

Case Report

High energy pediatric fall with minor injuries

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ABSTRACT

Fall from height traumas are considered of **high energy**, being a significant cause of morbidity and mortality, especially when greater heights are involved. Minor repercussions or expectant health care provided in **high-energy** falling trauma have been scarcely reported. This case report describes a healthy female child's history, a victim from a high energy trauma, and considerable potential risk of severe injuries, which surprisingly showed minor repercussions. She was founded on the floor, walking, and was brought to the hospital by the local primary trauma emergency service. The initial trauma evaluation found nothing, except a small wound on the chin. A full-body CT-SCAN (Computerized Tomography Scan) was performed and diagnosed with a small laminar pneumothorax, which did not need medical procedures or interventions. She evolved well during the hospitalization, and daily chest X-rays showed the regression of the pulmonary lesion. She had hospital discharge after a few days with no sequels. This case report is probably unique, and apparently, few situations like this were previously published.

Introduction

Falls from height traumas (FFHT) are considered to be related to high energy, being a significant cause of morbidity and mortality. Literature reports a direct relationship between the height of the fall and the probability of death. Despite being already questioned as a trustful indicative of severity, the height is one of the most commonly used parameters in the trauma screening [1,2]. Accidents are the largest cause of death in children under 15 years, responsible for 20% of accidental deaths [3]. In pediatrics, falls are prevalent. Demographics and risk factors have been described in observational studies and cohorts, and measures have been proposed to reduce these accidents' frequency and morbidity [4]. However, high-energy falling trauma case reports in preschool-age have been scarcely reported, as well as evolution and outcomes with minor repercussions. This case report describes patient care that involved these fortuitous circumstances.

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Case report

A female patient of 2 years and 4 months, with 10 kg (22,05 pounds), without previous comorbidities, was admitted to the Emergency Room of the Hospital do Trabalhador, in Curitiba, State of Paraná (Brazil), at 3:40 pm on 9/3/2020. She was a victim of an FFHT, due to a 10 meter fall (32,8 ft), from the fourth floor, directly on the ground. She was found on the ground floor walking and was brought by Integrated Service for Emergency Trauma - Paraná (SIATE), immobilized in Kendrick Extrication Device (KED) (Fig. 1).

Primary Trauma Assessment (ABCDE):

- A - Pervious airway, with a cervical collar, KED and long rigid board;
- B - Present vesicular murmur, symmetric bilaterally. Preserved thoracic expandability, despite excoriation in the right hemithorax, SpO₂%; 98% with oxygen mask with reservoir, at 8 L/min;
- C - Full pulses, HR 150 bpm, rhythmic and normophonic heart sounds in 2 times, without murmurs. Flaccid and painless abdomen;
- D - Glasgow Coma Scale (GCS) score of 14 (patient crying and eventually sleepy). Isochoric and photoreagent pupils;
- E & Secondary Assessment - Corto-contusive wound of approximately 2 cm, on chin, abrasions on the face, and on the right hemithorax. Stable pelvis.

The Injury Severity Score (ISS) was 9, and the Pediatric Trauma Score (PTS) was 10. Peripheral venous access and analgesia were done. A whole-body CT-SCAN was performed, and a left laminar pneumothorax, such as a slight peripheral opacity in the lingula. This was compatible with pulmonary contusion. Spinal or cranioencephalic lesions were not present (Fig. 2).

The pneumothorax was managed conservatively, and immediate drainage was not performed. She was followed-up by being monitored in the Emergency Room. The patient started fasting, was administered with cefazolin sodium, dipyrrone, and transferred to the Pediatric Intensive Care Unit (ICU) with an observation plan. After 24 h, without the necessity of any procedure, the pneumothorax regressed. On 09/07/2020, the child was in good general condition, active, reactive, stained, hydrated, stable, and without pain or physical examination changes. Control X-ray showed a regression of the pneumothorax. The patient was discharged, only having a chin suture (Fig. 3).

Discussion

The height at which the fall occurs is one of the predictors of severity in pediatric trauma. In this case report, a 2-year-old child fell from a height of 10 m. This height is commonly considered a high-risk factor for severe injuries and increased mortality, especially in trauma services screening. However, the authors' relevance as an isolated factor had already been questioned, who found no significant relationship [5].

In addition, it is essential to consider orotracheal intubation and blood transfusions when it comes to the management of high kinetic energy traumas. It is frequent to find these patients with GCS less than 8 [5]. However, the patient in the reported case did not present any of these particularities.

There are few case reports in the literature of high plane falls related to minimal injuries. One such case was reported by Michele Zasa [6] in which a 16-year-old boy fell 15 m and showed minimal injuries, remained conscious, and had only distal lesions in his limbs. He was submitted to orthopedic surgeries, evolved well, and was discharged after some weeks.

Smith et al. [4] pointed out the flexibility of the thoracic bone framework in children as a protective factor against rib fractures and severe lung injuries. For this reason, most pediatric lung contusions are due to blunt trauma. The most common injuries in high plane



Fig. 1. Female patient during her arrival in the emergency room.

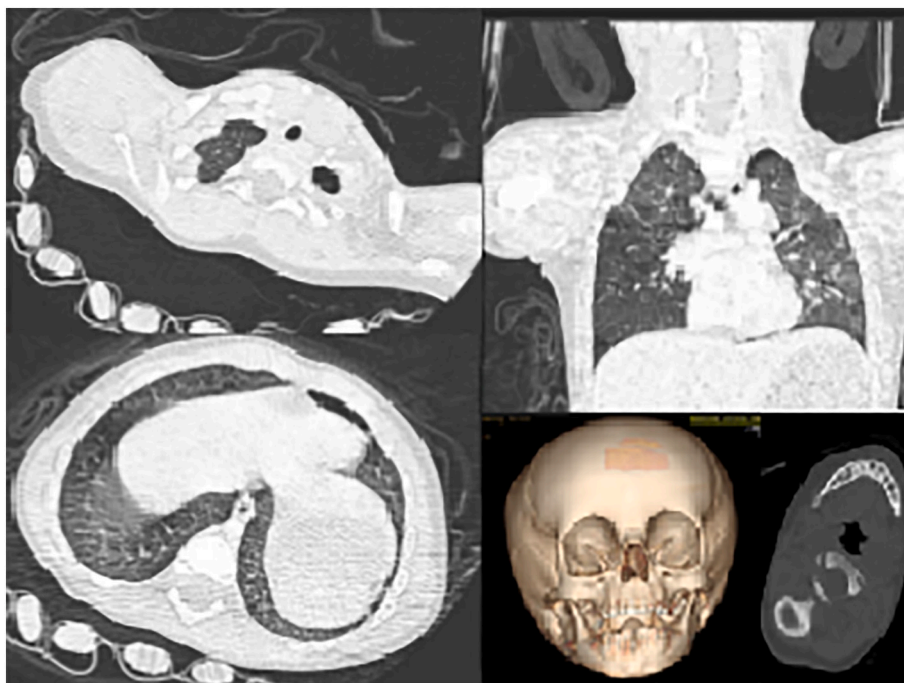


Fig. 2. Left laminar pneumothorax and peripheral opacity in the lingula compatible with pulmonary contusion. The initial suspicion of skull base fracture was excluded on CT-SCAN.

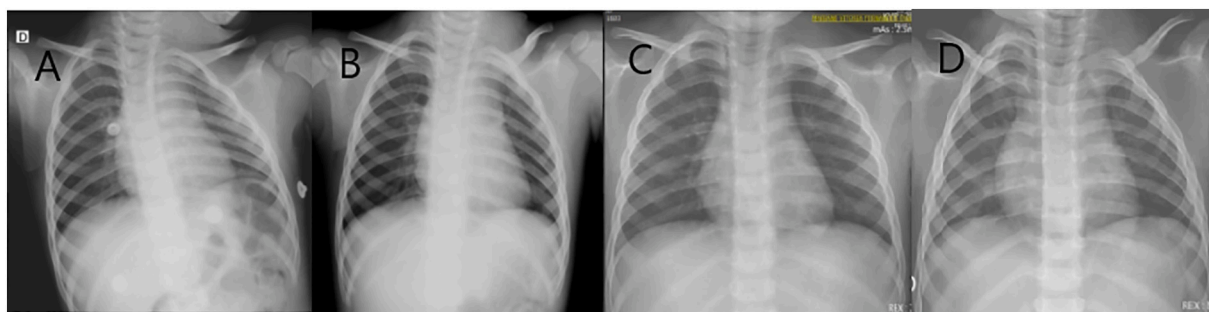


Fig. 3. Serial X-ray during hospital stay showing spontaneous pneumothorax regression, without the need of surgical procedures. (A) 03/09, (B) 04/09, (C) 05/09, (D) 07/09.

fall trauma in small children occur on the head, chest, pelvis, and spine. On the other hand, the larger the child, the greater the chance of finding more peripheral lesions due to the greater ability to protect the central organs with the limbs [5]. That said, the two-year-old child, in this case, would be susceptible to more central lesions, but with a protective factor to chest fractures.

There is a significant statistical correlation between mortality and ISS [7]. The increase in mortality from falls from height was related to a higher age [8], to a surface type that absorbs less impact (higher mortality if the surface deformability is lower) and the first part of the body that impacts the ground [2]. In the reported case, the child had a direct and free fall against the concrete sidewalk (she did not collide with bulkheads during the fall). This type of surface has a low level of deformity and is, therefore, a risk factor for increased mortality; however, the child had minimal injuries, which justifies part of this case report's relevance.

The following are predictors of outcome in severe trauma in children: ISS greater than or equal to 25, GCS less than or equal to 7, blood transfusion in the emergency room greater than or equal to 20 mL/kg, and PTS (Pediatric Trauma Score) less than or equal to 4 [9]. In addition, Orliaguet et al. [9] concluded that traumatic death is practically zero in children with none of these reference values and 63% (with 9% confidence) in children with all values. Thus, with the use of these evaluations, it can be inferred that this child had a low chance of death.

In addition, a seasonal relationship of accidents due to falls in children was shown, with the highest incidence between May and August - which correlates with the summer school vacation period in North America [10]. This data suggests a positive correlation between a long time at home and this type of accident. At the same time, it is essential to think about the impact of social isolation at

home during the COVID-19 pandemic. Activities in daycare centers and schools were suspended when the accident reported in this case occurred.

Finally, more studies are needed to discover hypotheses that justify minimum injuries like this one. It is essential to point out that these cases seem to be punctual, with very few reported, and that high-energy accidents in children can be very morbid. For this reason, we emphasize the importance of investing in programs of prevention and awareness about accidents, as well as prevention and monitoring of childhood negligence.

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