

# A case of pneumothorax following bougie-guided intubation in a patient undergoing excision of an intraventricular space occupying lesion

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## Abstract

A 46-year-old female with intraventricular space occupying lesion was posted for craniotomy and excision of the same. Immediately following routine induction of general anaesthesia and a bougie-guided intubation, she developed increased airway pressures and desaturation associated with a decreased air entry on the right side of the chest suggestive of a right-sided pneumothorax which was confirmed with radio imaging and following the placement of chest drain the saturation improved and airway pressures decreased. To be faced with a pneumothorax following an intubation could be surprising for a non-suspecting anaesthesiologist and it can have important implications especially in neurosurgical cases where a tight control of intracranial pressure is warranted. Hence, this case report emphasises the need for a high index of clinical suspicion for proper management and safe patient outcome.

**Key words:** Chest tubes, general anaesthesia, pneumothorax

## INTRODUCTION

Pneumothorax following routine induction of general anaesthesia (GA) is a rare event (0.1%)<sup>[1]</sup> and has been reported with difficult intubation, double lumen endotracheal tube placement and ARDS patients on a ventilator, following feeding tube placement, etc.<sup>[2-4]</sup> We report a rare case of pneumothorax following routine induction of GA followed by a bougie-guided intubation necessitating an intercostal drain (ICD), which might be deleterious in neurosurgical anaesthesia if not identified early.

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## CASE REPORT

A 46-year-old female presented to our hospital with a 2-month history of a headache and vomiting. Her Glasgow coma scale was 15/15; pupils were bilaterally equal, no neurological deficits with stable vitals measuring a heart rate of 78 and a blood pressure (BP) of 130/80 mm Hg. Her weight was 73 kg and height 150 cm and had a Mallampati score of I with a normal neck extension and flexion. Pre-operative workup showed an intraventricular space occupying lesion. Her investigations including pre-operative chest X-ray were within normal range and did not show any emphysematous bulla. She was posted for excision of the tumour (Poppen's approach) under GA and was accepted under the American Society of Anaesthesiologists Physical Status I.

After attaching the standard monitors including pulse oximetry, non-invasive BP and electrocardiogram,

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anaesthesia was induced with a sleep dose of propofol, fentanyl 2 mcg/kg body weight and vecuronium 8 mg (0.1 mg/kg). Direct laryngoscopy revealed a Cormack-Lehane Grade II, and a gum elastic bougie was passed through the glottic opening under vision and a 7.5 mm cuffed flexometallic endotracheal tube was railroaded over the bougie in a single attempt.

Immediately, following intubation, it was noticed that the airway pressure was high in the range of 40–45 cm H<sub>2</sub>O, there was no air entry on the right side and the right hemithorax had a hyper-resonant note to percussion. The patient desaturated to 80% with 40% oxygen in air and needed 100% oxygen to maintain saturation (SpO<sub>2</sub>) of 95% using manual bag ventilation due to high airway pressures. Pneumothorax was suspected and a C-arm imaging done revealed a right-sided massive pneumothorax [Figure 1]. Immediately, a chest tube was placed [Figure 2] following which the airway pressures decreased to 22 cm H<sub>2</sub>O and the saturations improved to 100% with 40% oxygen. Throughout the period, the patient remained haemodynamically stable. The surgery was deferred and an endoscopic third ventriculostomy was done to decrease the intracranial pressure (ICP), and the patient was electively ventilated for a few hours and trachea was extubated. Fiberoptic bronchoscopy done through the endotracheal tube and high resolution computed tomography (CT) were done to look for a tracheobronchial tear which could have attributed to the pneumothorax, but it failed to give a conclusive evidence. Her post-operative course was uneventful and a chest X-ray done on a post-operative day 5 after removal of the ICD was normal and she was rescheduled for surgery on a later day.

## DISCUSSION

Common causes of pneumothorax following GA include placement of double lumen tube, intubation in neonates,

difficult intubation or repeated attempts at intubation and use of stylet, in patients receiving jet ventilation.<sup>[2-8]</sup> Pneumothorax has also been reported as a post-operative complication following uneventful GA.<sup>[9]</sup> Established risk factors include female gender, age >50, use of double lumen tubes, gross over inflation of cuff. Probable risk factors include corticosteroid use, tracheomalacia, poor general medical condition, misuse of stylet.<sup>[9]</sup>

In women, anatomical and technical factors may be responsible for causing tracheal tears including downward displacement of the tube too far into a short trachea, use of oversized tubes and weakness of trachea.<sup>[8]</sup> Female patients, short stature and obesity are some risk factors associated with this complication. Pneumothorax with its associated increases in peak airway pressures can indirectly increase the ICP, which will be associated with deleterious outcomes in patients undergoing neurosurgery.<sup>[10]</sup>

The mechanisms of pneumothorax following tracheal intubation are high positive pressure during mechanical ventilation, and the mechanism is primarily the dissection of air along the perivascular sheath of the pulmonary artery presumably due to rupture of perivascular alveoli.<sup>[11]</sup>

In a retrospective study of 19 patients treated for iatrogenic tracheobronchial lesions, 11 (58%) had a single lumen tube, 4 (21%) had a double lumen tube and 2 (10%) by tracheal cannula, the post-operative mortality was 42%, which was not dependent on the rupture but basically by the underlying disease requiring intubation.<sup>[12]</sup>

The cause of pneumothorax, in this case, could be due to a tracheobronchial mucosal tear following insertion of bougie, which was not big enough to be identified by bronchoscopy or high-resolution CT, but



Figure 1: Right-sided pneumothorax following intubation

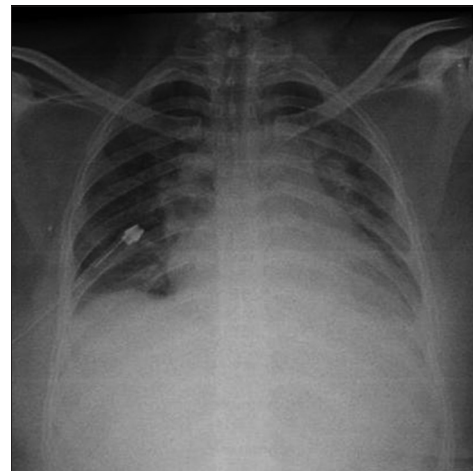


Figure 2: Intercostal drain tube *in situ* and a good lung expansion

the positive pressure ventilation could have worsened the pneumothorax. Suspicion of pneumothorax is purely clinical and the common findings include increased airway pressures, decreased air entry in the corresponding hemithorax, desaturation and hypotension. Chest X-ray (CXR), CT scan or lung ultrasound can aid in making a diagnosis. The diagnosis is confirmed with a chest X-ray or CT scan. Since this patient did not reveal any major tracheobronchial tear on bronchoscopy and the air leak settled after placement of an ICD, she was managed conservatively.

Although pneumothorax following routine induction of GA is a rare entity, haemodynamic instability, desaturation and higher airway pressures should alert the anaesthesiologist in suspecting it. Lung ultrasound or a CXR is an easy and quick on table method to diagnose pneumothorax.<sup>[10]</sup> It should also be stressed that in bougie-guided intubations, the bougie should be stabilised while the endotracheal tube is advanced to avoid tracheobronchial injury.

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#### Conflicts of interest

There are no conflicts of interest.

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