

Repair of right main bronchus tear after blunt chest trauma: A case report

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ABSTRACT

Background: Tracheobronchial injuries (TBIs) are uncommon life-threatening injuries to the tracheobronchial tree that follow trauma. As TBI manifests with non-specific signs and symptoms, early detection is the main key to proper management and decrease in the high mortality and morbidity rate. **Case presentation:** A 17-year-old male was the victim of a car roll over road traffic accident. Pan Computed Tomography (CT) was done and showed severe subcutaneous emphysema with pneumomediastinum, bilateral pneumothorax and a proximal right main bronchus wall defect. Fiberoptic bronchoscopy confirmed the diagnosis which was repaired by right thoracotomy. CT scan of the chest was done 6 months after the operation which showed an intact wall of the right main bronchus. **Conclusion:** TBIs are rarely seen in trauma cases, but they carry high mortality and morbidity rates. This case report highlights the importance of management of TBI is early detection as diagnosis might be challenging.

Keywords: Tracheobronchial injuries, right main bronchus tear, thoracic trauma, subcutaneous emphysema, bilateral pneumothorax and pneumomediastinum.

1. INTRODUCTION

Tracheobronchial injuries (TBIs) are uncommon injuries or lacerations to the trachea, left or right bronchi stem, or both bronchi up to the secondary bronchi. This can result from a blunt trauma, penetrating trauma, or iatrogenic injury. TBI usually presents with generalized unspecific symptoms following trauma, including respiratory distress, subcutaneous emphysema, and unilateral or bilateral pneumothorax (Natale et al., 2014). Any delay in the diagnosis of these injuries can result in serious complications such as tension pneumothorax, empyema, hilar abscesses, atelectasis, pneumonia, mediastinitis, and respiratory failure. This can worsen the prognosis significantly and can be life-threatening (Natale et al., 2014; Díaz et al., 2019).

TBIs are rarely seen in blunt or penetrating chest traumas, but they have a high mortality rate reaching up to 31.4% (Schibilsky et al., 2020). Moreover, around 81% of patients with airway injury generally die immediately or before arriving at the emergency department due to tension pneumothorax (Díaz et al., 2019). Diagnosis can be made with chest radiological studies such

as chest X-ray or CT scan, but diagnosis is difficult and likely delayed or missed. The reason is that secondary complications such as pneumothorax can be misleading and can be interpreted as the primary etiology instead of TBI. In this case report, we discuss a case of a surgical repair for right main bronchus injury following a road traffic accident.

2. CASE PRESENTATION

A 17-year-old male was a victim of a road traffic accident where the car rolled over, and he was ejected from the car as he was not wearing his seat belt. The patient was transferred from another secondary peripheral hospital to our tertiary trauma center as a life-saving case with bilateral chest tubes inserted at the initial hospital in due to bilateral pneumothorax and pneumomediastinum as result of the blunt chest trauma. We received the patient intubated and sedated with bilateral chest tubes in place. The patient was vitally unstable with a heart rate of 116 bpm, blood pressure of 96/53 mmHg, respiratory rate of 16 breaths per minute, and SpO₂ of 99% with FiO₂ of 25% and PEEP of 5 and continuous air leak from bilateral chest tubes. An advanced trauma life support (ATLS) protocol was applied, and the airway was secured as the patient was received intubated already.

The patient had a large subcutaneous emphysema all over his face, so his pupils could not be assessed at the time of presentation. As ATLS protocol was completed and the patient's condition was stabilized. Brain, abdominal, skeletal, and vascular injuries were ruled out clinically and radiologically. Chest x-ray (CXR) and pan Computed Tomography (CT) with contrast were done. Imaging revealed severe subcutaneous emphysema in the region of his face, neck, and chest wall along with pneumopericardium and pneumomediastinum. It also showed bilateral pneumothorax with bilateral lower lobe collapse. Most importantly, it revealed a defect in the wall of the proximal right main stem bronchus (Figure 1 and 2). A left posterior nondisplaced fracture of the first rib was also noted. Given these findings, the patient underwent fiberoptic bronchoscopy, which confirmed the diagnosis of right main bronchus injury that was then repaired by right thoracotomy.

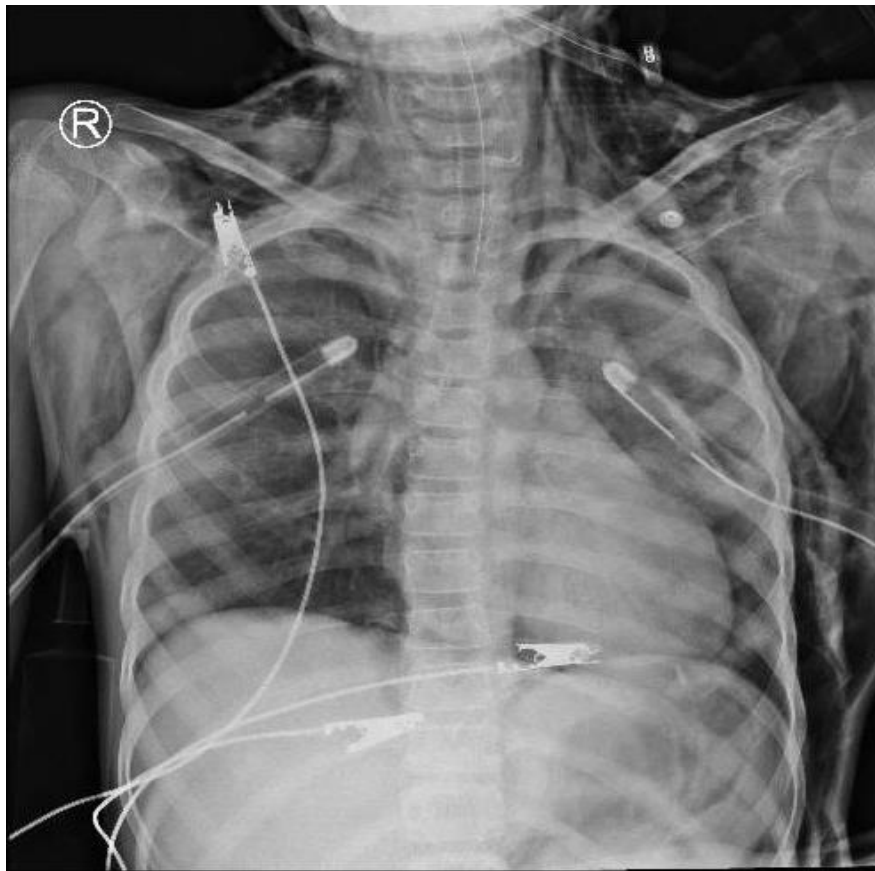


Figure 1 First chest X-ray at initial presentation.

Intraoperatively, under general anesthesia, a right posterolateral thoracotomy incision was done with the patient in left decubitus position. Exploration of the right thoracic cavity showed extensive emphysema of the mediastinum and hematoma behind the azygous vein. Therefore, the right inferior pulmonary ligament and the hilum of the right lung were released. The

azygous vein was ligated and cut distal to the right main bronchus. A right main bronchus tear was identified and repaired with a 3/0 Prolene stitch. One 28F-size chest tube was inserted, hemostasis was assured, and closure was performed with no intraoperative complications or difficulties. Postoperatively, chest x-ray (CXR) was done (Figure 3) and the patient was transferred to the intensive care unit (ICU), where he was kept intubated and sedated.

After six days, the patient was off sedation and extubated with no complications. Also, the right intercostal tube (ICT) was removed at that time after it showed no air leak and lung was expanding well with no pneumothorax or any residual collection. Moreover, the patient was transferred to the general ward, where he had his left intercostal tube (ICT) was removed after 13 days post operatively after it showed no air leak and lung was expanding well with no pneumothorax or any residual collection. The patient was discharged without complications after showing both clinical and radiological improvement. After 6 months from the operation, the patient was followed up as an outpatient by repeating the CT scan which showed an intact wall of the right main bronchus and complete interval resolution of both the pneumomediastinum and subcutaneous emphysema that had been noted before (Figure 4).

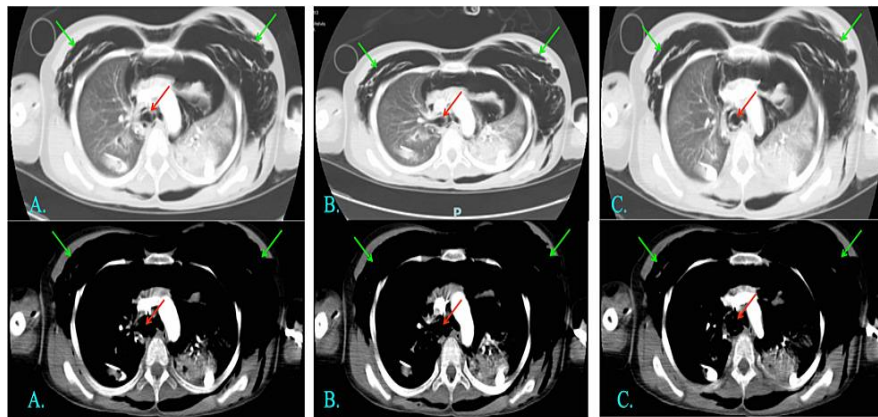


Figure 2 Different mediastinal and lung windows of chest CT with IV contrast showing right main bronchus tear with large subcutaneous emphysema and pneumomediastinum. Red arrows identifying the injury to the right main bronchus. Green arrows identifying the large subcutaneous emphysema of the chest wall.



Figure 3 Chest X-ray immediately post-operation.

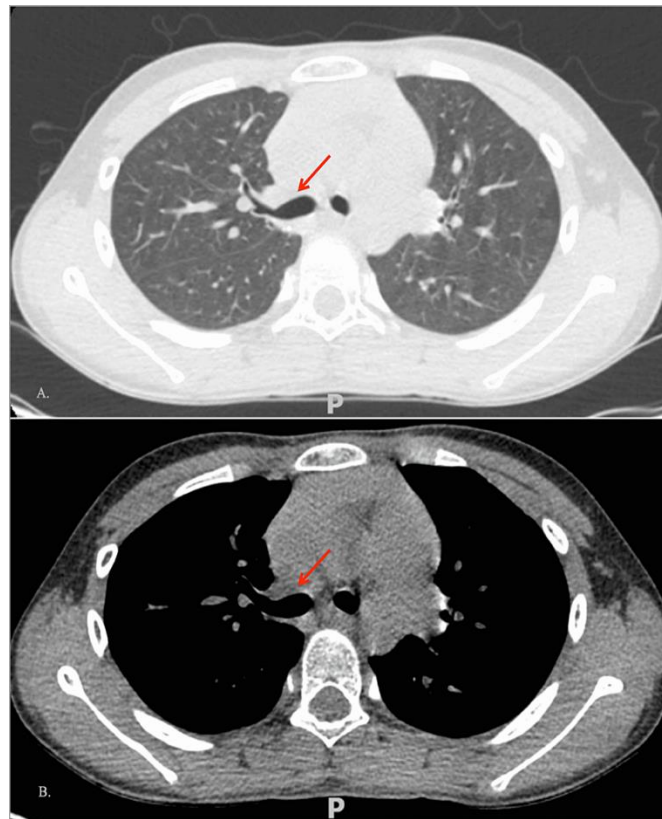


Figure 4 Outpatient follow up chest CT with IV contrast showing complete resolution of pneumomediastinum and subcutaneous emphysema with intact right main bronchus after the repair. A. Lung window of CT chest with IV contrast. B. Mediastinal window of CT chest with IV contrast. Red arrows show the previous place of the injury after the surgical repair with intact bronchus walls.

3. DISCUSSION

Since the establishment and implementation of ATLS and comprehensive prehospital trauma assessment and management, increasing frequency of TBI has been encountered due to early detection. Although TBIs are considered uncommon in all traumas, they have high mortality and morbidity rates if they are not immediately detected and managed accordingly (Schibilsky et al., 2020; Díaz et al., 2019). Schibilsky et al., (2020) analyzed 136,389 trauma patients who were registered in TraumaRegister DGU in Germany over 7 years from 2002 to 2015, and only 561 (0.4%) of them had suffered TBI. This highlights how uncommonly TBIs are generally encountered in trauma cases. However, TBIs have shown higher mortality rates. Schibilsky et al., (2020) observed that the mortality of patients with TBI was higher (24.6%) than that of all trauma cases overall (13.7%). Also, in TBI cases, lower airway injuries have been shown to have higher mortality rates than upper airway injuries (Kummer et al., 2006).

The diagnosis of TBI may be challenging as its symptoms are generalized and non-specific. TBI may manifest as dyspnea, severe chest pain, respiratory distress, subcutaneous emphysema, persistent unilateral or bilateral pneumothorax despite a chest tube, and pneumomediastinum. Thus, the diagnosis of TBI might be misleading and requires both high clinical sense and high clinical suspicion in any trauma case with these non-specific symptoms (Hwang et al., 2013). Depending on the patient's stability, either a CT scan of the chest or bronchoscopy is considered as the gold standard investigation for the diagnosis of any TBI injury. Chest X-ray does not provide detailed visualization of the tracheobronchial tree and only shows secondary signs of TBI, such as pneumomediastinum, pneumothorax, and subcutaneous emphysema.

After TBI has been diagnosed, the management varies from simple conservative management and close observation to an urgent aggressive surgical intervention. As with any trauma case, the first assessment and management start at the site of incidence, continuous through the prehospital transportation and in the hospital. During the primary survey, most patients require chest tube insertion as pneumothorax is typically present in most TBI cases (Schibilsky et al., 2020). Conservative management is usually considered in small injuries with the presence of resolving pneumomediastinum, pneumothorax, clinical improvement, clinical stability, and general progression of the patient's condition. However, once a CT scan of the chest shows the presence of TBI in the trachea or the right or left main bronchus, a surgical intervention is needed for exploration and primary repair. After the surgical

repair, most patients will improve as long as there are no other severe traumatic injuries that may affect the progression of the patient's condition.

4. CONCLUSION

The key to proper and rapid management of TBI is early detection and diagnosis. TBIs are uncommonly encountered in trauma cases and might be challenging to diagnose. However, when they are present, they have high mortality and morbidity rates. Thus, further multicenter studies are crucial to highlight how unspecific TBI can manifest, the importance of early detection, and its correlation with the overall outcome and burden to the hospital.

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Author Contributions

All authors have participated in collecting and analyzing the data, writing the article and revising it critically for publication. All authors have read the final version of the manuscript and approved it for publication.

Ethical approval

Not applicable

Informed consent

Inform consent was obtained from the patient for publication of this report and accompanying images.

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Conflict of interest

The authors declare that there is no conflict of interests

Data materials availability

All data that support and are associated with this study are present in the paper and the findings of this study are embedded within the manuscript.

REFERENCES AND NOTES

1. Díaz C, Carvajal DF, Morales EI, Sangiovanni S, Fernández-Trujillo L. Right main bronchus rupture associated with blunt chest trauma: A case report. *Int J Emerg Med* 2019; 12(1):39. doi: 10.1186/s12245-019-0258-3.
2. Hwang JJ, Kim YJ, Cho HM, Lee TY. Traumatic tracheobronchial injury: Delayed diagnosis and treatment outcome. *Korean J Thorac Cardiovasc Surg* 2013; 46(3):197-201. doi: 10.5090/kjtcs.2013.46.3.197.
3. Kummer C, Netto FS, Rizoli S, Yee D. A review of traumatic airway injuries: Potential implications for airway assessment and management. *Injury* 2007; 38(1):27-33. doi: 10.1016/j.injury.2006.09.002.
4. Natale C, De Lesquen H, Beranger F, Prunet B, Bonnet PM, Avaro JP. Blunt bronchial injuries: A challenging issue. *Injury Extra* 2014; 45:22-24. doi: 10.1016/j.injury.2014.01.006
5. Schibilsky D, Driessen A, White WJ, Lefering R, Paffrath T, Bouillon B, Walker T, Schlensak C, Mutschler M. Traumatic tracheobronchial injuries: Incidence and outcome of 136.389 patients derived from the DGU traumaregister. *Sci Rep* 2020; 10(1):20555. doi: 10.1038/s41598-020-77 613-x