

Case report

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# Airway management in a patient with blunt trauma neck: A concern for anesthesiologist



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### **KEYWORDS**

Blunt neck trauma; Tracheal tear; Airway management; Fiberoptic bronchoscope **Abstract** Laryngo-tracheal injuries resulting from blunt trauma neck are fortunately rare, but may have dire consequences. A high index of suspicion is required to make the diagnosis. Here we report a case of airway management of a patient with blunt trauma neck with tracheal tear posted for tracheal tear repair under GA. Tracheostomy, FOB guided intubation and direct laryngoscopy are the standard methods used to secure the airway in these patients, but sometimes they may aggravate the underlying injury. Technique of choice depends upon patient's condition, urgency, and experience of anesthesiologist and surgeon.

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#### 1. Introduction

Upper airway injuries are relatively uncommon, due to the protection provided by the bony cage comprising of mandible, sternum and cervical spine. Incidence varies widely depending upon the type of patients studied. It is more common in trauma patients with the reported incidence as high as 1 in 125 in comparison with non-trauma patients with the incidence of 1 in 137,000 [1,2]. Fifty percentage of these injuries involve

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the cricoid cartilage and cricothyroid membrane, while the rest involve thyroid cartilage, thyrohyoid membrane, and cervical trachea [3].

Definitive treatment ranges from conservative management to emergency tracheostomy. Literature suggests tracheostomy under local anesthesia (LA) as the gold standard and the safest option [4–6], but endotracheal intubation under general anesthesia (GA) is also sought to be a reasonable alternative as it is likely to be the fastest and least invasive method of securing the airway [3].

Here, we report a case of linear tracheal tear in a patient with blunt neck trauma which might have got converted into a tracheal hole while performing endotracheal intubation, and successful use of fiberoptic bronchoscope (FOB) to diagnose the problem and to secure the airway.

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### 2. Case report

A 22 year old male patient weighing 60 kg met with a road traffic accident and sustained blunt injury to the neck. Patient subsequently developed swelling around the neck for which he consulted our institute. History of coughing out of blood stained sputum was present. There was no history of change in voice, difficulty in breathing and swallowing. Patient was hemodynamically stable.

On examination there was no evidence of trauma and active bleeding from the oral cavity. On auscultation of respiratory system, normal vesicular breath sounds were heard all over the lung fields. His oxygen saturation was 96–98% on room air. On examination of the swelling, crepitus and tenderness were present. Routine investigations were normal. Chest Xray revealed no evidence of rib fracture and pneumothorax (Fig. 1). Antero-posterior and lateral X-rays of neck showed surgical emphysema (Fig. 2). There was no evidence of cervical spine injury.

Patient was admitted to ward for observation and hemodynamic monitoring. Four hours later, patient developed difficulty in breathing. Surgical emphysema around the neck got worsened and extended from the neck to the face, chest, back, shoulders and upper limbs. The progression of subcutaneous emphysema warned to the possibility of internal airway injury and tracheal trauma. Computed Tomography scan of thorax and neck was done. It revealed a linear tear on right tracheal wall extending from C6 to T1 vertebrae level. Patient was posted for tracheal tear repair under GA.

In the operating room, standard monitoring including electrocardiogram, pulse oximetry, and non-invasive blood pressure were attached to the patient. Before induction, his vital signs were blood pressure of 122/68 mmHg, heart rate of 86 beats/min, respiratory rate of 26/min and saturation of 96%. GA with endotracheal intubation was planned. Patient was pre-oxygenated for 3 min with 100% O<sub>2</sub>. Injection fentanyl 150 µg, propofol 120 mg and suxamethonium 100 mg were administered. On laryngoscopy, there was no evidence of



Figure 2 X-ray neck (presence of subcutaneous emphysema).

pharyngeal and laryngeal trauma. Laryngoscopy revealed Cormack and Lehane's grade 1 view. Cuffed endotracheal tube (ETT) of size 7.0 was inserted under vision through the glottis into the trachea to a depth greater than the usual (26 cm at lips) with the aim to pass the ETT beyond the tracheal tear. No cricoid pressure was applied at this time as it may worsen undiagnosed internal airway injury. Though trachea was intubated under vision, there was no tracing on capnograph and there was no air entry on auscultation of chest. The resistance of the reservoir bag was high. Laryngoscopy was reperformed to find the cause and to rule out esophageal intubation. ETT was seen to be passing through the glottis into the trachea. The ETT was slowly withdrawn under continuous capnograph monitoring. When the tube was at 17 cm mark at the angle of mouth, tracing on capnograph appeared and bilateral breath sounds were heard. ETT was secured at this depth.

FOB was passed through the lumen of the ETT. When the tip of the FOB reached beyond the tip of ETT, a circular rent measuring approximately  $2 \times 1$  cm was noticed over the right tracheal wall where the tracheal tear was present (Fig. 3).



Figure 1 Chest X-ray (no evidence of rib fracture/ pneumothorax).



Figure 3 Surgical image. Showing rent in right tracheal wall.

The tip of the FOB was passed beyond the tracheal tear into the trachea and ETT was rail-roaded over the FOB to a depth of 25 cm from the angle of mouth and above the level of carina. ETT position was reconfirmed by noting tracing on capnograph and bilateral auscultation of chest. Injection atracurium (15 mg) was administered to provide muscle relaxation. Anesthesia was maintained with inhalation of isoflurane (between 1.0 and 1.2 MAC) in O<sub>2</sub>:Air in the ratio of 50:50. Surgeons repaired the tracheal rent and did surgical tracheostomy just above the repair. Procedure lasted for 70 min. Intra-operative course was uneventful. Surgical emphysema decreased over the next 3 days. Tracheostomy was decannulated using smaller size tubes and tracheostomy site was closed after 10 days of surgery.

#### 3. Discussion

Laryngo-tracheal injuries following blunt trauma neck are fortunately rare, but may have dire consequences. A high index of suspicion is required to make the diagnosis, as they are often associated with other, more obvious injuries such as closed head injuries, cervical spine injuries, facial trauma, and chest trauma. Serious injuries to the laryngo-tracheal anatomy could exist even in the absence of any obvious external injuries. Hoarseness of voice, pain, dyspnea, dysphagia, subcutaneous emphysema and hemoptysis are some of the clinical signs and symptoms which point toward an internal injury of the airway [2,7].

We planned endotracheal intubation by direct laryngoscopy under GA as surgical access for tracheostomy was difficult due to the presence of extensive surgical emphysema and distorted anatomy. FOB guided intubation would have been ideal in our case as the patient was hemodynamically stable and was not in respiratory distress. But the passage of bronchoscope and railroading of ETT over the scope may aggravate airway injury, and has been reported to cause complete laryngo-tracheal separation. In a case series reported by Maktabi et al. [8], where in 3 patients with normal non-traumatic airway sustained trauma to the larynx during awake fiberoptic intubation and it is likely that traumatized airway is more at risk.

A smaller size ETT was chosen with the anticipation of narrowed airway due to trauma and edema formation. In our patient the tip of the ETT has either damaged the rent situated in the lateral tracheal wall or might have just entered the rent and created the false passage and was the reason for the absence of tracing on the capnograph and high resistance in the bag.

Controversy regarding ideal method of securing the traumatized airway still persists. Literature suggests tracheostomy under LA as the gold standard option. But if there is urgency to secure the airway and contraindication to perform tracheostomy, oral intubation under GA is considered as a reasonable option. Definitive treatment ranges from conservative management to emergency tracheostomy. Conservative management includes passing an ETT beyond the rent and elective mechanical ventilation to ensure adequate healing of the rent. Use of high frequency oscillatory ventilation, low airway pressures, sedation, cardio-pulmonary bypass are the other methods described in the literature depending upon the clinical scenario [9–11]. Availability of different airway gadgets and adequate training for securing the airway are necessary to minimize the incidence of iatrogenic airway trauma.

To conclude, the presence of laryngo-tracheal trauma even in the absence of signs and symptoms of external injury is a real possibility and can be life threatening. Securing the airway at the earliest remains top priority. In patients with airway injury who are hemodynamically stable and not actively bleeding, awake FOB guided endotracheal intubation is an ideal and alternative option to elective tracheostomy. It not only helps in accessing the injury and for securing the airway, but also helps in smoother entry of ETT under vision to a depth beyond the injury. In hindsight we feel that intubation using awake FOB could have been safer in our patient as it could have helped in visualizing the lesion and for securing the airway without resulting in the catastrophe we encountered.

#### **Conflicts of Interest**

None.

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