Successful detection and management of kinked tracheal tube in a patient with severe post-burn contracture of the neck

Sir,

We present a patient with severe post-burn contracture (PBC) neck, whose airway was secured by awake fibreoptic intubation. The post-induction period was complicated by the development of a kink in the tracheal tube. The management difficulties are described.

A 32-year-old male, of weight 55 kg, was scheduled for release of PBC neck and split-thickness skin grafting. Airway examination revealed a severe neck contracture, sternomental distance 3 cm and a modified Mallampati class 4 oropharyngeal view. The plan was to secure the airway with awake fibreoptic-guided nasal intubation. Following topical airway anaesthesia and sedation, the adult fibreoptic bronchoscope (FOB), preloaded with 7.0 mm polyvinyl chloride (PVC) tracheal tube, was introduced nasally and the carina was identified. The tracheal tube was negotiated easily through the nasopharynx. Moderate difficulty was encountered while railroading the tube through the cords. This was overcome by withdrawing the tube by 1 cm followed by 90° anticlockwise rotation and re-advancement. Egress of expired air from the tracheal tube was confirmed and the anaesthetic circuit was connected. Patient’s spontaneous breaths were seen to communicate with the reservoir bag. Propofol 100 mg IV was administered. On manual ventilation, bag compliance was very poor and chest expansion was inadequate. EtCO₂ trace was not present. The capnograph was quickly re-checked by the assistant and was found not to work. An assistant auscultated the chest and bronchospasm was diagnosed. Bronchodilator therapy was administered. As there was no improvement, the surgeon was instructed to urgently release the contracture after local anaesthetic infiltration. Peak airway pressure (PAW) was high (42-58 cm H₂O). Anaesthesia was maintained with O₂, N₂O and isoflurane 0.8-1% with assisted ventilation. Chest auscultation revealed both inspiratory and expiratory wheeze, suggesting an obstruction. The position of the head was adjusted to rule out bevel impingement against the tracheal wall. Over-inflation of tube cuff was excluded. A suction catheter was introduced into the tracheal tube to find the site of obstruction. It could not be passed beyond 14 cm from machine end of the tube. Next, the fibrescope was introduced into the trachea and could not be negotiated beyond approximately 14 cm. An attempt to pass Cook airway exchange catheter was unsuccessful. The index and middle fingers were introduced orally to palpate any kink of the tracheal tube. No kink was found. Firmly holding the tube intraorally with two fingers, it was pulled out of the nose by 1 cm. This resulted in remarkable improvement in bag compliance, no audible wheeze on auscultation, and PAW of 15 cm H₂O. Vecuronium 4 mg was administered. The remainder of the intraoperative course was uneventful, residual neuromuscular block was antagonised and the trachea was extubated when the patient was fully awake with adequate respiratory efforts. Examination of the tracheal tube revealed a kink near the site of pilot tube exit, 17 cm from tube tip [Figure 1].

The airway management of patients with PBC neck often presents unique challenges to the anaesthetist. In the present case, FOB-guided tracheal intubation was unremarkable except for the difficulty in railroading the tracheal tube through the glottis. We were certain of correct placement of the tracheal tube as the carina had been visualised, egress of expired air from tracheal tube was felt, and chest expansion, though inadequate, was present. Hence, propofol was administered following which we had reached the point of no return, that is, an obtunded patient with a difficult airway and “bronchospasm.” For this reason, the surgeon was asked to release the contracture. The capnograph that had worked perfectly well in the previous case stopped working in the present case. This shows that equipment failure can occur at the most inopportune times and cannot always be anticipated.

A kinked, blocked (mucous plug, cuff herniation) or

![Figure 1: Kinked PVC tracheal tube](image-url)
Letters to Editor

misplaced (endobronchial/oesophageal) tracheal tube can mimic severe bronchospasm.\(^1\) The high peak airway pressures, poor bag compliance and wheeze led us to erroneously assume a diagnosis of bronchospasm. Presence of wheeze during inspiration favours a kink in the tracheal tube. Bronchospasm generally exhibits an expiratory wheeze or if severe, both an expiratory and inspiratory wheeze, or a silent chest.

In patients with severe fixed flexion deformity of the neck, it would be prudent to use a reinforced flexible tracheal tube to avoid intraoperative kinking. Also, a flexible tracheal tube is easier than a PVC tube to pass over the fibrescope inserted into the trachea as a flexible tube can change its direction more easily to follow the curve of the fibrescope.\(^2\)

The kinking typically occurs where the cuff line exits, 18 cm from the tube tip,\(^3\) as was seen in the present case. Kinking of the tracheal tube has been described previously.\(^4,5\) We did not administer neuromuscular blocking agent (NMBA) until after the kink had been identified and corrected. PVC tubes are thermosensitive and soften at body temperature, and kinking may occur at low angles.\(^6\) Administration of NMBA could have converted a partial airway obstruction to a complete obstruction because of abolition of oropharyngeal muscle tone.

To summarise, some of the key points important for the management of a patient with a difficult airway due to PBC neck are: 1) kinking of PVC tracheal tube can take place at the naso- or oro-pharyngeal level because of the acute flexion deformity; 2) a kinked tracheal tube can mimic bronchospasm; 3) use of flexible reinforced tracheal tube should be considered in patients with severe contracture neck with acute fixed flexion neck deformity; 4) NMBA should not be administered if tracheal tube kink or obstruction is suspected; and 5) the importance of checking the breathing circuit and monitoring equipment for proper functioning prior to every patient with a difficult airway is emphasised.

**Smita Prakash, Amitabh Kumar, Meenakshi Kumar, Anoop R Gogia**

Department of Anaesthesia and Intensive Care, Vardhman Mahavir Medical College and Safdarjang Hospital, New Delhi, India

**Address for correspondence:**
Dr. Smita Prakash,
C 17 HUDCO Place, New Delhi, India.
E-mail: drsunilprakash@gmail.com

---

**REFERENCES**

1. Looseley A. Management of bronchospasm during general anaesthesia. Update in Anaesthesia. 27,1; 2011:17-21. Available from: http://www.anaesthesiologists.org/. [Last accessed on 2012 Dec 18].
2. Asai T, Shingu K. Difficulty in advancing a tracheal tube over a fibreoptic bronchoscope: Incidence, causes and solutions. Br J Anaesth 2004;92:870-81.
3. Hubler M, Petrasch F. Intraoperative kinking of polyvinyl endotracheal tubes. Anesth Analg 2006;103:1601-2.
4. Niu HH, Ho CT, Tsai PS. Successful detection and management of unexpected endotracheal tube kinking during neurosurgery--a case report. Acta Anaesthesiol Taiwan 2004;42:119-23.
5. Hariharan U, Garg R, Sood R, Goel SR. Intraoperative kinking of the intraoral portion of an endotracheal tube. J Anaesthesiol Clin Pharmacol 2011;27:290-1.