INTRODUCTION
Recent increase in traffic accidents has resulted in an increase in blunt Tracheobronchial Injuries (TBIs). In spite of improved emergency services and patient transport, many patients still die before reaching the hospital. Thus, prompt recognition and aggressive treatment is of utmost importance. However, it is very difficult to draw conclusions about the treatment methods.

Tracheobronchial lesions in blunt chest trauma are rare. The incidence is about 1%, but these are potentially life-threatening events. Indirect signs such as pneumothorax, pneumomediastinum, subcutaneous emphysema or an insufficient expansion of the lungs after drainage of a pneumothorax are ominous. The fastest and most reliable method to assess the definite diagnosis of tracheobronchial lesion is fiberoptic tracheobronchoscopy. Early surgical treatment is mandatory to prevent major pulmonary resection. The clinical picture is not a uniform one, and typical clinical signs occur often without an airway lesion. Therefore, the correct diagnosis may be delayed.

Here, we report a case of right main bronchus transaction resulting from severe blunt trauma, managed in a peripheral Army Hospital. Diagnosis of major airways injury was delayed but the patient had complete recovery with minimal residual disability.

CASE REPORT
A 35-year-soldier was crushed between two stationary heavy military vehicles when one of them was hit by a third one. He was evacuated to Combined Military Hospital (CMH), Bahawalpur, within 30 minutes of accident in a critical condition. There was severe respiratory distress, tension pneumothorax on right side and paradoxical breathing. Tension pneumothorax was managed immediately by passing a wide bore cannula in second intercostal space in midaxillary line followed by chest tube with under water seal. Due to paradoxical breathing and inability to maintain oxygen saturation on spontaneous ventilation, endotracheal tube was passed, and patient was put on positive pressure ventilation selecting ASV (Adaptive Support Ventilation) mode. Physical examination and portable radiographs showed multiple rib fractures on right side, anterior as well as posteriorly.

On the second day, weaning off from invasive ventilation in favour of non-invasive ventilation was planned. Both lungs were fully expanded and there was minimal air leak in chest tube. Thoracic epidural catheter was passed for pain relief, patient extubated on spontaneous ventilation and ventilatory support continued on CPAP (Continuous Positive Airways Pressure) mode in DuoPAP mode. The DuoPAP mode provides CPAP and pressure support to a spontaneously breathing patient, which can be adjusted as required. Ten centimeters of water CPAP and 15 centimeters of water pressure support was used.

On the third day, surgical emphysema developed around the chest tube, which extended within 24 hours to neck and upper chest. There was persistent air leak in the chest bottle, the amount varying from minimal leak to gross bubbling. On the 4th day of injury, patient became actually distressed with fall in oxygen saturation and gross surgical emphysema. He was reintubated and...
put on ventilatory support in CMV (Controlled Mandatory Ventilation) mode. Chest tube was explored and air leak was found alongside the tube. Tube was reaffixed with deeper stitches. Due to gross surgical emphysema and pneumomediastinum, on radiograph, a major airway injury was suspected (Figure 1). On the 5th day of injury, the Thoracic Surgery Department, CMH, Rawalpindi was updated on the condition of the patient and visit of a thoracic surgeon was requested for definite diagnosis and treatment. Transfer of patient to Rawalpindi was ruled out as well-equipped transport facility was not available for such a long distance. No other thoracic surgery setup was available nearby. The Pulmonology Department, Bahawal Victoria Hospital (BVH), Bahawalpur was requested fibreoptic bronchoscopy to assess an airway injury. The pulmonologist visited and advised conservative treatment and ruled out the requirement for bronchoscopy. While the arrival of thoracic surgeon from Rawalpindi was delayed for 2 days, the apparent urgency also appeared to be subsiding as the gross surgical emphysema gradually diminished, the air leak from the chest tube minimized, there was no pneumothorax, and pneumomediastinum had subsided.

On the 6th day after injury, early changes of Respiratory Distress Syndrome (RDS) appeared in the form of bilateral haziness and requirement of higher inspired oxygen and Positive End Expiratory Pressure (PEEP) to maintain normal oxygen saturation. This was ascribed to possible lung contusions. Parenteral nutrition was started through central venous line providing 2000 kcal and 60 grams protein daily. The thoracic surgeon arrived along with required additional equipment for possible surgery and double lumen endotracheal tubes for anaesthesia. Rigid bronchoscopy was planned which revealed a fractured tracheal ring at lower right trachea with minor air leak, thoracotomy was planned for next day. One lung anaesthesia with left sided 37 mm internal diameter broncho-cath (double lumen tube), placed and confirmed clinically, achieved a successful deflation of right lung during right thoracotomy. There was minimal fluid in pleural cavity, lung was adherent at apical level, and there was a haematoma under the mediastinal pleura. Dissection of pleura revealed almost complete division of tracheobronchial tree at junction of trachea and right bronchus (Figure 2) with granulation tissue obscuring the site. Azygos vein was divided, pleura and vagus were dissected off tracheobronchial area, margins of divided ends refreshed, inferior pulmonary ligament divided, and primary anastomosis of distal trachea and right main bronchus done with 3/0 vicryl interrupted sutures. Intercostal muscle flap was applied to cover the anastomosis. Lung expansion achieved to test air leak at 40 cm of water airways pressure. As there was no air leak, two chest drains were placed and wound was closed in layers.

For postoperative analgesia, 18 guage epidural catheter was placed in sixth-seventh thoracic epidural space. Bronchocath was replaced with an 8.0 mm single lumen tube. Patient was shifted to intensive care unit and put on ventilatory support, choosing ASV mode. A combination of antibiotics was started to ensure a comprehensive coverage. Despite the change of antibiotics according to culture reports, pulmonary infection persisted. On 6th postoperative day, tracheostomy was done to help in suctioning and continued ventilatory support in spontaneously breathing patient in ASV mode. On the 7th day, vancomycin was added in view of persistent infection. On the 9th day, fever settled, pulmonary secretions decreased, and radiographic haziness of lungs subsided. After few unsuccessful attempts patient was successfully weaned off ventilator on the 14th postoperative day. The main reason of failure was a plug of thickened secretions blocking a major airway, which had to be cleared by saline lavage and endobronchial suction. Tracheostomy tube was removed on the 17th day. Patient was gradually mobilized and the subsequent course was uneventful.

**DISCUSSION**

The rarity of major airway injuries due to blunt trauma and occult clinical nature of such injuries often result in a delay in diagnosis. Many patients with traumatic rupture of the tracheobronchial tree, die before reaching the hospital. In this case, the most prominent finding was gross surgical emphysema but that was a late development. Persistent leakage of air in the chest tube suggested a bronchopleural fistula but the amount of leakage progressively decreased suggesting a healing process. Even the surgical emphysema regressed after adjustment of chest tube and positive pressure ventilation. Bronchoscopy could not be arranged till the 6th day of injury but provided the best evidence of the injury. So, it is rightly accepted as the most useful diagnostic method. A study of 14 years experience in tracheobronchial injuries suggested that in patients with respiratory distress, blunt trauma and subcutaneous emphysema, bronchoscopy is useful to make a diagnosis, and should be employed aggressively in all such cases.
The surgical treatment of a major airway injury requires a thoracic surgical department due to the required surgical skills, specialized anaesthetic care, intra- and postoperatively, and the special instruments and equipment required. In the available literature, there is no evidence of such cases being repaired surgically in a peripheral hospital. Cases from periphery are transferred to tertiary care hospitals and specialized thoracic surgery departments. The last case of blunt trauma leading to tracheobronchial injury reported from Pakistan was by Ahmed et al. in 2006 and was treated in one of the best equipped teaching hospitals in Karachi,12 In the present case, resources were mobilized towards the patient as an attempt to transfer the patient to a distant thoracic surgery unit could have had serious consequences. It would have been impossible to manage an unstable patient during transfer without a very well-equipped air ambulance, which was not available.

We recommend that in all cases of severe blunt chest trauma, the possibility of major airways injury should be given due consideration. Bronchoscopy should be carried out in all cases having pneumothorax, pneumomediastinum and surgical emphysema. The risk of transportation of the patient to a specialized centre should be weighed against a possible local management. An outreach program by the specialized centres in such situations can help the peripheral hospitals to manage such cases.

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REFERENCES