

Acute hypoxaemia due to intraoperative lung collapse after repositioning the patient

Address for correspondence:

Dr. Bina P Butala,
Department of Anaesthesia
and Critical Care,
Smt. G. R. Doshi and
Smt. K. M. Mehta Institute
of Kidney Diseases and
Research Centre &
Dr. H. L. Trivedi Institute of
Transplantation Sciences,
Civil Hospital Campus,
Asarwa, Ahmedabad,
Gujarat - 380 016, India.
E-mail: bina58@yahoo.com

Bina P Butala, Veena R Shah, Guruprasad P Bhosale

Department of Anaesthesia and Critical Care, Smt. G. R. Doshi and Smt. K. M. Mehta Institute of Kidney Diseases and Research Centre & Dr. H. L. Trivedi Institute of Transplantation Sciences, Civil Hospital Campus, Asarwa, Ahmedabad, Gujarat, India

ABSTRACT

Desaturation after induction of anaesthesia and repositioning due to mucus plug causing atelectasis (lung collapse) is a rare event. We present a case of intraoperative right lung collapse due to mucus plug in a patient undergoing left laparoscopic nephrectomy. Hypoxaemia occurred after the induction of anaesthesia and repositioning. X-ray chest revealed right lung collapse and surgery was subsequently postponed. Lung re-expanded after postural drainage and suction. Postoperatively patient was diagnosed to have retrocardiac bronchiectasis. After preoperative preparation with postural drainage, chest physiotherapy, and antibiotics, the patient underwent surgery uneventfully.

Key words: Hypoxaemia, lung collapse, mucus plug, postural drainage

Access this article online

Website: www.ijaweb.org

DOI: 10.4103/0019-5049.84859

Quick response code



INTRODUCTION

General anaesthesia is associated with lower oxygen tension due to increased alveolar-arterial oxygen gradient and occasionally oxygen desaturation leading to hypoxaemia.^[1] These changes are magnified when supine and/or lateral positions are assumed. The other mechanical causes of hypoxaemia are equipment failure, endotracheal tube blockade, endobronchial or oesophageal intubation and clinical causes are aspiration, hypoventilation, or pulmonary embolism especially in patients with trauma.^[1] Intraoperative atelectasis of a bronchopulmonary segment, entire lobe, or lung due to mucus plug as a cause of hypoxaemia is uncommon and may be potentially fatal.^[1] We report a case of intraoperative right lung collapse due to mucus plug in a patient undergoing left laparoscopic nephrectomy.

CASE REPORT

A 46-year-old male, chronic smoker, weighing 55 kg was diagnosed to have bilateral obstructive uropathy due to renal stone disease. He was posted for left laparoscopic nephrectomy for left-sided non-functioning kidney. He had a past history of D.J. stenting and cystolitholapaxy under spinal anaesthesia and right-sided percutaneous nephrolithotomy (PCNL) and ureterorenoscopy (URS) before 2 months. Both the procedures were uneventful. On general examination he had clubbing. He was maintaining 100% oxygen saturation on room air. Systemic examination was normal except few occasional crepitations in the left infrascapular area. Preoperative blood investigations were within normal limits with serum creatinine of 1.12 mg/dl. X-ray of the chest was also reported as normal [Figure 1].

How to cite this article: Butala BP, Shah VR, Bhosale GP. Acute hypoxaemia due to intraoperative lung collapse after repositioning the patient. *Indian J Anaesth* 2011;55:395-8.

A balanced general anaesthesia with standard monitoring was used. Trachea was intubated with an 8.5 mm cuffed endotracheal tube (ET). After intubation, secretory sounds were felt in the bag with 100% oxygen saturation. When the patient was put in the right lateral kidney bridge position, oxygen saturation decreased from 97% to 81% with 100% FiO₂. Resistance was felt in the ventilating bag. On auscultation, breath sounds were reduced in the right supraclavicular, mammary, and scapular areas. Suction catheter was passed through the endotracheal tube to check patency. Since there was no improvement in the oxygen saturation, he was put in the supine position. On examination respiratory movement was decreased in right supraclavicular and mammary regions. On auscultation, breath sounds were absent in right supraclavicular, mammary areas and bronchial breathing was present with crepitations in the right inframammary and infra-axillary regions. Portable chest radiograph was suggestive of right upper lobe lung collapse [Figure 2]. Preparation for fiberoptic bronchoscopy was done. In the mean time, postural drainage for the right upper lobe in the reverse Trendelenberg position with head end of the operation table elevated by 18 inches was attempted and yielded a thick yellowish green mucus plug. A sudden improvement was seen in the respiratory movement in the supraclavicular and mammary area with normal vesicular breathing and 100% oxygen saturation. The repeat chest radiograph taken after 10 min showed complete expansion of the right upper lobe [Figure 3]. Surgery was postponed and the patient was extubated and shifted to the postanaesthetic care unit. Retrospective examination of the preoperative chest radiograph which was reported normal, showed multiple retrocardiac cystic shadows. High resolution computed tomography (HRCT) thorax was advised and it showed cystic bronchiectasis in the left lower lobe [Figure 4]. A successful operation was done after 15 days with preoperative chest physiotherapy, incentive spirometry, antibiotic coverage, and intraoperative use of humidification and avoidance of anti-sialogogues.

DISCUSSION

Acute pulmonary collapse is common in the postoperative and intensive care unit (ICU) setting but is a rare event after induction of anaesthesia and repositioning. The most common cause is endobronchial intubation or blockage of tube by secretions, blood, or herniated cuff.^[1] Our report

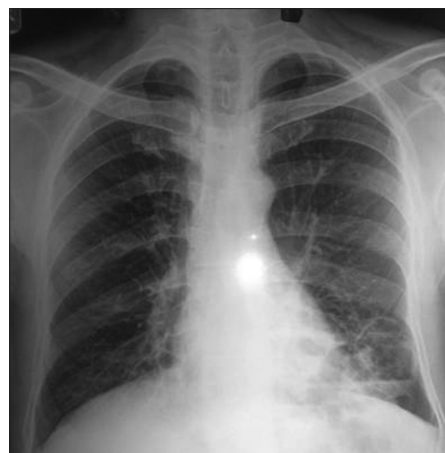


Figure 1: Preoperative chest X-ray

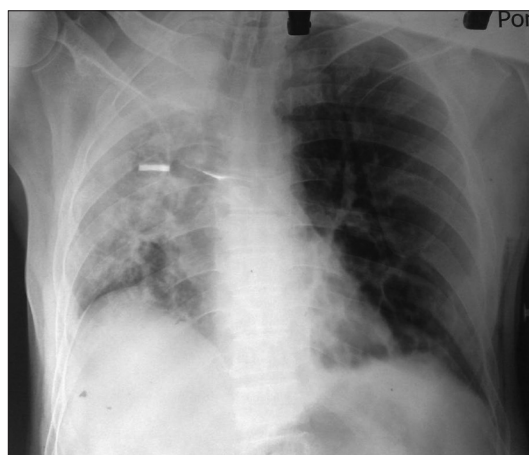


Figure 2: Intraoperative lung collapse



Figure 3: Right upper lobe opened up after postural drainage

highlights the precipitous onset of hypoxaemia associated with considerable pulmonary collapse due to mucus plug.

Normally, general anaesthesia is associated with lower oxygen tensions, and occasionally oxygen desaturation



Figure 4: HRCT thorax

leading to hypoxaemia can occur. Mechanisms for hypoxaemia include ventilation perfusion (V/Q) mismatch, hypoventilation, diffusion impairment, and physiologic or anatomic shunt.^[1]

During anaesthesia and neuromuscular relaxation, ventilation is redistributed to the nondependent regions of the lungs due to atelectasis and airway closure in the dependent lung regions, resulting in increased alveolar-arterial oxygen gradients and hypoxaemia.^[1] In the lateral position, gravity-related preferential perfusion to the dependent lung worsens this V/Q mismatch and hypoxaemia.^[1,2] In our patient, this was not the cause as hypoxaemia developed acutely with physical findings.

In our patient, the initial clinical presentation included sudden onset of hypoxaemia on assuming a lateral position so initial diagnosis was blockage of ET tube/endobronchial intubation as there was reduction or absence of breath sounds on right lung. ET blockage was ruled out by passing of the suction catheter which aspirated few secretions and endobronchial intubation was ruled out by auscultation. Due to persistent hypoxaemia, the patient was turned to the supine position which revealed diminished movement on right upper chest. Immediate X-ray confirmed right upper lobe collapse. To find out the cause of collapse, fiberoptic bronchoscopy was planned but before that with postural drainage mucus plug was aspirated and the patient improved clinically and radiologically.

To know the cause of mucus plug, we reviewed the

chest X-ray taken on table and compared it with previous preoperative X-ray which was reported normal, which actually showed cystic cavity with air-fluid level in the left lower lobe which was concealed behind cardiac shadow. On giving right lateral position, secretions from this cavity must have shifted to right upper lobe bronchus causing right upper lobe collapse. Retrocardiac bronchiectasis was later confirmed by HRCT. The patient underwent subsequent surgery uneventfully after standard preparation.

Significant lung collapse is usually associated with haemodynamic instability due to mediastinal shift and decreased venous return. However, our patient remained haemodynamically stable. The probable reason could be that in the setting of proximal airway obstruction the elevated airway pressure is not transmitted to the extraparenchymal intrathoracic structures like great vessels, so venous return and cardiac output remain preserved as it has been shown previously.^[3]

While lung collapse and intraoperative hypoxaemia have been reported previously, few involve mucous plugging and atelectasis.^[4] In reviewing the literature, we found five reports describing mucous plugging, all associated with orthopaedic surgery following trauma^[1] and all diagnosed with chest radiographs. In these patients, the combination of recent trauma and surgery was the contributing factor to intraoperative atelectasis and lung collapse from mucous obstruction. Four other cases of mucous plugging have been reported in quadriplegic patients initially diagnosed

with pulmonary embolism.^[5] However, the chest radiograph was inconclusive, and diagnosis was made in these cases only by the use of ventilation scintiscans.^[1]

This report highlights a rare but important cause of intraoperative hypoxaemia. Though written normal, chest X-ray showed signs of bronchiectasis, but on reviewing the chest X-ray we understood there was missed diagnosis. If this was identified earlier thorough toileting before positioning could have prevented this complication. Although intraoperative fiberoptic bronchoscopy is a gold standard to aid diagnosis and management, a trial of postural drainage may be life-saving.^[6]

REFERENCES

1. Shields JA, Nelson CM. Acute hypoxaemia after repositioning of patient: A case report. *AANA J* 2004;72:207-10.
2. Pivalizza EG, Tonnesen AS. Acute life-threatening intraoperative atelectasis. *Can J Anaesth* 1994;41:857-860
3. Das J, Mahajan S, Samplay MK, Aggarwal NK. Management of a case of endobronchial blood clot in the postoperative period. *Indian J Anaesth* 2009;53:233-6.
4. Singh K, Low TC. Sudden profound hypoxaemia in the intensive care unit. *Ann Acad Med Singapore* 1998;27: 597-600.
5. Samuels SI, Clark RW. Profound atelectasis during anesthesia. *Anesth Analg* 1980;59:792-5.
6. Nair SR, Pearson SB. Images in clinical medicine. Mucous plug in the bronchus causing lung collapse. *N Engl J Med* 2002;347:1079.

Source of Support: Nil, **Conflict of Interest:** None declared