Successful Non-operative Management of Tracheal Injury after Blunt Trauma in a Child: A Case Report

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Tracheobronchial injuries (TBI) are rare but potentially fatal complications of blunt thoracic trauma. Recent literature supports conservative management in selected stable cases. In this study, we describe the case of a pediatric patient with a tracheal tear that was managed successfully without surgical intervention.

In hemodynamically stable pediatric patients, even high-grade tracheal injuries may be managed conservatively with close intensive care unit (ICU) monitoring. Early multidisciplinary evaluation is essential.

TBI following blunt trauma is an uncommon but life-threatening condition, particularly in children. Blunt trauma accounts for approximately 94% of TBIs in pediatric cases, in contrast to penetrating trauma which predominates in adults [1]. Management options are typically guided by injury classification, such as the (American Association for the Surgery of Trauma [AAST] Grade III, Cardillo Level IIIA). Non-operative treatment may be appropriate in specific stable cases even in high-grade injuries, as illustrated in former literature [2,3].

PATIENT DESCRIPTION

A previously healthy 9-year-old boy was brought to the emergency department after a high-speed motor vehicle accident. Initial examination revealed stable vital signs (SpO_2 97%, Glasgow Coma Scale 15) and crepitus on the anterior neck. Notable findings included a seatbelt sign across the chest and neck, a frontal scalp hematoma, and a deformity of the left elbow.

IMAGING

Chest X-ray revealed extensive subcutaneous emphysema and pneumomediastinum [Figure 1A]. A computed tomography (CT) scan showed bilateral pulmonary contusions, pneumothorax, and a 2 cm posterior tracheal tear 0.5 cm above the carina [Figure 1B].

The tear fit AAST Grade III (laceration, full-thickness laceration less than 2 cm in length without cartilage loss) and Cardillo Level IIIA (complete laceration of all tracheal layers with mediastinal soft tissue herniation into the lumen or broad communication of the airway with the mediastinum).

Regarding the other injuries, there was a linear fracture in the frontal bone without intracranial hemorrhage, and a humerus fracture.

MANAGEMENT

A multidisciplinary team including surgery, anesthesia, and radiology elected for non-operative treatment based on clinical stability, imaging findings, and supported literature. The patient was managed in the pediatric ICU with continuous monitoring, oxygen via nasal cannula, pain control, physiotherapy, and serial imaging. Non-invasive ventilation and intubation were avoided to minimize barotrauma risk.

At 56 hours post-trauma, flexible bronchoscopy confirmed a healing scarred tracheal tear. No signs of progression or air leakage were observed. During hospitalization, a closed reduction of the humerus fracture was performed under sedation without airway instrumentation.

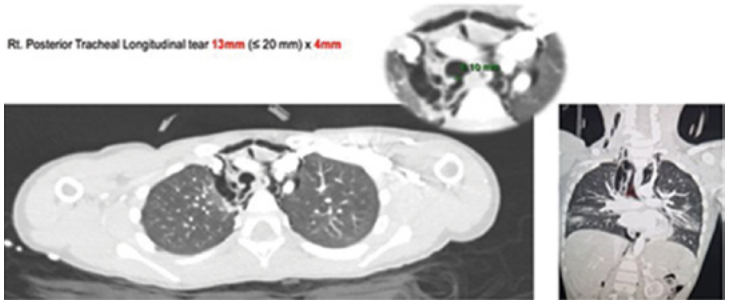
Discharge on day 9 was based on clinical resolution of subcutaneous emphysema, stable respiratory parameters, and confirmatory computed tomography. A follow-up bronchoscopy on day 18 showed satisfactory healing without complications. There was no ongoing treatment, and the patient was observed in pediatric orthopedic and pulmonary outpatient clinics with satisfactory healing for his humerus fracture and respiratory tract.

Written informed consent for publication was obtained from the patient's legal guardians.

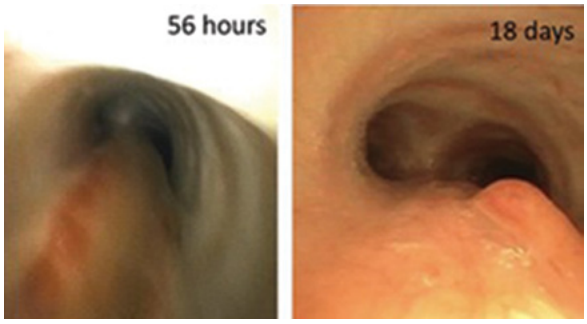
Figure 1. Images of tracheal tear

[A] Chest X-ray (anteroposterior view) on admission revealing marked subcutaneous emphysema (red arrow) and pneumomediastinum (angel wing sign, blue arrows)

[B] Computed tomography scan on admission showed bilateral pulmonary contusions, pneumothorax, and a 2 cm posterior tracheal tear 0.5 cm above the carina



[C] Bronchoscopy 56 hours after the trauma showing that the tear with scar=18 mm. Follow-up radiograph after 18 days showing that the tear did not expand, satisfactory healing process signs were observed



COMMENT

Tracheobronchial injuries are often underdiagnosed, especially in multi-trauma settings. Patients with blunt chest trauma frequently have concomitant injuries to the head, abdomen, or skeleton.

TBIs in children are rare and challenging. Compared to adults, children may present with more subtle signs despite significant injury due to greater tracheal elasticity. Typical pediatric TBI management includes airway stabilization, bronchoscopy, and CT imaging. While surgical repair is traditional for full-thickness tears, recent reports suggest non-operative approaches may suffice in hemodynamically stable cases, especially with short tears (< 2–3 cm), absence of esophageal injury, and no ventilatory dependence [4,5].

The AAST classification grades tracheal injuries by depth and extent. The Cardillo system, typically used in adults, considers anatomic disruption and mediastinal communication. Our patient had Cardillo Level IIIA (complete tear with mediastinal involvement)

Non-operative management is suitable for selected stable cases because it avoids surgical complications. It is also reported to have favorable outcomes in those cases. Nonetheless, non-operative management requires intensive monitoring, does not reduce the risk of delayed complications, and is still limited to specific indications.

Our case supports this non-surgical approach, highlighting the importance of early detection, multidisciplinary input, and access to high-level monitoring.

CONCLUSIONS

TBIs in stable pediatric patients may be treated by nonoperative methods even when traditionally considered for surgical repair. Clinical vigilance and a multidisciplinary framework are essential for favorable outcomes.

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