

Case Report

Complete disruption of cervical trachea and esophagus after open injury: a case report and literature review

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Received May 21, 2018; Accepted August 1, 2018; Epub December 15, 2018; Published December 30, 2018

Abstract: Purpose: Complete disruption of the trachea and esophagus is distinctly uncommon and adequate treatment in the setting of trauma has been clinically challenging. Early accurate recognition and appropriate emergency management result in better patient outcomes. Methods: We report a case of complete disruption of cervical trachea and esophagus after open injury, and performed a brief review of the clinical features, diagnostic strategies, and management options of the combined injury. Results: Her remarkable symptoms were bleeding, severe neck pain, and slightly dyspnea. Complete disruption of the cervical trachea and esophagus was explored, then the patient received emergency intubation, tracheotomy, and saturation. Postoperative esophagogram showed no esophageal anastomotic leakage and stenosis. Conclusions: Complete disruption of trachea and esophagus should be treated by surgical intervention with primary repair to avoid the risk of death due to inappropriate treatment and postoperative complications.

Keywords: Open traumatic injury, tracheal disruption, esophageal injury, diagnosis, treatment, repair

Introduction

Open injury to the cervical trachea and esophagus results from a violent impact and excision to the neck, which pushes the trachea and esophagus against to the rigid cervical spine, causes tracheal cartilage and esophageal wall ruptures. This complex injury is rare because of the flexibility of the tracheal cartilages, the esophageal location behind the trachea, and the protection offered by the mandible manubrium of the sternum, clavicles, and cervical spine.

The cervical trachea and esophagus are located deeply in the neck, and are closely associated with the major cervical vessels and nerves, which are also frequently injured in patients with tracheal and esophageal injuries. This rare and serious injury is challenging for diagnosis, and treatment often necessitates a consultation with doctors from multidisciplinary department, including thoracic surgeons, otolaryngologists, and intensivists.

Open cervical injury is more commonly observed than blunt trauma, but aphonia and nons-

pecific symptoms, additionally masked by complaints with other traumas, delays the diagnosis and surgical management. Because post-repair morbidity and mortality are mainly related to anastomotic failures, every single factor should be considered carefully at the time of initial management strategy formulation.

Combined tracheo-oesophageal trauma poses special problems: they are distinctly rare and thus may lead to management errors, they produce unique technical problems and they may lead to complex complications in the remote post-operative period. The aim of this paper was to present a case of complete disruption of cervical trachea and esophagus caused by traumatic injury of flowerpot fragment, and the treatment approach which was applied.

Case report

The patient, a 58-years old female found conscious, was carried to the Emergency Department at night, and was hemodynamically stable. Her front neck tissue was incised by the sharp porcelain fragment. In order to keep the airway unobstructed, the patient had to bow

Complete disruption of cervical trachea and esophagus

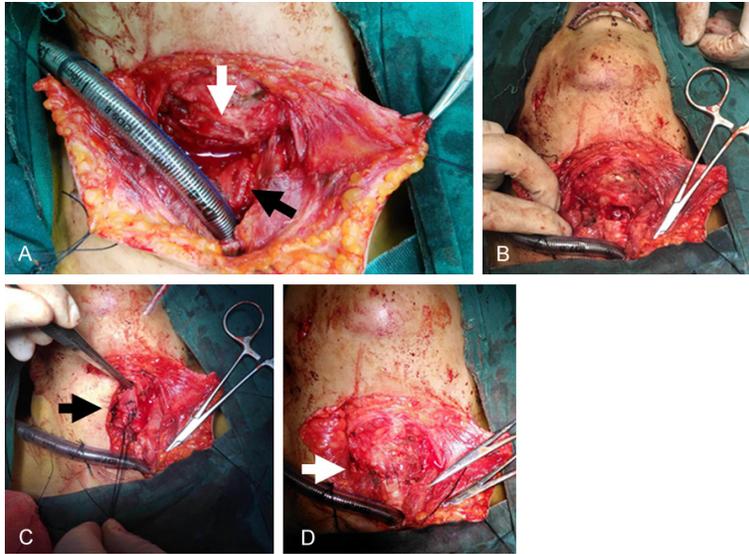


Figure 1. A. Intraoperative view, showing complete disruption of trachea (white arrow) and esophagus (black arrow), and emergency intubation performed in the distal end of trachea for airway patency. B. Primary tracheotomy was performed before sutured trachea and esophagus. C. The esophagus (black arrow) was preferentially sutured with 3/0 mersilk. D. Following repair of the esophagus, the trachea (white arrow) was sutured with 3/0 coated vicryl.

her head to reduce local traumatized tissue tension and neck pain, and prevent the blood from flowing into trachea.

The main symptoms at presentation were severe neck pain, bleeding, and slightly dyspnea. Fortunately, the carotid artery and other vessels were not ruptured, and the patient came to our department for subsequent medical management. No pathological findings were determined from the physical examinations but as the complaints continued, bedside cervical X-ray imaging was applied. Vertebra fractures were not examined.

Complete disruption of cervical trachea and esophagus were identified (**Figure 1A, 1B**), emergency intubation was performed, and the tube was inserted into the end of trachea. Between the fourth and fifth cartilage ring position, tracheotomy was operated to keep continuous ventilation for suturing the trachea and esophagus. Exploration of organ and tissue trauma was performed without delay. Definitive closure and drainage were carried out as soon as possible, and the esophagus was primarily repaired with 3/0 mersilk (**Figure 1C**) and subsequently the trachea was repaired

with 3/0 coated vicryl (**Figure 1D**). A nasogastric tube was placed by a nurse during the operation, and a bilateral drainage tube was executed subcutaneously. Early antibiotic treatment and enteral nutritional support through a nasogastric tube was applied to improve the whole body condition. Postoperative 10 days laryngoscopy showed right recurrent laryngeal nerve injury. Two weeks after operation, esophageal imagines with meglumine diatrizoate showed no stenosis and anastomotic leakage (**Figure 2**), subsequently, the nasogastric and tracheal tubes were removed respectively and a normal soft diet was gradually resumed. Under postoperative monitoring, no complications developed and the patient was discharged to go home on day 21. Four

months of follow-up she was well without any complications.

Discussion

Open traumatic injury of cervical trachea associated with esophagus is rare entity, the complex clinical manifestations and rapid progression of severity present diagnostic and management challenges. The most common symptoms are neck pain, varying degrees of dyspnea, hoarseness, cough, and hemoptysis. Physical examination findings include bleeding, emphysema, skin contusions, cyanosis, vocal cord paralysis, mediastinal emphysema and aphonia.

Owing to serious nature of this injury, the majority of patients die before reaching hospital because of airway compromise or obstruction. Patients with complete tracheal disruption have an abnormally positioned trachea and formed a false passage. The tracheal injury was obvious owing to an open wound in the neck, and there may not be immediate dyspnea. Symptoms of tracheal injury may be easily overlooked in patients with other serious injuries. Early accurate diagnosis and treatment are therefore important for ensuring good out-

Complete disruption of cervical trachea and esophagus

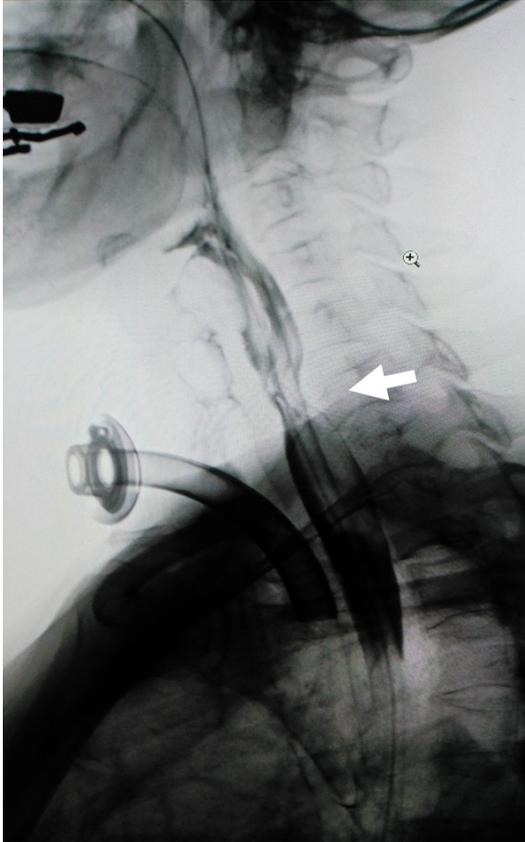


Figure 2. Esophagography at 2 weeks after surgery, no esophageal anastomotic leakage and stenosis (white arrow) is seen.

comes [1], and improved awareness of this injury is needed.

The clinical manifestation hoarseness or aphonia was highly suspicious of open injuries to the recurrent laryngeal nerves, so traumatic wound was examined carefully to confirm signs. In complete tracheal rupture, a gap in the tracheal rings can be observed, it is important to perform immediate neck and chest X-ray, or CT scanning [2], can clearly show the trachea, esophagus, larynx, and cervical vertebra, and in the most important preoperative diagnostic imaging modality for determining the degree of tracheal injury and the approach of treatment.

The main therapeutic aim is to maintain the patency of the airway. If necessary, emergency intubation or tracheotomy should be performed [3, 4]. Hemostasis should be achieved, and vital signs should be stabilized. Early repair of injuries to the trachea, esophagus and other

airways helps to preserve the function of these structures [5].

There is controversy regarding whether airway patency is best maintained by tracheal intubation or by tracheotomy [6]. We advocate using endotracheal tube into the distal of the trachea, as initial procedure for the high level of ventilation.

After confirmation of the diagnosis, we advocate that patients with significant tracheal injury should undergo standard tracheostomy to reduce the risk of potentially serious damage to the airway. Intubation under anesthesia should be performed by a skilled operator, using a relatively small endotracheal tube.

The initial intubation attempt is important and necessary, attention should be paid that operative attempts may increase the separation between the ends of the trachea and cause additional trauma and hemorrhage in the surrounding tissue. If the endotracheal tube cannot be successfully placed in the distal end of the disrupted trachea, the patient may die owing to airway obstruction, so immediate tracheotomy should be underwent.

When open injury to the cervical trachea has been diagnosed, surgical exploration should be carried out under general anesthesia [7]. Due to the character of anatomic structure between cervical esophagus and trachea, esophagus separation should preferentially be repaired as soon as possible. In order to protect the tracheal mucosa during treatment, and whenever possible the mucosa should be sutured together to prevent the formation of granulation tissue, scarring, and tracheal stenosis. If the trachea is completely ruptured, care should be taken to keep the sutures close to trachea, to avoid damaging the recurrent laryngeal nerves and vessels.

There is controversy regarding whether to retain the endotracheal tube after repair of a tracheal injury. We believe that the tracheal tube should be retained in patients have undergone repair of severe injuries to recurrent laryngeal nerves or trachea. Postoperatively, the head should be kept forward to reduce anastomotic tension, corticosteroid administration reduces inflammation and inhibits proliferation of granulation tissue, which helps to prevent

Complete disruption of cervical trachea and esophagus

postoperative tracheal stenosis caused by the anastomotic scar.

Complete esophagus rupture can be diagnosed early, the development of septic complications in particular are a life-threatening risk which rapidly progresses to an emergency surgical event and develops secondary to therapeutic procedures, It is very rarely encountered event, thus our surgical experience is limited.

Depending on the location of esophagus injury, anastomotic leaks can lead to secondary wound infection, mediastinitis, abscess, empyema, pneumonia, and sepsis. Of all these complications, sepsis carries the highest associated mortality. The primary goal of management strategy should be the prevention of sepsis by maintenance or establishment of wide drainage.

The initial symptoms of esophageal disruption vary according to the site of the rupture, time which has elapsed and the amount of contamination. In the current case, disruption was in the cervical area and the patient presented with dyspnea and neck pain. To prevent esophagus and trachea contamination, early antibiotic treatment and enteral nutritional support are also recommended [8].

When more than 24 hours has elapsed before esophageal and tracheal saturation and when there is wall or cartilage contamination, the complication and mortality rates are much higher. Early admittance and management have been reported to be the best prognostic factor. These first 24 hours have been described in the literature as the 'golden period' [9-11].

Injury to both the esophagus and trachea with parallel suture lines should be separated by a tissue flap to tracheoesophageal prevent fistula formation. Muscle flaps also improve the vascular supply in the setting of active contamination [12]. Adequate drainage, exclusion of distal obstruction, and maintenance of nutritional support are the cornerstones of fistula management and the majority of them heal with time [13, 14].

In the case which is diagnosed early, particularly in cervical area, primary saturation is suggested as the first choice [15, 16]. As this was

appropriate for the current case, primary repair is suitable regardless of the time interval after injury.

Adequate nutritional support also plays an important role in optimizing clinical outcomes. Total parenteral nutrition or jejunostomy feeding should be started as soon as possible. In the current case, the enteral nutrition pathway of the patient must be kept open by nasogastric or duodenal tube.

Complete cervical tracheal and esophageal disruption due to neck traumatic injury is distinctly rare and presents diagnostic and management challenges. Diagnosis and surgical intervention with primary repair, particularly in the first 24 hours post-injury, is fundamental to achieve a optimize outcome after complete trachea and esophagus disruption. Early accurate recognition and emergent referral for definitive airway management is also important [8].

Our patient was lucky enough in that no neck blood vessels fractured during the injury and she got an ambulance and was rushed to the Emergency Department for special treatment within 3 hours of the accident.

Disclosure of conflict of interest

None.

Abbreviation

CT, Computed tomography.

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Complete disruption of cervical trachea and esophagus

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