Case Report

Is tracheostomy suitable for securing airway after facial firearm injuries?

Derinoz Oksan, Belen F. Burcu, Yilmaz Sebahat

Department of Pediatrics, Medical Faculty of Gazi University, Turkey (Oksan D, Burcu BF); Department of Pediatrics, Dr. Sami Ulus Children's Health and Disease Education and Research Hospital, Ankara, Turkey (Sebahat Y)

Corresponding Author: Oksan Derinoz, Email: oderinoz@gazi.edu.tr

BACKGROUND: Head and neck region have many vital structures, and facial firearm injuries (FFIs) more likely lead to life-threatening situations than other body injuries. These injuries have high potential of airway compromise associated with significant morbidity and mortality.

METHODS: We describe an 11-year-old boy who had received tracheostomy after a FFI complicated with pneumothorax and subcutaneous emphysema 8 hours after the procedure. The patient was treated at the Department of Emergency and Critical Care, Gazi University School of Medicine, Turkey.

RESULTS: The patient was discharged without any complications from the Critical Care Unit after treatment for five days.

CONCLUSIONS: Airway management is of utmost importance in resuscitation of FFI, but it is always difficult to secure via the orotracheal route due to the deformed facial structures. Tracheostomy is an option for airway management in FFI affecting head and neck region. However, tracheostomy may be associated with life-threatening complications, which should be closely monitored with early intervention.

KEY WORDS: Airway obstruction; Emphysema; Firearms; Pediatrics; Tracheostomy

World J Emerg Med 2011;2(4):307-309
DOI: 10.5847/wjem.j.1920-8642.2011.04.012

INTRODUCTION

Head and neck region have many vital anatomical structures, and firearm injuries to this region usually cause more life-threatening conditions than those to other regions. More importantly, injuries of this region have high potential of airway compromise. Tracheostomy for facial firearm injury (FFI) is difficult to obtain an intubation via orotracheal route because of bleeding and distortion of facial structures or possible swelling that could obstruct the airway. Hence tracheostomy may cause life-threatening complications and it should be performed with caution.^[1]

Here, we present an 11-year-old boy who underwent tracheostomy after a facial firearm injury complicated with pneumothorax and subcutaneous emphysema 8

hours after the procedure.

Case report

The boy who had a FFI while playing with his father's gun was transferred from a local hospital to our pediatric emergency department for the trauma management and the anticipated need of reconstructive surgery. Before the inter-hospital transfer, he was stabilized with airway secured by tracheostomy and circulation support with intravenous fluid infusion and packed red blood cells transfusion (2 units). His condition was stable with uneventful inter-hospital transfer. No chest X-ray was performed before and after tracheostomy and the patient was subsequently transferred to our department.

On arrival to our department, the patient was conscious with an open airway. His blood pressure was 100/80 mmHg, pulse 90/minutes, respiratory rate 15/minutes (spontaneous breathing through tracheostomy), temperature 36.5 °C, oxygen saturation 95% with room air, and Glasgow Coma Score 15. There was significant tissue loss on the right lower face with a tracheostomy cannula on the anterior neck (Figure 1). His tongue was edematous. Examination of the respiratory system was normal. Intravenous antibiotics (Cefazoline; 50 mg/kg per 24 hr ÷ Q8 hr IV) and tetanus immunization with ATT (dT) vaccine were given as he came from a rural area without knowledge on his vaccination status. Baseline laboratory tests results and chest X-ray were normal. Plain CT of the face showed corpus fracture of the right mandible. Respiratory distress and hypotension developed within few hours after admission. He had desaturation to 90%-92% with room air during CT

Figure 1. Photo showed significant tissue loss at the right side of the face. The patient had a cannula at the neck during tracheostomy.

Figure 2. Chest radiograph showed the right side pneumothorax, with a tracheostomy tube, atelectasis on the left hemithorax (black arrow), and subcutaneous emphysema at the left chest wall (white arrow).

scanning. Auscultation of the chest showed reduced air entry. The right hemi-thorax crepitus was palpable over the left chest wall from the neck to umbilical regions. The patient developed hypotension and required resuscitation. His vital signs deteriorated to a respiratory rate of 30/minutes, a pulse rate of 122/minutes and blood pressure of 80/40 mmHg. He was suspected to have tension pneumothorax, and urgent needle decompression and fluid resuscitation with normal saline 20 mL/kg were prescribed. Repeated chest X-ray examination showed pneumothorax on the right hemithorax and subcutaneous emphysema on the left chest (Figure 2). A chest tube was inserted and connected to the underwater seal drainage for three days. Subsequently respiratory distress of the patient was improved. He was discharged from the hospital 5 days after admission to our department.

DISCUSSION

Airway compromise is life-threatening in patients with FFI.^[2] Dolin et al^[3] reported that 35% of patients with FFIs required urgent airway control in emergency department. The treatment of FFIs adheres to the basics of trauma resuscitation, but emphasis should be given to the management of the airway in patients with firearm injuries. In these patients, tracheostomy is difficult to obtain an orotracheal route because of bleeding and distortion of facial structures or subsequent swelling.^[1] Once the airway is controlled, resuscitation should be followed.

Tracheostomy is performed for various reasons such as complications including bleeding, pneumomediastinum and pneumothorax, anatomic injury, infection, subcutaneous emphysema, and displacement and blockage of the tracheostomy tube.^[4]

There are different complications associated with tracheostomy. Colman et al^[5] reported that the incidence of early complications (before 7 days) after tracheostomy was 11% (19) of 172 patients including 3 patients with accidental decannulation, 2 patients with pneumonia, and 1 patient with false tract formation. Tracheitis and granulation tissue as late (after 7 days) complications were seen in 77.3% of the patients. Pneumomediastinum, pneumothorax and emphysema as early complications were found in 43% of the patients aged more than 12 months. The overall incidence of early complications ranged from 5 % to 15.5%.^[6, 7]

The pleural apex is higher in children than in adults. It may extend up to the lower neck. Damage to the cervical pleura may result in pneumothorax

or pneumomediastinum. Pneumomediastinum and small pneumothoraces are likely to be resolved and can be followed up without intervention, whereas larger pneumothoraces require insertion of a chest drainage. Subcutaneous emphysema may occur during tracheostomy. It rarely occurs following oral and nasal surgery or maxillofacial trauma.^[4, 8]

In our patient, tracheostomy was performed at a local hospital before he was transferred to our clinic. We did not have any information about his CXRs before and after surgical procedure, but his CXRs in our clinic were normal. He was hemodynamically stabilized at admission; but his clinical condition deteriorated subsequently. A study showed that CXR after tracheostomy may be unnecessary with the use of flexible endoscopy.^[9] In our clinic, we routinely obtain CXR after insertion of a tracheostomy cannula to check its position. In our patient a normal CXR was insufficient to foresee any early complication and close monitoring is needed to identify potential complications and therefore to offer immediate intervention.

In conclusion, tracheostomy is an option for the management of the airway in patients with firearm injuries to the head and neck region. To detect early complications and to confirm the correct position of a tube, we recommend postoperative CXR. Moreover, close monitoring of vital signs is required to identify potential complications.

Funding: None.

Ethical approval: Not needed.

Conflicts of interest: The authors declare that there is no conflict of interest.

Contributors: Oksan D proposed the study and wrote the paper. All authors contributed to the design and interpretation of the study and to further drafts.

REFERENCES

- 1 Hollier L, Grantcharova EP, Kattash M. Facial gunshot wounds: A 4-year experience. *J Oral Maxillofac Surg* 2001; 59: 277-282.
- 2 Demetriades D, Chahwan S, Gomez H, Falabella A, Velmahos G, Yamashita D. Initial evaluation and management of gunshot wounds to the face. *J Trauma* 1998; 45: 39-41.
- 3 Dolin J, Scalea T, Mannor L, Sclafani S, Trooskin S. The management of gunshot wounds to the face. *J Trauma* 1992; 33: 508-515.
- 4 Cochrane LA, Bailey CM. Surgical aspect of tracheostomy in children. *Paediatr Respir Rev* 2006; 7: 169-174.
- 5 Colman KL, Mandell DL, Simons JP. Impact of stoma maturation on pediatric tracheostomy-related complications. *Arch Otolaryngol Head Neck Surg* 2010; 136: 471-474.
- 6 Tantiniorn W, Alper CM, Bluestone CD, Casselbrant ML. Outcome in pediatric tracheotomy. *Am J Otolaryngol* 2003; 24: 131-137.
- 7 Carr MM, Poje CP, Kingston L, Kielma D, Heard C. Complication in pediatric tracheostomies. *Laryngoscope* 2001; 111: 1925-1928.
- 8 Bildik F, Baydin A, Doğanay Z, Nural MS, Deniz T, Güven H. Subcutaneous emphysema of the face, neck and upper mediastinum following a minor maxillofacial trauma. *Ulus Travma Acil Cerrahi Derg* 2007; 13: 251-253.
- 9 Darden D, Towbin R, Dohar JE. Pediatric tracheostomy: is postoperative chest X- ray necessary? *Ann Otol Rhinol Laryngol* 2001; 110: 345-348.

Received July 6, 2011

Accepted after revision November 11, 2011