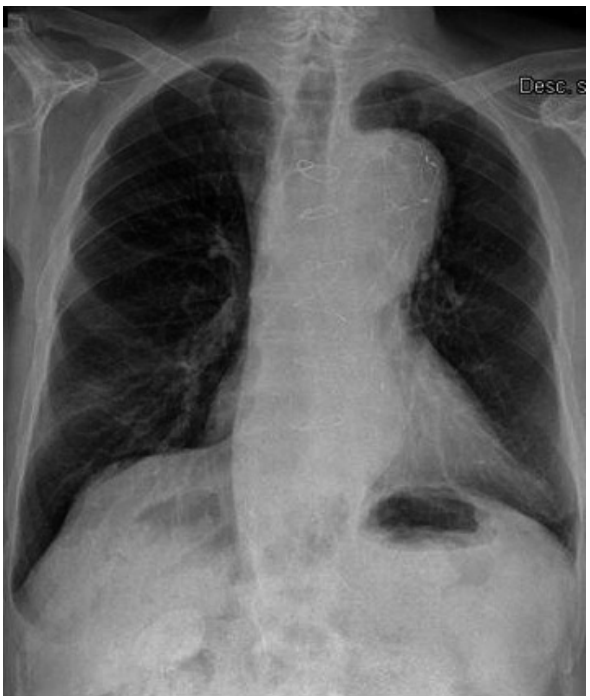

Figure 3. Resolution of the pleural effusion with almost complete normalization of the basal ventilation.

Conclusions

In our case, the use of EzPAP® allowed lung expansion and mucus clearance using only one instrument, which was ultimately effective. No adverse effects were observed, and the patient's clinical condition improved rapidly.

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