A severed endotracheal tube and potential airway catastrophe during LeFort osteotomy—can we prevent this?

Preeta George, MBBS, MD, John E. Fiodjoe, MD, Mohamed A. Rehman, MD, Allan F. Simpao, MD
Department of Anesthesiology and Critical Care Medicine, Perelman School of Medicine
The University of Pennsylvania and The Children’s Hospital of Philadelphia, Philadelphia, PA

Summary
Endotracheal tube (ETT) damage is a well-known complication of LeFort-1 advancement
ETT damage may result in head-position-dependent ventilation changes
Reasons to perform sterile airway exchange
   • Aspiration risk
   • Inadequate ventilation
   • Increased risk of airway fire due to fresh gas flow leakage
Emergency airway equipment should be readily available

Intraoperative Management
A 19-year-old 55-kg male with mid-face hypoplasia was scheduled for LeFort-1 advancement with bilateral malar osteotomies. Anesthetic induction was uneventful. Four attempts were required to secure a cuffed nasal endotracheal tube due to difficult airway anatomy.

One hour after incision, during the left maxillotomy, the sounds of the osteotome cutting through bone ceased and the surgeon expressed concern that the endotracheal tube had been damaged due to gas leakage noted in the nasopharynx. The patient’s vital signs, flow-volume loops and capnograph appeared stable, so the procedure resumed. Several minutes later, the ventilator’s circuit leak alarm sounded, the tidal volumes decreased from 400mL to 100mL, and the flow-volume loops indicated a large circuit leak. The capnograph waveform was nearly nonexistent and the surgeon noted bubbles in the right nares. Gas flows were increased to compensate for the leak.

It was noted by the anesthesia team that the patient’s head had been turned approximately 15 degrees off of midline following the initial suspicion of tube damage. The surgeon restored the patient’s head to the midline position, at which point the leak resolved and the tidal volumes returned to baseline values.

Discussion
This case demonstrates a rare, potentially catastrophic airway complication whose mechanism has been illustrated by Thyme, et al. (Figure 2). To avoid the complications, intubation should occur via the contralateral nares for a unilateral maxillotomy.

In this situation, the decision whether or not to re-secure the airway with a new one presents a dilemma. Aspiration risk, inadequate ventilation, and increased risk of airway fire due to fresh gas flow leakage warrant tube exchange, which should be performed using an airway exchanger while maintaining the sterile operative field. One may also perform a fiberoptic exam of the tube using a sterile endoscope. Emergency airway equipment should be available, as a cut tube may hook onto bone edges that impede withdrawal.

Tube exchange was achieved in this case due to multiple reasons: the initial difficulty with nasal intubation, the extensive sterile field, the fractured maxilla and subsequent airway distortion, and the risk of catching the severed end of the tube on bone edges. One potential method to minimize this risk in the future is to use radiographic techniques to identify when the osteotomy is in close proximity to the endotracheal tube.

Intraoperative Management (cont.)
The anesthesia team postulated that the surgeon had indeed cut the endotracheal tube, resulting in an aperture that opened whenever the head was positioned away from the opening (i.e. to the patient’s right side). The concerns were discussed with the surgical team who kept the head midline as much as possible for the procedure.

The surgeons were made aware of the risks of the cut tube and the backup plan, which included emergency airway equipment in the room and preparation for an urgent tracheostomy. The case proceeded without further complications and extubation was uneventful. Inspection of the endotracheal tube revealed that the endotracheal tube had been cut and the pilot tube had been severed completely. (Figure 1)

References