

Complete cervical tracheal transection caused by blunt neck trauma: Case report

Jin Hui Paik, M.D.,¹ Jeong-seok Choi, M.D.,² Seung Baik Han, M.D.,¹
Hyun Min Jung, M.D.,¹ Ji Hye Kim, M.D.¹

¹Department of Emergency Medicine, College of Medicine, Inha University, Incheon, South Korea;

²Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Inha University, Incheon, South Korea

ABSTRACT

This study aimed to report the survival of a rare case of complete tracheal transection followed by blunt neck trauma. A 66-year-old man was presented in the emergency room after a motorcycle accident in which a rope was wrapped around his neck. Although alert, he was in respiratory distress. A computed tomographic scan showed transection of the cervical trachea. Emergency neck exploration revealed that the tracheal laceration had been cut from the tracheal anterior third ring to the posterior first ring and the anterior esophageal wall had ruptured. Laryngectomy, tracheostomy, and esophagopharyngeal anastomosis were performed. Prompt airway management and immediate neck exploration is important for survival in these cases.

Key words: Blunt injuries; rupture; trachea.

INTRODUCTION

Traumatic tracheal injury after blunt neck trauma is rare; however, most patients with complete tracheal transection usually die at the scene due to loss of airway.^[1] The few, who survive and arrive at a hospital, pose a diagnostic and therapeutic challenge to the trauma team. These patients may suffer fatal outcomes when misdiagnosed or long-term complications, if treated improperly.^[2] Early diagnosis and treatment of tracheal injuries lead to the best outcome. Nevertheless, emergency physicians have limited experience in these cases and have reached no consensus on its management.^[3]

In this paper, our experience with one survivor of complete cervical tracheal transection caused by blunt neck trauma

combined with esophageal rupture and review of the relevant medical literature were reported.

CASE REPORT

A 66-year-old man was presented in the emergency room after a motorcycle accident in which a rope was wrapped around his neck. Although alert, he was in respiratory distress. His motor and sensory neurologic signs were normal. He had neck fluctuation on breathing and initial pulse oximetry saturation (SpO₂) was 93%. The vital signs included a blood pressure of 134/80 mmHg, a heart rate of 102 beats/min, a respiratory rate of 22 breaths/min, and an axillary temperature of 36.2°C. Significant crepitus was noted on his neck area. Massive subcutaneous emphysema was present on a lateral cervical spine radiograph and pneumomediastinum was seen on a supine chest radiograph (Fig. 1). Fiber optic bronchoscopy guided endotracheal intubation was planned; however, 10 minutes after the patient's arrival in the emergency room, he showed agitation, cyanotic change, and a decrease in SpO₂ at 81%. Despite aggressive and effective ambu-bagging with manual airway maintenance, SpO₂ did not increase. Therefore, urgent orotracheal intubation was done. There was large amount of blood in the mouth and the right epiglottic area was swollen. His SpO₂ increased to 98% after orotracheal intubation. Computed tomographic scan (CT) of the neck and chest revealed transection of the cervical trachea above the thoracic inlet, pneumomediastinum, and sub-

Address for correspondence: Ji Hye Kim, M.D.

Department of Emergency Medicine, College of Medicine, Inha University, 7-206, Sinheung-dong 3 ga, Jung-Gu, Incheon, South Korea. 400-711 Incheon - South Korea

Tel: +82 32 890 2310 E-mail: jihye@inha.ac.kr

Qucik Response Code



Ulus Travma Acil Cerrahi Derg
2014;20(6):459-462
doi: 10.5505/tjtes.2014.32744

Copyright 2014
TJTES

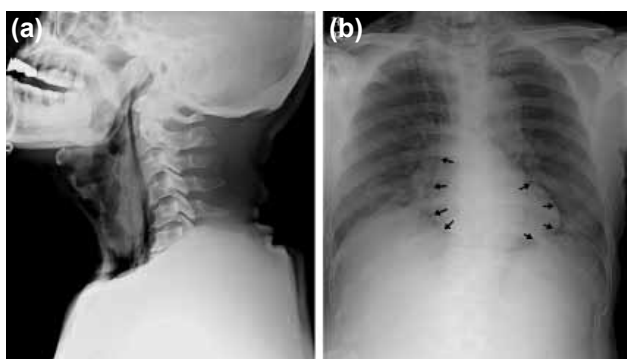


Figure 1. (a) Lateral cervical spine radiograph showing massive subcutaneous emphysema. (b) Supine chest radiograph showing pneumomediastinum (arrows).

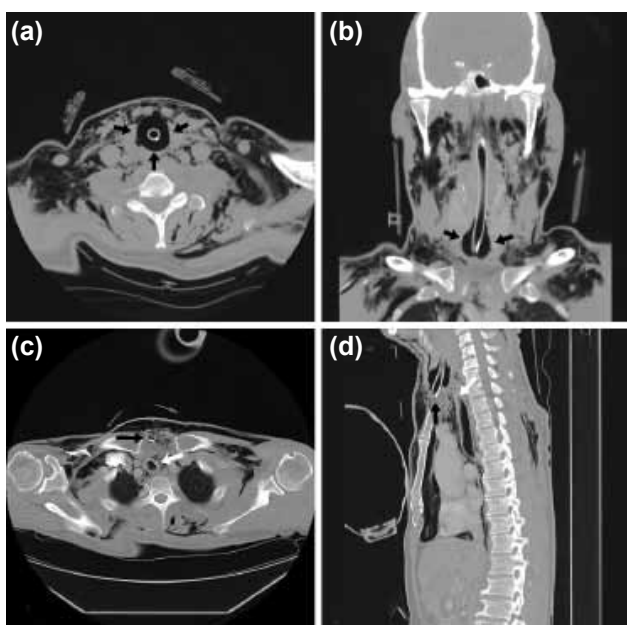


Figure 2. CT scan showing transection of the cervical trachea above the thoracic inlet. (a) Axial CT image of the neck showing over-distension of the endotracheal tube cuff (black arrows). (b) Coronal CT image of the neck showing over-distension of the endotracheal tube cuff (black arrows). (c) Axial CT image of the chest showing the endotracheal tube tip in the upper anterior chest wall, suprasternal notch level (black arrow) and thoracic trachea (white arrow). (d) Sagittal CT image of the chest showing the endotracheal tube tip in the upper anterior chest wall, suprasternal notch level (black arrow) and thoracic trachea (white arrow).

cutaneous emphysema in the chest wall and lower neck (Fig. 2). Routine blood samples taken on admission showed a leukocytosis of 12.450/microliters, hemoglobin concentration of 14.4 g/dl, hematocrit of 41.7%, and C-reactive protein of 0.04 mg/dl. The results of the blood chemistry were as follows: serum glucose 170 mg/dL, BUN 20.7 mg/dL, creatinine 0.86 mg/dL, albumin 3.7 g/dL, creatine phosphokinase 320 IU/L, and LDH 244 IU/L. The serum electrolytes and blood gas parameters were as follows: sodium 138 mEq/L, potassium 3.6 mEq/L, chloride 104 mEq/L, pH 7.37, paCO_2 46.3 mmHg, paO_2 36.4 mmHg, and bicarbonate 26.3 mmol/L in room air.

Approximately 90 minutes after arrival in the emergency room, neck exploration was performed by an otorhinolaryngology surgeon. Apron incision was done and subplasty flap was made from hyoid bone level to substernal notch level. The tracheal laceration had been cut from the tracheal anterior third ring to the posterior first ring (Fig. 3). Urgently, endotracheal tube insertion was done at the lower part of lacerated trachea. Exposed larynx showed frangibility with esophageal rupture. Thus, total laryngectomy was performed, and closed thoracostomy was carried out for right pneumothorax. Esophagopharyngeal anastomosis was conducted by thoracic surgeon for esophageal rupture, which was pedunculated on the anterior wall; the posterior wall was intact. The patient was managed postoperatively with pain control and antibiotics. As an abscess formation was found at the left of the tracheostomy site, an iatrogenic fistula formation was made for the pharyngocutaneous fistula. Fistula repair was performed four times during the following one year and fistula recurrence was not reported up to the following next year. The patient is now in tracheostomy state and able to feed orally.

DISCUSSION

The incidence of traumatic tracheal injuries seems to be roughly 0.5% to 2% among individuals sustaining blunt trauma, including blunt trauma to the neck.^[4] Main types of blunt injuries are high-impact blunt compression injuries such as motor vehicles accidents (59%), followed by crush injuries (27%).^[5] In blunt injuries, intrathoracic trachea and main stem bronchi injury account for 62%, cervical trachea 23%, and lobar bronchi 15%.⁵ Most common presentations are respiratory distress, dyspnea, poor gas exchange, and hemoptysis.^[5] Cyanosis and serious respiratory embarrassment is present in 30% of the cases. Another common symptom is hoarseness or dysphonia, occurring in 46% of the patients.^[4] The most common signs of airway injury reported in most series are subcutaneous emphysema (35%-85%), pneumothorax

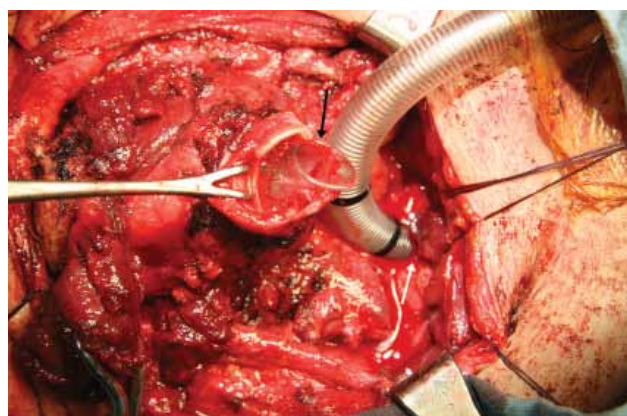


Figure 3. The tracheal laceration had been cut from the tracheal anterior third ring to the posterior first ring. Orally intubated endotracheal tube tip was placed in out of trachea (black arrow). Endotracheal tube was inserted at lower part of completely transected trachea (white arrow).

(20%-50%), and hemoptysis (14%-25%); however, the lack of specificity and the occult nature of the injury frequently result in a delayed diagnosis.^[6]

Deep cervical emphysema and pneumomediastinum are seen in 60% of the patients with tracheobronchial injuries.^[4,7,8] Blunt trauma is often associated with multiple injuries involving not only the chest, but also the abdomen, head, and orthopedic structures.^[4,9] Cervical trauma of the airway frequently involves the esophagus, recurrent laryngeal nerves, cervical spine and spinal cord, larynx, and carotid arteries and jugular veins.^[4] Combined transection of the cervical trachea and esophagus, as a result of blunt trauma, is a rare injury accounting for less than 1% of trauma cases seen in major centers.^[10]

Many tracheobronchial injuries are not diagnosed immediately (25-68%). Delayed diagnosis is more commonly seen with left-sided injuries.^[5,8] Physicians need to maintain a high index of suspicion related to nonspecific signs such as dyspnea, cough, subcutaneous emphysema, and hemoptysis.^[11] The mechanism of injury, vocal changes, and rapidly expanding subcutaneous emphysema in the neck are important clues.^[11] Clinical examination is followed by radiologic imaging, angiography, computed tomography, and tracheo-bronchioesophagoscopy.^[12]

Accurate interpretation of the chest radiograph is essential in the early diagnosis of occult upper-airway injury.^[13] The preponderant findings on chest radiograph include subcutaneous emphysema, pneumomediastinum, pneumothorax, and air surrounding the mainstem bronchi.^[13] The best diagnostic investigation is bronchoscopy; flexible bronchoscopy should be carried out first to determine the location and extent of the injury.^[5,14-16] However, the bronchoscopic procedure is precarious and characterized by abundant bleeding in the respiratory tract and a rapid drop in arterial oxygen saturation, which are all factors precluding diagnostic confirmation.^[6]

A CT scan can be performed if diagnosis is uncertain on plain films.^[7,11] Preoperative CT can be useful in assessing associated laryngeal injuries or other unsuspected chest injuries that should be dealt with at the time of surgical exploration. CT is contraindicated in hemodynamically unstable trauma patients or patients with unstable airways.^[4] Helical CT with 3D reconstruction should be considered a suitable 'screening' test in a trauma patient suspected of tracheal rupture and may help the clinician in the decision to perform a bronchoscopy on the patient.^[6]

The primary initial goals are stabilization of the airway, reversal of shock, relief of the pneumothorax, and determination of the extent and location of injury.^[4,8] The management of tracheobronchial injuries, depending on the severity, consists of emergency operation in cases of tracheal rupture, hemorrhage or esophageal injury, or of selective operation.

^[12] Patients who show respiratory distress, are unstable hemodynamically, or who have clinical suspicion of an airway injury should be intubated immediately with in-line cervical stabilization, preferably with the guidance of a flexible bronchoscope, as described previously.^[4,11] Airway manipulation can exacerbate a tracheal injury, hence careful orotracheal intubation is considered to be the only option available before transport.^[16]

Debridement and primary repair is the treatment of choice and good postoperative recovery has been reported.^[5] Surgical repair is indicated when a transmural tear longer than 1 cm causes a pneumothorax unrelieved by tube thoracostomy. Complete transection of the trachea should be managed by careful suturing and being cautious to avoid damage to the recurrent laryngeal nerves. While small lacerations have been successfully managed conservatively, primary repair of a tracheobronchial rupture is the treatment of choice.^[8] For most cervical tracheal injuries, urgent tracheostomy is the best method for airway control.^[16] Patients with suspected tracheal injuries, who are clinically stable and oxygenating at greater than 90% SpO₂, should not be intubated and treated only with high flow oxygen. This recommendation may have to be urgently modified in patients presenting with hypovolemic shock or altered mental status from brain injuries.^[13,16] In this case, patient was unstable and unable to maintain airway. Urgent orotracheal intubation was done. Even though the endotracheal tube was placed out of trachea, ventilation and oxygenation was maintained by positive ventilation. As the case stands above, if the patient is unstable, it is our belief that oral intubation should not be delayed and urgent orotracheal intubation must be considered.

The prognosis of the patient is largely dependent on an early diagnosis and good interdisciplinary management.^[12] Prompt airway management and immediate neck exploration is important for survival in these cases.

Conflict of interest: None declared.

REFERENCES

1. Dertsiz L, Arici G, Arslan G, Demircan A. Acute tracheobronchial injuries: early and late term outcomes. *Ulus Travma Acil Cerrahi Derg* 2007;13:128-34.
2. Hamid UI, Jones JM. Combined tracheoesophageal transection after blunt neck trauma. *J Emerg Trauma Shock* 2013;6:117-22. [CrossRef](#)
3. McCrystal DJ, Bond C. Cricotracheal separation: a review and a case with bilateral recovery of recurrent laryngeal nerve function. *J Laryngol Otol* 2006;120:497-501. [CrossRef](#)
4. Karmy-Jones R, Wood DE. Traumatic injury to the trachea and bronchus. *Thorac Surg Clin* 2007;17:35-46. [CrossRef](#)
5. Wong EH, Knight S. Tracheobronchial injuries from blunt trauma. *ANZ J Surg* 2006;76:414-5. [CrossRef](#)
6. Le Guen M, Beigelman C, Bouhemad B, Wenjje Y, Marmion F, Rouby JJ. Chest computed tomography with multiplanar reformatted images for diagnosing traumatic bronchial rupture: a case report. *Crit Care* 2007;11:R94. [CrossRef](#)

7. Hahn B. Tracheobronchial rupture. J Emerg Med 2007;33:193-4. [CrossRef](#)
8. Roxburgh JC. Rupture of the tracheobronchial tree. Thorax 1987;42:681-8.
9. Rossbach MM, Johnson SB, Gomez MA, Sako EY, Miller OL, Calhoun JH. Management of major tracheobronchial injuries: a 28-year experience. Ann Thorac Surg 1998;65:182-6. [CrossRef](#)
10. Hamid UI, McGuigan JA, Jones JM. Transection of the aerodigestive tract after blunt neck trauma. Ann Thorac Surg 2011;92:1896-8. [CrossRef](#)
11. Hsiao SH, Chen BS, Lee TM, Hsu SY, Lai YY. Delayed diagnosis of complete tracheal transection after blunt neck trauma. Tzu Chi Med J 2009;21:77-80. [CrossRef](#)
12. Veit JA, Metternich F. Management of traumatic tracheal injuries: presentation of a rare case and review of the literature. [Article in German] Laryngorhinootologie 2008;87:270-3. [Abstract] [CrossRef](#)
13. Cassada DC, Munyikwa MP, Moniz MP, Dieter RA Jr, Schuchmann GF, Enderson BL. Acute injuries of the trachea and major bronchi: importance of early diagnosis. Ann Thorac Surg 2000;69:1563-7. [CrossRef](#)
14. Baumgartner FJ, Ayres B, Theuer C. Danger of false intubation after traumatic tracheal transection. Ann Thorac Surg 1997;63:227-8. [CrossRef](#)
15. Kaptanoglu M, Dogan K, Nadir A, Gonlugur U, Akkurt I, Seyfikli Z, et al. Tracheobronchial rupture: a considerable risk for young teenagers. Int J Pediatr Otorhinolaryngol 2002;62:123-8. [CrossRef](#)
16. Norwood SH, McAuley CE, Vallina VL, Berne JD, Moore WL. Complete cervical tracheal transection from blunt trauma. J Trauma 2001;51:568-71. [CrossRef](#)

OLGU SUNUMU - ÖZET

Künt boyun travmasının neden olduğu komplet servikal trakeal transeksiyon: Olgu sunumu

Dr. Jin Hui Paik,¹ Dr. Jeong-seok Choi,² Dr. Seung Baik Han,¹ Dr. Hyun Min Jung,¹ Dr. Ji Hye Kim¹

¹Inha Üniversitesi Tıp Fakültesi, Acil Tıp Anabilim Dalı, Incheon, Güney Kore;

²Inha Üniversitesi Tıp Fakültesi, Kulak Burun Boğaz-Baş ve Boyun Cerrahisi Anabilim Dalı, Incheon, Güney Kore

Bu yazıda, künt boyun travması sonrası seyrek görülen ve sağ kalan bir komplet trakeal transeksiyon olgusu sunuldu. Altmış altı yaşında erkek hasta bir motosiklet kazası sonrası, boynunu bir halata kaptırmış vaziyette acil servise getirildi. Bilinci açık olmasına rağmen solunum sıkıntısı çekiyordu. Bilgisayarlı tomografi taraması servikal trakea transeksiyonunu gösteriyordu. Acil boyun eksplorasyonu trakea laserasyonunun trakea anteriorunda 3. halkadan posteriorunda 1. halkaya uzandığını ve ön özofagus duvarının yırtılmış olduğunu gösteriyordu. Larengektomi, trakeostomi ve özofagofarengeal anastomoz yapıldı. Bu olguların sağkalımı için acilen havayolunun açılması ve hemen boyun eksplorasyonu yapılması önemlidir.

Anahtar sözcükler: Künt travmalar; rüptür; trakea.

Ulus Travma Acil Cerrahi Derg 2014;20(6):459-462 doi: 10.5505/tjtes.2014.32744