

# USE OF AIRWAY EXCHANGE CATHETER FOR BRONCHOSCOPY OF A PATIENT WITH DOWN'S SYNDROME

AYŞE KARCI\*, SEDEN DURU\*\*,  
ELVAN ÖÇMEN\*\* AND VOLKAN KARAÇAM\*\*\*

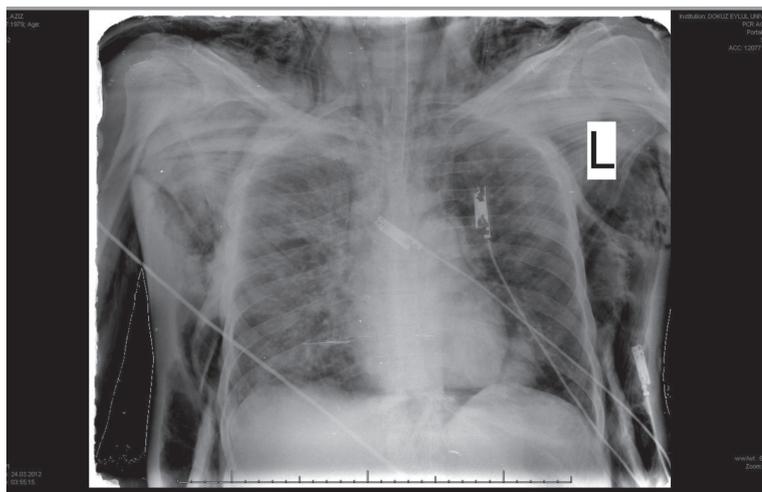
Tracheobronchial injuries (TBI) are highly fatal, and early diagnosis and repair are crucial for survival.<sup>1-3</sup> The anesthesiologist and the surgeon must secure the integrity and patency of the airway for these cases. These injuries remain infrequent, and are becoming less fatal due to the availability of the resources necessary to achieve a secure airway, and thus some of them can be managed conservatively.<sup>4</sup> We report an unusual case of upper airway compromise and extensive subcutaneous emphysema due to traumatic bronchial rupture and its conservative repair in a patient with Down's syndrome.

**Conflict of interest:** The authors declare that they have no conflicts of interest to disclose.

## Case Presentation

A 33-year-old, 120 kg man with Down's syndrome presented to the Emergency Department with dyspnoea and cough which began while he was having his meal. Radiography and computed tomography of the chest showed a foreign body present in the left lung. On examination he was tachypneic with severe suprasternal retractions and subcutaneous emphysema of face, chest wall, axillae, and back which was thought to be caused by the massive air leak due to the foreign body. Upon development of severe respiratory distress and subcutaneous emphysema, he was intubated and mechanically ventilated while taken to the operating room for bronchoscopy. (Fig. 1)

*Fig. 1*  
*Posteroanterior chest*  
*radiograph of the patient with*  
*subcutaneous emphysema*  
*due to rupture of left main*  
*bronchus*



\* Associate Professor, Department of Anesthesiology and Reanimation, Dokuz Eylül University, School of Medicine, İzmir, Turkey.

\*\* Consultant Doctor, Department of Anesthesiology and Reanimation, Dokuz Eylül University, School of Medicine, İzmir, Turkey.

\*\*\* Consultant Doctor, Department of Thoracic Surgery, Dokuz Eylül University, School of Medicine, İzmir, Turkey.

**Corresponding author:** Ayşe Karci, Dokuz Eylül Üniversitesi Tıp Fakültesi Hastanesi Anesteziyoloji ve Reanimasyon Anabilim Dalı, İnciraltı, İZMİR. Tel: +90 232 412 28 01; E-mail addresses: ayse.karci@deu.edu.tr

In addition to massive subcutaneous emphysema in the face, neck and anterior chest, the tongue was severely swollen and laryngoscopic view (as far as it could be performed) revealed that the edema was not limited to the tongue and the lips, but the oral cavity was also involved. Therefore, extubation of the patient was deemed potentially hazardous (Fig. 2). Since emphysema had progressed rapidly following endotracheal intubation and mechanical ventilation, the patient was suspected of having sustained a tracheal injury due to the foreign body. Bronchoscopy was required for removal of the foreign body and also for the diagnosis and treatment of the suspected rupture. The only surgical indication for repairing the laceration was the reluctance to extubate the patient and the surgeon's first choice was conservative treatment. The decision was to use an airway exchange catheter, which has a high success rate when used as a guide for re-intubation, but has not been reported for extubation before bronchoscopy.

Fig. 2

*Extensive swelling of the tongue and subcutaneous emphysema of the neck and the anterior chest*

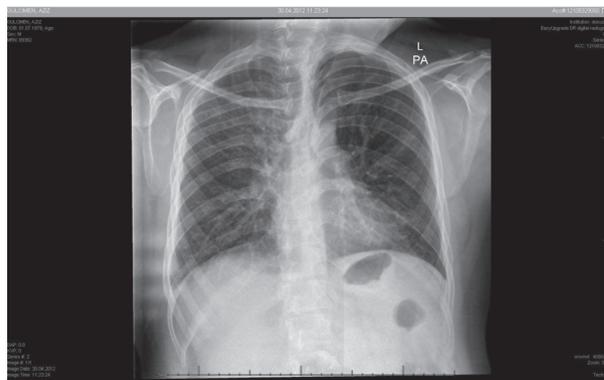


An 14-F airway exchange catheter (AEC) 83-cm long, with an outer diameter of 6.5-mm was introduced through the endotracheal tube before the tube was removed, and was left *in situ* during bronchoscopy. Using a rigid bronchoscope, a chicken bone about 4 cm long was extracted from the distal part of the left main bronchus. The bronchoscopic view showed a tear just above the level where the chicken bones was located. The bronchial rupture was endoscopically treated using fibrin glue.

On the second postoperative day, the patient was extubated without any complications when the standard extubation criteria were met, and when the patient was conscious, hemodynamically stable, and could protect and clear the airway. Furthermore, the subcutaneous edema had disappeared. (Fig 3)

Fig. 3

*Posteroanterior chest radiograph of the patient soon after extubation*



## Discussion

Tracheal injuries are rare events and their management requires a fast and straightforward diagnostic evaluation. They are not diagnosed immediately in 25-68% of the cases but tachypnoea and subcutaneous emphysema are frequent physical findings and can alert the physician for diagnosis. Although it is commonly agreed that posttraumatic injuries require surgical intervention the management of iatrogenic injuries is presently shifting towards a more conservative treatment. For both urgent bronchoscopy and re-intubation, maintaining a continuous access to the airway following extubation was mandatory in our case, presented above. A compromised airway such as this presents an uncommon diagnostic and surgical challenge to the anesthesiologist and the surgeon<sup>5</sup>.

Cassada et al.<sup>1</sup> reported that independent of mechanism or anatomic location of injury, delay in the diagnosis of injuries to the trachea and major bronchi was the most important prognostic factor for postoperative morbidity in foreign body aspirations causing rupture in respiratory tract. Since the patient was intubated when he was brought to the operating room, extubation should be performed as soon as

possible to enable bronchoscopy for diagnosis.

The American Society of Anesthesiologists Task Force on the Management of the Difficult Airway recommends consideration of placement of a stylet prior extubating the difficult airway, to facilitate re-intubation if necessary, and also to allow ventilation<sup>6</sup>. Airway exchange catheters (AEC) are long, thin hollow tubes which have distal terminal and side holes for ventilating the patient and are supplied with removable 15-mm connectors that are compatible with the anesthetic circuit<sup>5</sup>. Continuous access to the airway via an AEC seemed to be the only safe extubation strategy for this patient with Down's syndrome. Maintaining a conduit within the trachea that affords the ability to resecure the airway and ventilate the patient was the planned extubation strategy.

A prospective analysis by Mort<sup>8</sup> supports the concept of an AEC-facilitated extubation strategy. In the analysis, the benefit of airway exchange catheters was demonstrated in selected patients, but its use in patients with Down's syndrome and airway deterioration has not been mentioned.

Previous investigators who incorporated an airway 11F (3.7 mm ED) catheter for securing the airway in difficult extubation patients, have reported that it is well tolerated<sup>7,9</sup>. The larger sized AEC, the 14F (4.7 mm ED) which has not been previously reported for difficult extubation patient, have been found to be useful for maintaining access to the airway and re-intubating the trachea. The larger sized AEC

was preferred for this case because, first, it can be used as a stylet for tracheal re-intubation; second, we wanted a larger diameter, in case we would use the ventilator port of the airway exchanger catheter to ventilate the patient.

The presence of the AEC to assist in re-intubating the trachea is a major step toward improving safety in patients whose re-intubation was considered a risk. In addition to the use of an AEC for a difficult extubation and bronchoscopy in a patient with Down's syndrome, this case presents a conservative approach to tracheobronchial injuries. When Lampl et al.<sup>10</sup> presented their experience for the first time in 1994, hardly anyone appeared to be convinced about the advantages of this procedure. Later on, the effects of conservative treatment of tracheal lacerations were confirmed by Ross<sup>11</sup> and Molins<sup>12</sup>. Non-operative management of TBIs should be reserved for patients with small laceration of the membranous tracheal wall (<2 cm) and in severely injured patients with a high operative risk<sup>13</sup>. However recently, Gómez-Caro et al.<sup>14</sup> have stated that conservative treatment for tracheobronchial injuries is effective regardless of the mechanism of production, length, or site of injury. Conservative treatment should be carefully assessed in patients who meet strict selection criteria.

This case reconfirms that the AEC is an efficient method of maintaining continuous access to the airway after extubation, as it potentially offers a clinically valuable conduit for both bronchoscopy and re-intubation in difficult airways.

## References

1. CASSADA DC, MUNYIKWA MP, MONIZ MP, DIETER RA, SCHUCHMANN GF, ENDERSON BL: Acute injuries of the trachea and major bronchi: Importance of early diagnosis. *Ann Thorac Surg*; 2000, 69:1563.
2. BENFIELD JR: Traumatic bronchial rupture and other major thoracic injuries. *Ann Thorac Surg*; 1990, 50:523.
3. KOLETIS E, PROKAKIS C, BALTAYIANNIS N, APOSTOLAKIS E, CHATZIMICHALIS A, DOUGENIS D: Surgical decision making in tracheobronchial injuries on the basis of clinical evidences and the injury's anatomical setting: A retrospective analysis. *Injury Int J Care*; 2012, 43:1437.
4. JOUGON J, BALLESTER M, CHOUKROUN E, ET AL: Conservative treatment of postintubation tracheobronchial rupture. *Ann Thorac Surg*; 2000, 69:216, 2000.
5. POPAT M, MITCHELL V, DRAVID R, PATEL A, SWAMPILLAI C, HIGGS A: Difficult Airway Society Guidelines for the management of tracheal extubation. *Anaesthesia*; 2012, 67:318.
6. CAPLAN RA, BENUMOF JL, BERRY FA, ET AL: the American Society of Anesthesiologists Task Force on Difficult Airway Management. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology*; 2003, 98:1269.
7. BIRO P, PRIEBE HJ: Staged extubation strategy: Is an Airway Exchange Catheter the Answer? *International Anesthesia Research Society*; 2007, 105:1182.
8. MORT TC: Continuous airway access for the difficult extubation: the efficacy of the airway exchange catheter. *Anesth Analg*; 2007, 105:1357.
9. COOPER RM: The use of an endotracheal ventilation catheter in the management of difficult extubations. *Can J Anaesth*; 1996, 43:90.
10. LAMPL L: Tracheobronchial injuries. Conservative treatment. *Interactive Cardiovascular and Thoracic Surgery*; 2004, 3:401.
11. ROSS HM, GRANT FJ, WILSON RS, BURT ME: Nonoperative management of tracheal laceration during endotracheal intubation. *Ann Thorac Surg*; 1997, 63:240.
12. MOLINS L, BUITRAGO LJ, VIDAL G: Conservative treatment of tracheal lacerations secondary to endotracheal intubation. *Ann Thorac Surg*; 1997, 64:240.
13. WARWICK HS, BUSH W, NORTHROP C: Traumatic bronchial rupture. *AJR*; 1980, 134:1189.
14. GÓMEZ-CARO A, AUSÍN P, MORADIELLOS FJ, DÍAZ-HELLÍN V, LARRÚ E, PÉREZ JA, DE NICOLÁS JL: Role of conservative medical management of tracheobronchial injuries. *J Trauma*; 2006, 61:1426.