



What is Key for Early Recognition of Major Upper Airway Disruption after Blunt Neck Trauma? - A Case of Cricotracheal Separation with Abnormal Neck Seesaw Movement

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Abstract

Background: Cricotracheal separation is known as one of fatal laryngotracheal injury. Because of its rarity, we encounter difficulties both diagnosis and management. At the first touch, the patient sometime looks normal regardless of its severity. That is a very dangerous situation. If we overlook this injury, it might be a sudden upper airway obstruction. After diagnosis, we have other difficulties in its management. How we get secure the airway and how we treat it surgically.

Case Presentation: a 36-year-old worker was transferred from a construction site, due to blunt neck trauma. On arrival, his vital signs were almost normal. He could speak without respiratory distress. However, snow-grasping sense and abnormal seesaw movement were observed on his front neck. The neck CT showed massive subcutaneous and anterior mediastinal emphysema which indicated a possibility of upper air way disruption. So, the patient's airway was secured with awake intubation and emergency surgery were done. Intraoperative findings revealed the cricotracheal separation and fractures of the tracheal cartilages. We made a direct anastomosis between cricoid and trachea. Two weeks after surgery, he could discharge without any complications.

Discussion: The reports of cricotracheal separation were rare, but each of them said the difficulty of early recognition because of its initial benign looks. It is common that we notice the seriousness of the matter after CT. To make an early recognition, emphasis should be focused on its mechanism and physical findings.

Conclusion: When we managed blunt neck trauma, we should pay attention to a possibility of upper air way disruption. In such case, to secure the air way is crucial. The history of hard hit and physical finding such as snow-grasping sense and abnormal neck seesaw movement are keys.

Keywords: Abnormal neck seesaw movement; Blunt neck trauma; Cricotracheal separation; Upper airway disruption

Background

Cricotracheal separation related to blunt neck trauma is rare. It is known as a fatal laryngotracheal injury [1,2]. As general upper airway trouble is immediately noticed by anyone who is nearby the

patients because they have obviously respiratory distress. So early recognition is relatively easy. One thing for this special injury is discrepancy between the severity of injury and patient stable condition. Patients often come to an emergency department with good general condition despite the discontinuity of their cricoid cartilage and trachea. Their externally neck is almost intact with minimal bruising and respiratory distress is surprisingly mild

which might be enough a physician to convince “airway is OK!” [3]. In fact, it is a potentially lethal condition led to sudden death, disrupted upper airway might be easy to cause asphyxia at any time. So, early airway management is critical. Because of its rarity, standard surgical management for cricotracheal separation is controversial. Most of previous reports recommend to place tracheostomy at the point of just distal the injury [4]. Here in we present a case of cricotracheal separation due to blunt cervical trauma in which we noticed abnormal seesaw movement on his neck.

Case presentation

A 36-year-old field worker had been injured by an accident during his work. He was an employee at a site of construction. At that day, his task was unloading goods using a wheelbarrow from ground to a truck bed through a wooden board slope which was not fixed with both truck and ground. When he went up the slope, suddenly the wooden board slipped off the edge of the truck bed and he fell from the slope. As his hands tied the grips of wheelbarrow, he could not make an immediate action to protect himself using hands. His front neck was directory hit by the edge of the truck bed. It was assumed that his total wight was on his front neck at that moment. Just after the accident he was brought to our emergency department by an ambulance. On his admission, the vital signs were almost normal. He could speak without any respiratory distress. He complained neck pain and had a bruise on his front neck in which tenderness and snow-grasping sense were observed. At that time, one physician had noticed abnormal seesaw movement on his front neck (denting at inspiration and bulging at expiration) (Figure 1). There was no other injury on physical examination. Since airway was open, no respiratory failure and hemodynamically stable condition, the emergency physician went to CT first to evaluate internal neck injuries. The cervical CT revealed massive subcutaneous and anterior mediastinal emphysema that strongly suggested the presence of major upper airway disruption (Figure 2a). When he returned to emergency room from CT, he had just felt difficulty of breathing. We heard strider without using a stethoscope. His rip color had changed from pink to purple. The pulse oximeter showed decreased the saturation under 80% and it rapidly went down time to time despite of 10L per minute 100% oxygen supply using mask. At first crash awake oral intubation was tried by an emergency physician but failed. Secondary bronchoscope guided intubation was done successfully. After the airway was secured, he was transferred to operating room. Under general anesthesia, collar incision was made, and the neck exploration was done. The cricoid cartilage and trachea were almost completely separated with only

fragile adventitia was connecting both tissues (Figure 2b). Since the first and second tracheal cartilage were severely damaged, we resected them and made a direct anastomosis between cricoid and third trachea. They were approximated with interrupted suture using non-absorbable stich. After the skin was closed, we placed a few stay sutures between his chin and chest to prevent neck extension and disruption of the anastomosis (Figures 3-5). Intratracheal tube was extubated the day after surgery. He did not have hoarseness that revealed he had no recurrent laryngeal nerve palsy. The stay sutures between chin and chest were removed two weeks after surgery, and he could discharge without any major complication.

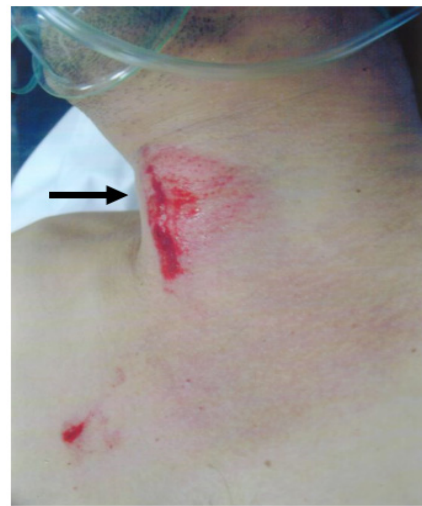


Figure 1: External findings: An arrow showed a bruise of the front neck.



Figure 2: Neck CT findings: Arrows showed massive subcutaneous and anterior mediastinal emphysema.

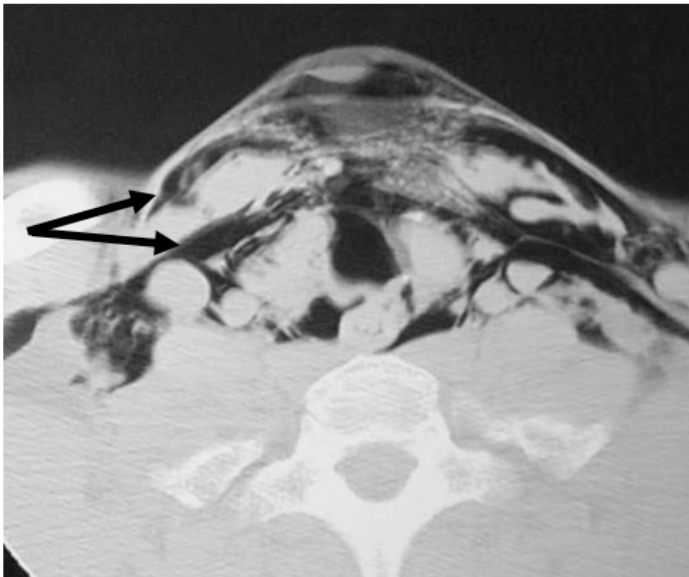


Figure 3: Seesaw movement: His front neck was dented during the inspiration (a) and was bulged during the expiration (b). The dotted line showed the motion.

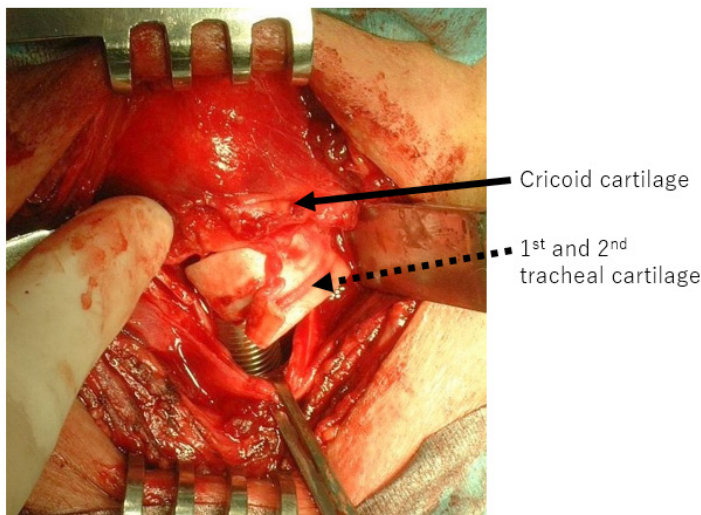


Figure 4: Intraoperative view: Cricoid cartilage and trachea was almost completely separated (solid arrow and dotted arrow). 1st and 2nd tracheal cartilages were also separated which was removed before repair.

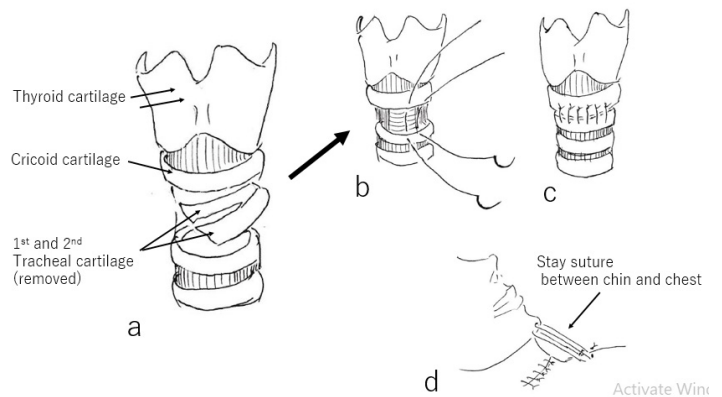


Figure 5: Shema of the surgery. a: before repair, 1st and 2nd cartilage were separated from both cricoid and 3rd trachea. b: Cricoid and 3rd cartilage was approximated with interrupted stich using non-absorbable lines. c: The anastomosis was finished. d: Stay sutures were placed between chin and chest not to extend his neck.

Discussion

Cricotracheal separation is positioned as highest severity of laryngeal trauma in the Schaefer classification [5] (Table 1). The mortality of complete tracheal transection is high as 40% [6]. It was mainly caused by blunt neck trauma. Penetrating injury is much less common. Most of its mechanism is motor vehicle accident (59%) [7]. This is usually occurred when the driver's neck hardly hits the steering wheel or dashboard. However, the number of this type of mechanism is substantial decline, since most of vehicles are equipped airbag recent year. Other mechanism is crush injury during sports such as hockey, basketball or karate [7]. The case of our patient falls into the category of this crush mechanism. It assumed that his front neck hardly hit the edge of the truck bed. One of rare mechanism is hanging. That is limited only survivors whose purpose does not achieve. Reported cases of cricotracheal separation are not so many but authors said all together its difficulty of early recognition. The patients often can speak and have no or minimal respiratory distress. There is a big discrepancy between the severity of injury and benign looks. Since that is blunt trauma, there are no major laceration and usually only slight bruise is seen on the victim's external neck. So, this injury frequently overlooked in the initial management. However, the continuity of cricoid and trachea has been already broken, a catastrophic upper airway obstruction may be triggered anytime anywhere. In

our case, the patient's condition had been drastically changed just after CT. It assumed that various movements with taking CT made an effect to deteriorate his temporary stability. Unfortunately, we could not recognize before CT, but we had noticed snow-grasping sense and abnormal seesaw movement. Especially abnormal seesaw movement is never described in previous reports for this type of injury. It shows that the patient's neck is denting during the inspiration and bulging during the expiration. This characteristic movement suggest the presence of major upper way disruption. To secure the airway many authors recommend bronchoscope guided intubation. Blind oral or nasal intubation is failed to achieve an adequate airway in 76% [8]. Early neck exploration is vital. Regarding the way of repair, authorities recommend making an anastomosis between cricoid and trachea followed to make distal tracheostomy, because recurrent laryngeal nerve injury can be expected in approximately 60% of patients with complete transection of the cervical trachea [1]. Fortunately, we had already checked the patient could speak well without hoarseness before surgery. So, we decided to make a direct anastomosis without tracheostomy. We think it is one option for selected case when we convinced that the patient does not have recurrent laryngeal nerve palsy. To protect early disruption of the anastomosis and keep the patient's neck flexion, stay stiches between chin and chest is mandatory when we do not make a tracheostomy. The optimal duration to keep the stich is unknown, but some author said it can be removed after day7 [9].

Group	Severity of injury
1	Minor endolaryngeal hematomas or lacerations without detectable fractures
2	More severe edema, hematoma, minor mucosal disruption without exposed cartilage, or non-displaced fractures
3	Massive edema, large mucosal lacerations, exposed cartilage, displaced fractures or vocal cord immobility
4	Same as group 3, but more severe with disruption of anterior larynx, unstable fractures, two or more fracture lines, or severe mucosal injuries
5	Complete laryngotracheal separation

Table 1: Schaefer Classification System for determining the severity of laryngeal injuries.

Conclusion

Cricotracheal separation is rare injury as blunt neck trauma. It sometimes missed at initial stage. The emphasis is focused on the taking history of its mechanism and physical examination. We think one of keys for early recognition is abnormal neck seesaw movement along with subcutaneous emphysema. When we noticed theses sings, the first thing to do is to secure the airway.

References

- Chen FH, Fetzer JD (1993) Complete cricotracheal separation and third cervical spinal cord transection following blunt neck trauma: a case report of one survivor. *J Trauma* 35: 140-142.
- Valerio P, Ivan M, Francisco R, Ureña A, Ricard R, et al. (2008) Survival after traumatic complete laryngotracheal transection. *Am J Emerg Med* 26: 837-844.
- Malliari H, Ntasenos E, Chatziavramidis A, Printza A, Konstantinidis I (2014) Cricotracheal separation with multiple cricoid fractures after blunt neck injury: a case report. *Hippokratia* 18: 65-66.
- Hermon A, Segal K, Har-El G, Abraham A, Sidi J (1987) Complete cricotracheal separation following blunt trauma to the neck. *J Trauma* 27: 1365-1367.
- Omakobia E, Micallef A (2016) Approach to the Patient with External Laryngeal Trauma: The Schaefer Classification. *Otolaryngol (Sunnyvale)* 6: 230.
- Ershadi R, Hajipour A, Vakili M (2017) Complete cricotracheal transection due to blunt neck trauma without significant symptoms. *J Surg Case Rep* 2017.
- Kiser AC, O'Brien SM, Detterbeck FC (2001) Blunt tracheobronchial injuries: treatment and outcomes. *Ann Thorac Surg* 71: 2059-2065.
- Reece GP, Shatney CH (1988) Blunt injuries of the cervical trachea: review of 51 patients. *South Med J* 81: 1542-1548.
- Moonsamy P, Sachdeva UM, Morse CR (2018) Management of laryngotracheal trauma. *Ann Cardiothorac Surg* 7: 210-216.