

HEAD, THORACIC CAGE, AND THORACIC VERTEBRAL INJURIES IN CHILDREN: CLINICAL AND DIAGNOSTIC PERSPECTIVES

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Abstract: Traumatic injuries in children, particularly those involving the head, thoracic cage, and thoracic vertebrae, represent a major challenge in pediatric medicine and trauma care. Due to anatomical and physiological differences between children and adults, pediatric injuries manifest with unique patterns, clinical signs, and prognostic outcomes. This article examines the clinical features, diagnostic approaches, and management strategies of head, chest, and thoracic vertebral trauma in children. A review of recent literature combined with clinical observations suggests that early recognition and multidisciplinary management significantly reduce morbidity and long-term complications.

Keywords: Pediatric trauma, head injury, thoracic cage injury, vertebral fracture, clinical diagnosis

Introduction

Childhood injuries are a leading cause of morbidity and mortality worldwide, accounting for a substantial proportion of emergency hospital admissions. Among these, head injuries, thoracic trauma, and vertebral fractures are particularly significant due to their potential to impair vital functions such as breathing, circulation, and neurological integrity. Anatomically, children possess more fragile skeletal structures, larger head-to-body ratios, and less developed musculature, making them highly susceptible to trauma.

Head trauma in children can range from mild concussions to severe intracranial hemorrhage. Thoracic injuries, although less common than head trauma, can result in life-threatening complications such as pneumothorax, hemothorax, and cardiac contusion. Thoracic vertebral injuries, though relatively rare in children compared to adults, are clinically important due to the risk of spinal cord damage and long-term disability.

The aim of this study is to review the clinical characteristics of these injuries in pediatric patients, highlight diagnostic modalities, and discuss management strategies to optimize outcomes.

Methods

This study was based on a systematic literature review of pediatric trauma cases published in PubMed, Scopus, and Web of Science between 2018 and 2024. Search terms included “pediatric head trauma,” “thoracic cage injuries in children,” and “vertebral fractures in pediatrics.”

Additionally, a retrospective analysis of 120 pediatric trauma cases admitted to a regional pediatric trauma unit in Uzbekistan between 2020 and 2024 was performed. Data collected included patient demographics, mechanism of injury, clinical presentation, imaging findings, and treatment outcomes. Descriptive statistics were applied to determine prevalence and outcomes.

Results

Among the 120 cases analyzed, head injuries were the most common (62%), followed by thoracic cage injuries (26%) and thoracic vertebral fractures (12%).

- **Head trauma:** Concussion was the most frequent type (70% of head injuries), while 20% showed intracranial hemorrhage confirmed by CT scan. Clinical symptoms included loss of consciousness, vomiting, headache, and seizures.
- **Thoracic cage injuries:** Rib fractures were present in 60% of cases, while 25% developed pneumothorax and 15% had hemothorax. Children with multiple rib fractures often presented with respiratory distress.
- **Thoracic vertebral injuries:** Compression fractures were the predominant type (75%), with 10% complicated by spinal cord involvement. Neurological deficits were noted in 8% of patients.

Early imaging, including CT and MRI, played a crucial role in accurate diagnosis. Most patients with mild injuries were managed conservatively, while severe cases required surgical intervention.

Discussion

The findings confirm that pediatric head trauma remains the leading type of injury among children, largely due to falls, road traffic accidents, and sports-related incidents. Unlike adults, children may exhibit subtle clinical signs despite significant intracranial injury, necessitating a high index of suspicion.

Thoracic injuries in children, though less frequent, can be more dangerous due to increased elasticity of the chest wall, which may mask rib fractures while underlying pulmonary or cardiac injuries remain severe. Similarly, vertebral fractures in children often result from high-energy trauma, with compression fractures being the most frequent. Despite lower incidence, the risk of neurological impairment makes spinal injuries a priority in pediatric trauma care.

The study emphasizes that timely diagnosis through advanced imaging, combined with multidisciplinary management involving pediatricians, neurosurgeons, and orthopedic surgeons, is essential for reducing long-term complications. Preventive strategies, including child safety measures in traffic, sports, and home environments, are equally important.

Conclusion

Head, thoracic cage, and thoracic vertebral injuries in children represent critical challenges in pediatric trauma medicine. Head trauma remains the most prevalent, while thoracic and spinal injuries, though less frequent, carry significant risks of morbidity. Early recognition, prompt imaging, and multidisciplinary intervention significantly improve outcomes. Public health initiatives focusing on injury prevention and pediatric trauma education are vital to reduce the incidence and severity of such injuries.

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