



A Case of Blunt Tracheobronchial Injury with Right Massive Pneumothorax and Lung Atelectasis

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Abstract

Blunt Tracheobronchial Injury (TBI) is usually not found common injury in civilian cases, but must be suspected to make diagnosis and managed as early as possible. In such a case, primary initial goals are to stabilize the airway and localize the injury and then determine its extent. This can be possible mostly with Computed Tomography (CT) scan of chest and flexible bronchoscopy. Usually penetrating injury occurs in cervical or upper thoracic region. On the other hand, blunt injuries occur in distal trachea and right main bronchus and they can be best approached by right posterolateral thoracotomy. The selection of manner and time of approaching depends on the existence and severity of additional injuries. Most of the injuries can be restored by deploying simple techniques such as primary repair, while some of them requires complex reconstruction technique apart from attention to pulmonary toilet, follow up is crucial for stenosis at anastomotic site.

Keywords: Blunt tracheobronchial injury; fiberoptic bronchoscopy; Thoracotomy

Introduction

Tracheobronchial injury is rare injury in the scenario of blunt chest trauma. But, it has a high mortality rate. Tears or ruptures of the airway are seen in 0.5% to 1.5% of all cases and around 81% of patients with airway injury die immediately or before arriving at the emergency department due to tension pneumothorax. It presents with shortness of breathing, severe persistent air leak in spite of intercostal tube drainage. In general, the most common symptom is dyspnea and the main findings on Chest X-Ray (CXR) are pneumothorax, pneumomediastinum, subcutaneous emphysema, and atelectasis. A delay in diagnosis increases the rate of complications, mainly infectious complications (empyema, hilar abscesses, mediastinitis, pneumonia, etc.) and the formation of granulation tissue leads to fibrosis that could obstruct the airway, impacting the patient's outcome. We present a case report of a patient who suffers right intermediate bronchus rupture after blunt chest trauma in the setting of a high-impact mechanism, emphasizing on the importance of early diagnosis and treatment to avoid major complications.

Case Presentation

A 26 year old man brought to emergency department with history of road traffic accident 2 days ago with complain of bilateral chest pain and difficulty in breathing. Patient had history of Road Traffic Accident (RTA) – two wheeler vs. four wheeler. Patient was taken to nearby hospital for primary management with complain of severe respiratory distress. Following initial examination, a chest tube was inserted immediately into right hemithorax for right pneumothorax. However there was severe persistent air leak requiring a second chest tube on same side at outside hospital. Despite the appropriate chest tube drainage, the patient was tachypneic and had increased oxygen demand on arrival at our facility. He underwent HRCT Chest to rule other cause of deterioration and ICD position. Considering the high energy nature of crash, continued severe air leak, and failure of lung expansion with chest tube insertion, a tracheobronchial injury was suspected. CT Chest showed large hemo-pneumothorax with complete collapse of right lung. Right intermediate bronchus was completely obliterated with hypodense material (Figure 1). Fracture involving 1st to 6th ribs on right side and left 1st rib fracture involving manubrium sternum. As there was no definite diagnosis of airway injury from CT, fiberoptic bronchoscopy was planned. Fiberoptic bronchoscopy showed right intermedius bronchus tear with slough extending till right middle lobe and lower lobe filled with clots and mucous. Tracheobronchial toileting was with Bronchoalveolar Lavage (BAL) taken for analysis, which showed moderate pus cells, few gram positive organisms. BAL-CS (Culture and Sensitivity) and FUNGAL- CS were done which showed no growth. A repeat Chest X-ray was done post-bronchoscopy which didn't show any significant change which warranted for

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Received Date: 26 Oct 2021

Accepted Date: 09 Dec 2021

Published Date: 16 Dec 2021

Citation:

Shah S, Kakadiya S, Rajput V. A Case of Blunt Tracheobronchial Injury with Right Massive Pneumothorax and Lung Atelectasis. *Ann Clin Case Rep.* 2021; 6: 2061.

ISSN: 2474-1655

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Figure 1: Before tracheobronchial repair.



Figure 2: Computed tomography showing collapsed lung with right subcutaneous emphysema.



Figure 3: Post tracheobronchial repair.

a surgical tracheobronchial repair (Figure 2). Patient underwent right posterolateral thoracotomy findings were suggestive of collapsed right lung with complete transection of bronchus intermedia at the junction of lower end of middle lobe and upper end of lower lobe of right lung. Bronchial transection repaired primarily with 4-0 polydioxane interrupted sutures. Valsalva maneuver was performed for air leak. No air leak was noted with full expansion of right lung including middle and lower lobe. Hemostasis was achieved. 32 Fr. Intercostal drainage tube was inserted and connected with intercostal drainage bag (Figure 3). Closure done with vicryl 1-0 in two layers and skin with ethilon 3-0. Postoperatively, X-ray chest showed complete expansion of right lung with I.C.D *in situ* and patient was closely monitored for all vital parameters, intake output and managed medically with antibiotics, antacids, analgesics, intravenous fluids and other supportive care. He improved symptomatically. He was off oxygen support and able to do incentive spirometry regularly. He was mobilized on day three post operatively and was discharged on post

operative day six.

Discussion

Tracheobronchial injury occurring due to blunt chest trauma is a very rare scenario, which requires very careful intervention of airway. Due to major airway trauma most of the patients dies in early hours either at site or in emergency room. We came across a very rare case of bronchial injury due to blunt chest trauma. Few such cases with tracheobronchial avulsion due to blunt chest trauma have also been reported earlier [1,2]. An injury occurring between the cricoid cartilage and division of lobar bronchi into their segmental branches is classified as a TBI [3]. There are various mechanism for TBI:

- Due to trauma (blunt/penetrating)
- Iatrogenic
- Inhalation of toxic fumes/Aspiration

In blunt trauma the recognition and diagnosis of TBI is very difficult due to non specific clinical sign and symptoms. Once you have a very high index of suspicious of TBI from mechanism of injury like high speed motor vehicle collision, fracture of first three rib and fracture of scapula than you should look after that immediately. The mechanism of TBI due to blunt trauma can be classified into three types-explosive rupture of tissues due to reflex closure of glottis, due to development of shearing forces at the cricoid cartilage and carina and thirdly, due to chest compression along antero-posterior axis leading to tensile force development causing laceration at the level of carina [4]. In this case, the patient underwent emergency thoracotomy to avoid imminent respiratory insufficiency. To prevent any potential respiratory insufficiency or late complications (bronchial stenosis recurrent pneumonia and bronchiectasis) which results from untreated TBI in less severe cases [5].

In terms of clinical manifestations, according to the study of Nishiumi hemorrhagic shock with systolic blood pressure less than 80 mmHg and heart rates more than 120 beats/min are the best predictors of poor outcome in TBI. Reduced PaO₂ in ABG is not a poor prognostic factor for TBI. The most specific radiological characteristics is non-expansion of injured lung after ICD insertion [6]. Yet there is no radiographic finding in plain X-rays which is pathognomic of deep tracheobronchial injury. Some suggested radiographic findings are hemopneumothorax, with the extent of pneumothorax limited to within 5 cm of the apex area and the collapse rate never exceeding 30% [7,8].

The key to diagnosis in severe tracheobronchial injury is flexible bronchoscopy and CT scan which are complimentary to each other. These may show site, nature, and extent of injury. However, bronchoscopic findings in TBI could be unclear even for an experienced thoracic surgeon who is not well-acquainted with bronchoscopy [9]. The management of TBI can be non operative in patients who are: [10]

- Hemodynamically stable
- Small laceration <4 cm, not involving all layers
- With cuff positioned below the level of injury
- With no other major associated injuries

Massive hemothorax or massive air leakage with nonexpanding of lung are two indications for rapid surgical intervention in TBI. The

surgical approach depends on the site of injury. Right thoracotomy is the best approach to access the carina, lower part of intrathoracic trachea, right main stem bronchus and proximal 2 cm of the left bronchus [3]. Our patient underwent right posterolateral thoracotomy through seventh intercostal space and end to end anastomosis of injured bronchus was done under double lumen endotracheal tube after which two lung ventilation was resumed.

Conclusion

As in this case, when a massive air leakage continues despite appropriate chest tube drainage in blunt chest trauma, laceration of the tracheobronchial tree should be suspected, and an earlier decision for surgery is warranted and could be more secure and life saving in nature.

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