

Anaesthetic Management of an Adult Patient with Diaphragmatic Eventration

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Abstract

This case report presents the anaesthetic management of an adult male, who had epidermal inclusion cyst of neck with incidental findings of diaphragmatic eventration, dextro position of heart and pituitary macro adenoma, but the patient was clinically asymptomatic, planned for neck exploration and excision of cyst. Induction of anaesthesia was uneventful, Intra operatively patient became hypoxic and hypotensive probably due to increase in shunting fraction, norepinephrine infusion was started; blood pressure and oxygen saturation improved, at the end of surgery patient was successfully extubated, rest of the course was unremarkable.

Keywords: Diaphragmatic eventration; Hypoxia; Norepinephrine

Introduction

Diaphragmatic eventration is a rare condition in which there is congenital or acquired abnormal elevation of diaphragm, it may be complete or partial. In adults, mostly it is asymptomatic, usually it involves left hemidiaphragm with right sided mediastinal shift [1]. When it is symptomatic patient may present with orthopnea, dyspnea due to hypoxia, recurrent chest infections and gastrointestinal tract symptoms.

Epidermal inclusion cysts represent the most common cutaneous cyst, it is an epidermoid cyst that is the result of the implantation of epidermal elements in dermis and is usually benign. It may occur anywhere on the body but most commonly on face, scalp, neck and trunk [2].

This case report presents the anaesthetic management of an adult male, who had epidermal inclusion cyst on right side of neck with diaphragmatic eventration and pituitary macro adenoma, who underwent neck exploration and excision of cyst.

Case Report

A 30 years old male was scheduled for neck exploration and excision of epidermal inclusion cyst on right side of neck, he had some features of Acromegaly. During the pre-anaesthetic checkup, patient informed that he has orthopnea on lying supine but could sleep comfortably in right and left lateral position. Rest of his medical and surgical history was unremarkable. On auscultation he had decreased air entry on left middle and basal area. Mass was arising from the floor of mouth and right upper neck and was hanging freely, it was not encroaching the thoracic inlet (Figure 1). Rest of the airway examination and preoperative biochemical investigations were normal. As the patient was unable to lie supine, it was planned that CT scan will be done under anaesthesia before starting the surgery.



Figure 1: Large mass arising from the floor of mouth and right upper neck.

In the operating room, routine monitoring was done including electrocardiography, non-invasive blood pressure, pulse oximetry, I.V. cannulation was done. His base line blood pressure was 130/70 mmHg, heart rate of 90 beats/minute and oxygen saturation was 98% on room air. After preoxygenation with 100% oxygen for 3 minutes at 30 degrees head up position, anaesthesia was induced with propofol 2 mg/kg, succinylcholine 1.5 mg/kg and morphine 0.1 mg/kg. The trachea was intubated and the patient was mechanically ventilated with the volume controlled mode. Anaesthesia was maintained with 1-1.5% isoflurane with oxygen-air mixture.

Patient was then moved for CT scan head, neck and upper chest to see any extension of that mass. CT scan revealed collapsed right upper and lower lobe with mediastinal shift towards right side and large left sided diaphragmatic eventration with bronchiectatic and fibrotic changes in left lung (Figure 2). There was also a large sellar mass with suprasellar extension, most likely representing pituitary macroadenoma. It was decided to proceed with the surgical procedure.



Figure 2: CT Scan showing, collapsed right upper and lower lobe with mediastinal shift towards right side and large left sided diaphragmatic eventration with bronchiectatic and fibrotic changes in left lung.

Intraoperatively, patient remained hemodynamically stable but after an hour saturation dropped gradually to 76%, blood pressure 84/60 mmHg but heart rate was 90 beats/minute, meanwhile FiO_2 increased to 100% and ETT position was reconfirmed. Arterial blood gas analysis revealed a PH of 7.43, PaO_2 75.8 mmHg, PaCO_2 46.6 mmHg, HCO_3^- 30 mmol/ litre and saturation 85% at 100% oxygen. Norepinephrine infusion was started at the rate of 0.05 mcg/kg/minute and gradually increased up to 0.1 mcg/kg/minute. His oxygen saturation and blood pressure gradually improved in 15 min and came up to 94% at 100% oxygen. The surgical procedure lasted for 3.5 hours.

After adequate neuromuscular recovery, neostigmine 2.5 mg and glycopyrrolate 0.5 mg was given. Endobronchial and oral suctioning was done and the endotracheal tube was removed once the patient was fully awake and following the commands. Patient was closely observed in the operating room for 30-45 minutes and had an uneventful course. Norepinephrine infusion was stopped after extubation which was tapered down intra operatively and patient was shifted in recovery room.

Arterial blood gas analysis showed a pH of 7.42, PaCO_2 of 45.30, PaO_2 of 118.20, HCO_3^- of 29.30 mmol/litre, base excess of 4.6 and an SO_2 of 98.50% on 40% oxygen. On the first postoperative day, his arterial blood gas analysis values were normal. Meanwhile cardiothoracic team reviewed the patient regarding diaphragmatic eventration but the patient refused for any other surgical procedure or investigation such as echocardiography, so he was discharged on second postoperative day.

Discussion

Anaesthetic management of patients with diaphragmatic eventration in adults is not adequately described in literature, as it is rare and usually asymptomatic. In this case, diaphragmatic eventration was an incidental finding.

Sudden rupture of the weakened diaphragm may result from any event that leads to an increase in intra-abdominal pressure, such as coughing, straining during light anesthesia or extubation [3]. When the eventration of the diaphragm changes into a true rupture, by the mass effect of the abdominal viscera, direct compression of the heart and mediastinal shift may occur. Compression of vena cava and pulmonary veins caused by the mass effect impairs venous return to the heart and decreases cardiac output [4]. Thus, an adequate depth of anaesthesia is required in these patients undergoing surgery. Nitrous oxide should be avoided in these patients, as the expansion of intra-abdominal viscera can impair the circulation and respiration [4].

In this case we were unaware at the time of induction that the patient had DE, so we intubated the patient in a routine manner and ventilated him on controlled mode ventilation, therefore he was at risk of diaphragmatic rupture. There was a case reported by Faheem and Fayad, in which a spontaneous diaphragmatic rupture took place after lower limb surgery with epidural anaesthesia. The probable mechanism of the rupture was explained by the increased workload of the diaphragm due to high regional anaesthesia [3]. Titration of local anaesthetic drugs should be done carefully to prevent high block levels when regional anaesthetic techniques are used.

In our case patient also desaturated with hypotension which was most probably because of increase shunting resulted due to loss of hypoxic pulmonary vasoconstriction by Isoflurane, although Norepinephrine has very little effect on it but it increases the blood pressure in patients with pulmonary hypertension [5]. Moreover this is the first case report in which patient had macroadenoma along with the other common findings.

The use of Total Intravenous anaesthesia (TIVA), which was reported in one study, can help us in avoiding the use of inhalational agents and thus protect the patient against the risk of respiratory and cardiovascular compromise and it has minimal effect on HPV. Moreover, TIVA reduces the risk of postoperative nausea and vomiting, thus reduces the risk of rupture [6].

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