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Traumatic bronchial injury



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ABSTRACT

INTRODUCTION: Tracheobronchial injury is a recognized, yet uncommon, result of blunt trauma to the thorax. Often the diagnosis and treatment are delayed, resulting in attempted surgical repair months or even years after the injury.

PRESENTATION OF THE CASE: We present a case report of a 31-year old female who suffered a left main bronchus transection after a motor vehicle accident. The diagnostic, management issues, and clinical findings surrounding this injury are reviewed.

DISCUSSION: Tracheobronchial disruption is a rare, life-threatening injury. Suspicion should be high when pneumomediastinum and pneumothorax are refractory to adequate pleural drainage. Flexible bronchoscopy with intubation distal to the injury may be necessary to prevent loss of the airway. Advance preparation should include setups for bronchoscopy, thoracotomy, and cardiopulmonary bypass. Patient survival depends on preparation and prompt surgical intervention.

CONCLUSION: A high level of suspicion and the liberal use of bronchoscopy are important in the diagnosis of tracheobronchial injury. A tailored surgical approach is often necessary for definitive repair.

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Tracheobronchial injury is an uncommon injury after blunt trauma. It is often associated with other fatal injuries. Here we describe a case of early identification of a bronchial injury after a motor vehicle accident.

A 31-year-old female was brought in as a critical trauma after being struck by a car on an urban street. She arrived with an intact airway and breath sounds heard bilaterally; ATLS was initiated and lead by the Trauma team. Just after stabilization, she became more distressed. Decision was made to intubate her. Standard intubation was performed by the PGY-2 ER resident with anesthesia team on standby using a 7 French endotracheal tube. The initial chest x-ray (CXR) demonstrated extensive left soft tissue emphysema extending to the neck. Computer tomography (CT) showed left side pneumothorax and pneumomediastinum (Fig. 1). She had a near obliteration of the left mid to distal main-stem bronchus proximal to the origin of the left upper lobe bronchus concerning for a bronchial injury (Fig. 2). Multiple fractures were noted throughout her chest wall, spine, and pelvis. No intra-cranial, intra-abdominal, or vascular injuries were seen (Fig. 3).

A left sided thoracostomy tube was placed. She had large air leak that was persisting on inspiration and expiration. She was hyperventilating with slight respiratory acidosis. A blood gas was performed which revealed a PCO₂ of 55 and pH of 7.27. She was admitted to the

ICU for bronchoscopy. Flexible bronchoscopy showed a 2 cm total disruption of the left mainstem bronchus. She was taken emergently to the operating room. A left posteriolateral thoracotomy was performed. There was a small opening in the aortopulmonary window with air leakage. This was enlarged. The transected left bronchus was found and repaired primarily in a two layered fashion with 4-0 Polydioxanone sutures (PDS) circumferentially around the cartilaginous area, then around the membranous portion. The anastomosis was patent on bronchoscopy intraoperatively and on post-operative day (POD) 4. She was extubated on POD 5 and discharged on POD 10. She was seen in clinic two months later with no respiratory complaints.

Tracheobronchial injury is a rare but morbid injury. In a large trauma autopsy series, 2% were found to have a tracheobronchial injury. Of those 81% died at the scene, mostly from associated injuries [1]. Motor vehicle accidents were the most frequent mechanism.

Most injuries occurred within 2 cm of the carina. Injury to the right main bronchus is more common and diagnosed earlier. This is thought to be due to the fact that the left main bronchus is protected by the aorta [2]. The median days until diagnosis for left sided injury was 30 days. The presentation for late diagnosis is often persistent pneumothorax. Historically, the outcome for left sided injury is more favorable than the right side, with a mortality rate of 8% compared with 16% [3].

The initial management should follow the Advance Trauma Life Support protocol. Findings on CXR can include pneumothorax, pneumomediastinum, subcutaneous emphysema and air

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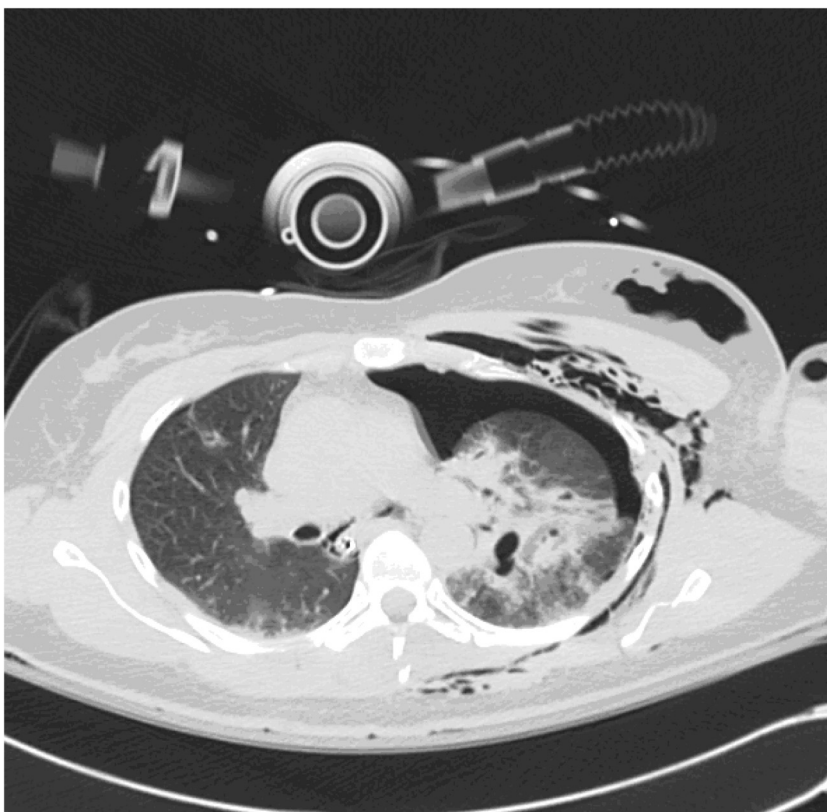


Fig. 1. Axial view of her CT scan demonstrating left pneumothorax, and soft tissue emphysema.



Fig. 2. Coronal view of her CT scan demonstrating left pneumothorax, extensive soft tissue emphysema, and left main bronchus disruption.

surrounding deep cervical tissue. “Fallen lung sign” [4] where the collapsed lung falls away from the mediastinum is not often seen but is specific to bronchial injury. Findings on CT are similar to those of CXR [5]. The definitive diagnosis is made with bronchoscopy [6].

Surgical repair should be performed as soon as possible. If an injury is identified early, primary repair should be attempted. The

mortality for those who underwent primary repair was lower than those who underwent resection of the injured bronchus and distal lung parenchyma (3% vs 13%) [3]. The outcome for non-operative management is generally worse than operative management. The operative approach differs depending on the location of the injury. Cervical trachea injury is repaired via collar incision. Distal trachea,

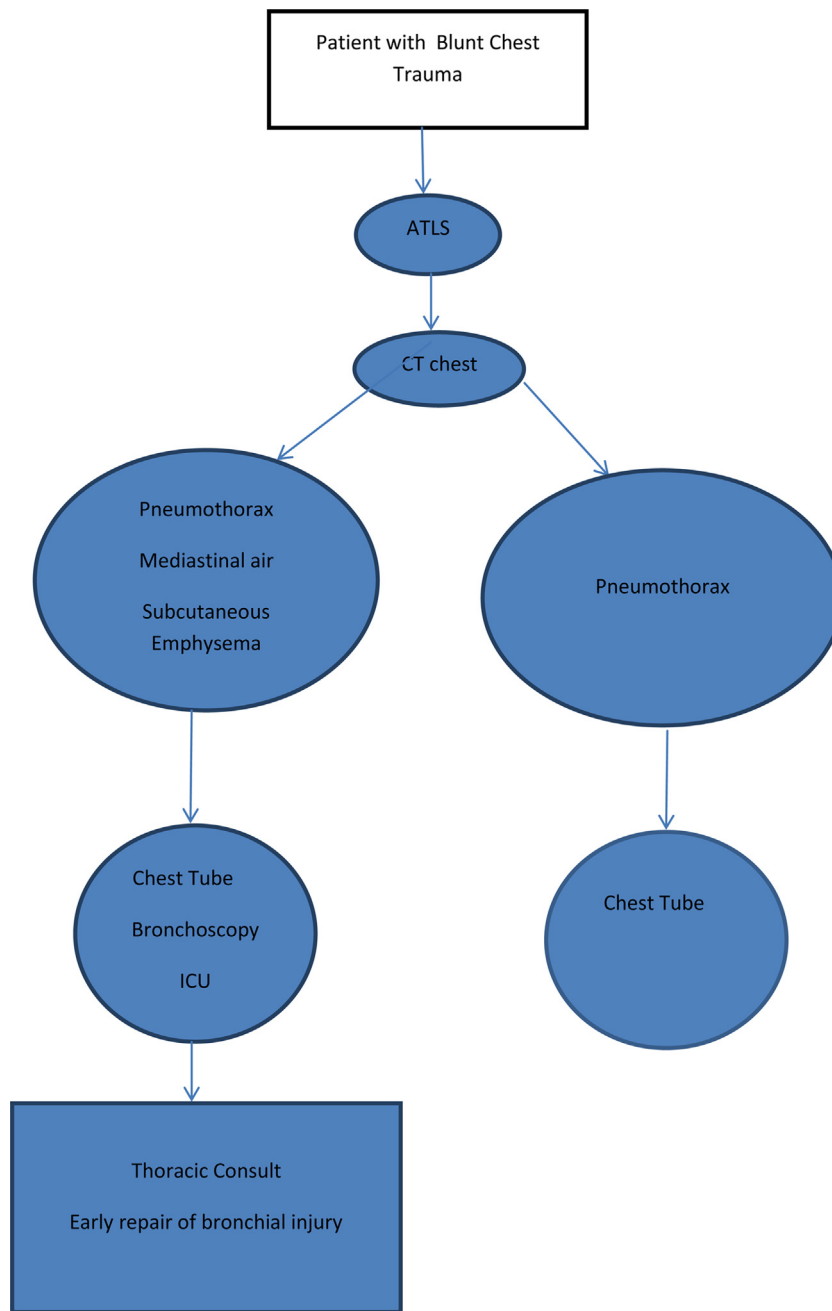


Fig. 3. Schematic Illustration of Management of Blunt Chest Trauma.

carina, and right main stem bronchus are approached through right posterolateral thoracotomy. The left main bronchus is exposed via a left posterolateral thoracotomy [7]. Debridement and end to end anastomosis should be attempted for significant tracheal and bronchial injury. Pneumonectomy should be avoided if possible. Muscle flap is sometimes used to help with the reconstruction. Lobectomy is performed if the injury is associated with lobar destruction.

Post repair complications include pneumonia, suture granuloma, wound infection, fistula, and stricture. Broncho- or tracheo-esophageal fistula may require resection and reconstruction. Viable tissue coverage is necessary. A stricture may be temporarily stented or undergo laser fulguration.

The overall outcome depends on the number of associated injuries. With advancement in trauma resuscitation and surgical techniques, the mortality rate has declined from 36% before

1950–9% since 1970 [3]. The long term outcome for those who undergo immediate repair is good with few respiratory symptoms [8].

Tracheobronchial injury is a rare but a morbid injury. It is often associated with other organ injuries. A high index of suspicion will lead to a prompt diagnosis and ultimately an improved outcome.

Conflicts of interest

None.

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Ethical approval

Approval has been given by UCLA IRB and Trauma committee Number IRB#16-000451.

Consent

Consent was obtained from patient to publish the case.

Author contribution

Ali Cheaito is responsible for design, data collection, and writing of paper.

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