Traumatic tracheobronchial injuries in children

Ahmed H. Al-Salem, MBBS, FRCSI, Syed Qaisaruddin, MS, Ayyampalayam N. Murugan, FRCS

ABSTRACT
Tracheobronchial injuries are rare and their occurrence is even more uncommon in the pediatric age group. This report describes two children, 9 and 8 years old, with traumatic tracheal injuries following blunt trauma to the neck in one and a penetrating pellet injury in the other. Their clinical features and aspects of management are discussed.

Saudi Medical Journal 1997; Vol. 18 (1) 93-95:

Keywords: Tracheobronchial tree, traumatic injury

Tracheobronchial injuries are uncommon and are occasionally seen after blunt thoracic trauma. In the pediatric age group they are very rare and usually are associated with major trauma to other systems and hence may be overlooked. Early diagnosis and prompt management can reduce mortality and morbidity. We present two children with tracheobronchial injuries, one following blunt trauma to the neck and the other secondary to a pellet injury.

Case reports

Case no. 1 A 9-year old female patient was brought to the Emergency Room at 5.50 pm with a history of fall of a heavy object over her neck two hours prior to her presentation. She was complaining of pain in the neck and some difficulty in speaking, but no difficulty in breathing. Her initial vital signs were stable and she was breathing normally. She had subcutaneous emphysema in the neck above the suprasternal notch extending laterally to the sternomastoid muscle on the right side. The oropharynx and larynx appeared normal on indirect laryngoscopy. Her chest and neck x-rays revealed small surgical emphysema in the neck (Fig. 1). No pneumothorax or hemothorax. She was diagnosed as traumatic injury to the trachea and because of her stable general condition and minimal emphysema, it was thought of as a small leak from the trachea, therefore she was admitted for close observation only. At 4.45 am on the second day, she had a bout of coughing and the surgical emphysema suddenly increased over the neck, face and upper chest and in a few minutes had spread to the abdomen and upper thighs (Fig. 2). Endotracheal intubation was tried, but the patient was very restless and irritable and she was immediately shifted to the operating room. She arrested in the operating room but was immediately intubated and resuscitated. The neck was explored via a transverse incision above the suprasternal notch. The trachea was found lacerated with a tear involving the anterior half of the circumference just below the thyroid isthmus. This was sutured with vicryl 2/0. The patient was kept on a ventilator postoperatively for 5 days and prescribed antibiotics. She was extubated on the sixth postoperative day and was discharged home on the 12th postoperative day doing well. The patient is one year post operatively and is without any clinical evidence of tracheal stenosis.

Case no. 2 An 8-year old male patient was brought to the Emergency Room with a history of gunshot (airgun) injury to his neck. He was in respiratory distress with massive subcutaneous emphysema over the neck, face, chest and abdomen. There was a pellet entry wound in the midline in the lower part of the neck. No evidence of exit wound was seen. He was intubated immediately in the emergency room and then admitted to the Intensive Care Unit. Chest x-ray showed pneumothorax on the right side with the pellet lying extrapleural on the left side of the chest without pneumothorax. He was taken to the operating room after insertion of an intercostal drain on the right side. Via a cervical collar incision, the neck was explored. The right external jugular vein was found lacerated therefore it was divided between ligatures. The trachea was found

From the Division of Pediatric Surgery (Al-Salem), and Departments of Surgery and ENT (Murugan), Qatif Central Hospital, Saudi Arabia.

Received January 1996. Accepted for publication in final form July 1996.

Address correspondence and reprint request to: Dr. Ahmed H. Al-Salem, PO Box 18432, Qatif 31911, Saudi Arabia.
to be perforated, with the pellet hole below the level of the thyroid isthmus at the 6th tracheal ring. The hole in the trachea was closed with vicryl 3/0 and the wound closed in layers. Postoperatively, the patient was kept on a ventilator for 4 days. The surgical emphysema decreased gradually. The intercostal drain was removed on the 2nd post operative day and he was discharged home on the 14th postoperative day. He is now 15 months postoperatively and is doing well without clinical evidence of tracheal stenosis.

Discussion

The incidence of tracheobronchial injuries is very low and in those who sustain blunt chest trauma it is reported to be approximately 1%. The incidence is reported to be higher in postmortem studies. Krommer et al in 558 cases found 9.9% incidence of tracheobronchial injuries, while Bertelsen and Howitz in 1,178 cases found 2.8% incidence of tracheobronchial injuries, the majority of whom were dead on arrival at the hospital. This type of injury is usually associated with major trauma and multiple organ involvement with injuries to other mediastinal or thoracic structures and hence may be overlooked. Early diagnosis and prompt management can reduce both mortality and morbidity. The incidence of tracheobronchial injuries in young children who sustain blunt thoracic trauma is very low. Children have pliable airways and it requires great force to rupture them and therefore these injuries are often associated with other severe and sometimes fatal injuries. In a series of 86 children reported by Smyth, 3 sustained rupture of the bronchus and 2 rupture of the trachea.

The clinical manifestations of tracheobronchial injuries are shortness of breath, subcutaneous and mediastinal emphysema, pneumothorax and hemoptysis. The presence of pneumothorax that is unrelieved by tube thoracostomy has been stressed as an important sign of tracheobronchial injury. In situations like our first case in which the tracheal injury was high, pneumothorax may be absent, but the presence of cervical and subcutaneous emphysema in a traumatized child should be considered an indication of tracheal injury. Our first patient did not have shortness of breath and had minimal subcutaneous emphysema to start with. Later where she coughed, she developed massive subcutaneous emphysema. We think the tracheal injury was sealed temporarily by a clot or a piece of tissue and later when the patient coughed, the tear opened up with massive air leak, therefore the presence of only minimal symptoms initially should not be taken lightly. In our patient, we presumed the leak was small based on the clinical presentation but intraoperatively she proved to have a major tear of the trachea. Our second patient had obvious penetrating injury to the trachea. The best diagnostic method is bronchoscopy, especially for children. Others have found CT-scan helpful in the diagnosis of tracheal injuries. However, in emergency situations like our first case or where the diagnosis is obvious as in the second case, these steps may be omitted.

The management of tracheobronchial injuries varies with the extent of injury. Small tears less than half of the circumference of the bronchus can be managed non-operatively with simple supportive therapy without tracheostomy. Others advocate placement of tracheostomy without explored small bronchial injuries.
without surgical repair. Our second patient was explored even though the wound was obviously small because of extensive surgical emphysema and the possibility of associated injuries in the neck being a penetrating type of injury. Large tears or rupture separation of the trachea and bronchi require surgical treatment. Usually these injuries are approached through a right lateral thoracotomy for tracheal and right bronchial injuries and a left thoracotomy for left bronchial injuries. Our two patients had high tracheal injuries which were approached via a cervical incision. In the past, these repairs were carried out with non-absorbable sutures, but recently they have been replaced by absorbable sutures (vicryl or dexon). These cause less tissue reaction and therefore decrease the incidence of tracheal stenosis due to anastomotic stricture. Both of our patients were sutured with vicryl and none of them developed clinical evidence of anastomotic stricture. Our patients were, in addition, electively ventilated. We think in high tracheal injuries, this helps prevent air leak and therefore promotes healing of the anastomosis.

References