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Traumatic Pneumopericardium and Diffuse Subcutaneous Emphysema in a Child- A Case Report and Review of the Literature

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Abstract **Case Report**

Pneumopericardium is defined as air inside the pericardial space. Pediatric pneumomediastinum and subcutaneous emphysema is an uncommon condition can occur due to various reasons : infection, trauma, foreign body aspiration, coexisting structural lung pathology or iatrogenic. It rarely happens after chest trauma. We are here to report a child 8 year old involved in a tackle during a recreational football game with clinically and radiologically affirmed pneumopericardium and diffuse sub cutaneous emphysema caused by chest trauma that was spontaneously relieved.

Keywords: Pneumopericardium, child, pneumomediastinum, subcutaneous emphysema, trauma.

INTRODUCTION

Pneumopericardium is rare occurrences in children, but it can results in potentially life-threatening consequences. Pneumopericardiun is secondary to pneumomediastinum when great forces applied to the chest provoke the passage of air from the mediastinal space to the pericardial space [1]. We report a case of chest pain secondary to pneumopericardium associated to pneumomediastinum and subcutaneous emphysema in a child as a result of chest trauma during a recreational football game.

CASE REPORT

During a recreational football game, an 8-year-old boy was involved in a tackle. One opposing player (weighing approximately 50 kg) tackled him from behind, causing him to fall to the ground while holding the ball and to receive chest compressions from the tackler. The child continued the match without any clinical signs or symptoms. Three days later, the child presented with a progressively worsening dry cough with swelling in the chest, neck, face Figure 1 and both upper limbs. He reported no history of asthma or previous thoracic injuries or foreign body.

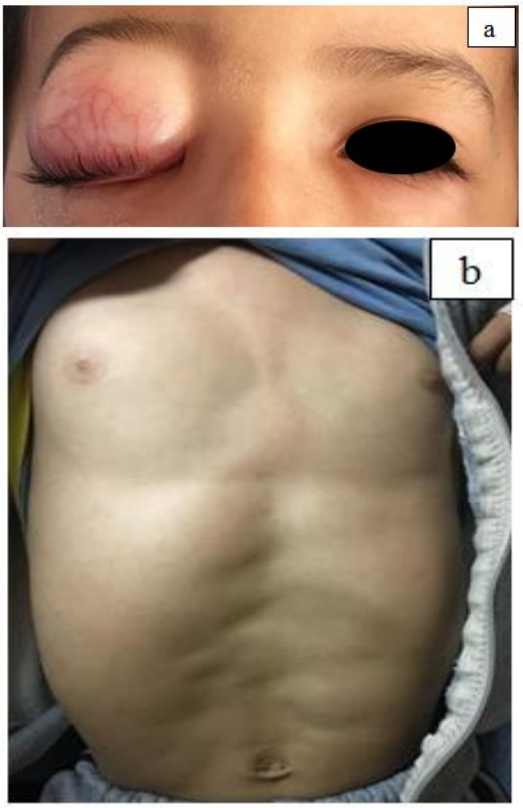

Fig-1: *At admission:* A: Palpebral swelling, B: swelling in the chest

On physical examination, the child presented normal vital signs:

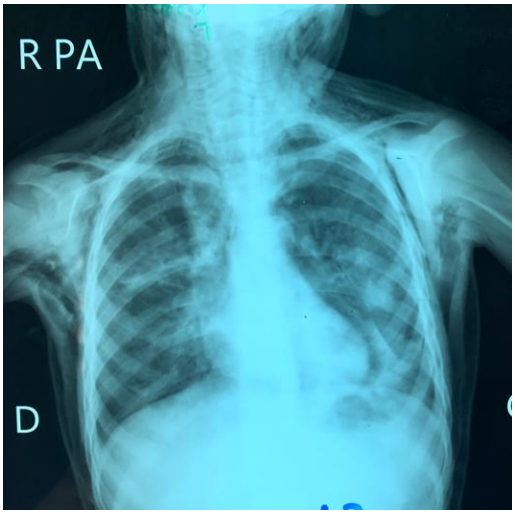

Fig-2: Chest X-ray shows radiolucent halo within the pericardium with sub cutaneous emphysema

Body temperature was 36.9°C, respirations were 23 breaths/min, heart rate 120 beats/min, oxygen saturation was 97% on room air, blood pressure 105/50 mmHg, and normal peripheral perfusion. No hematoma of the chest wall or external signs of sternal and rib contusions or fractures had been seen at the observational findings. However, palpation revealed a crackling sound and sensation crepitus in the affected area. Auscultation decreased in heart sounds. Chest X-ray Figure 2 and CT scan showed pneumopericardium, pneumomediastinum and diffuse subcutaneous emphysema Figure 3 without being able to detect the origin of the injury. Biological assessment and bronchoscopy findings were normal.

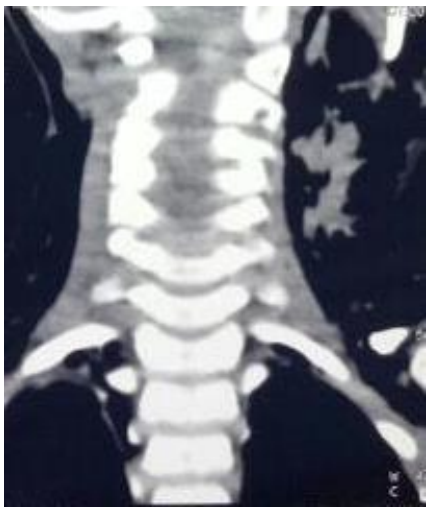

Fig-3: Coronal section computed tomography of the neck shows subcutaneous emphysema

The patient spent two days in the pediatric intensive care unit received non-invasive monitoring, analgesics and gastric protection, and then transferred to the pediatric department following the same procedure. A marked improvement was noticed from the tenth day while complete resolution of subcutaneous emphysema Figure 4 and pneumopericardium Figure 5 resolves after one month.

Fig-4: *One month later:* Total resolution of subcutaneous emphysema

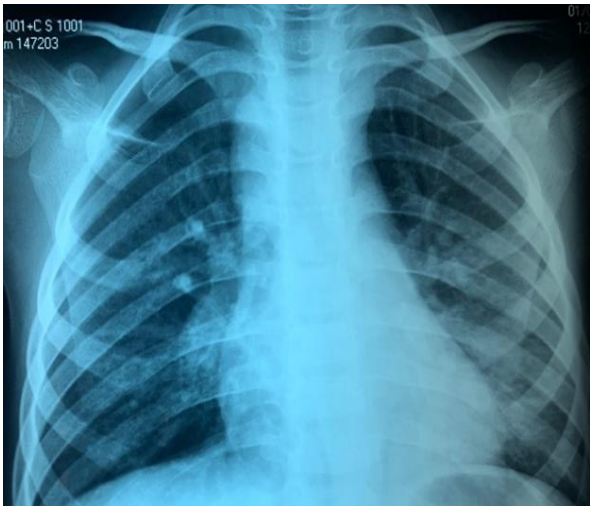

Fig-5: *One month later:* Chest x-ray shows total resolution of subcutaneous emphysema and de pneumopericardium

DISCUSSION

Regardless of the sport, pneumomediastinum is rare [2-4]. The combination of pneumomediastinum, pneumopericardium diffuse subcutaneous emphysema is a very unusual consequence of injuries to children that occurred during sports.

Subcutaneous emphysema can result from surgical, traumatic, infectious, or spontaneous etiologies. Injury to the thoracic cavity, sinus cavities, facial bones, barotrauma, bowel perforation, or pulmonary blebs are some common causes. Iatrogenic causes may occur due to malfunction or disruption of the ventilator circuit, inappropriate closure of the pop-off valve, Valsalva maneuvers that increase thoracic pressure, and trauma to the airway. Air may enter into the subcutaneous spaces via small mucosal injury in the trachea or pharynx during traumatic intubation, overinflation of endotracheal tube cuffs, or increased airway pressure against a closed glottis [5].

Obtaining full history is critical to explore the causes of subcutaneous emphysema and its complications. On physical examination, the most common finding associated with subcutaneous emphysema is crepitus on palpation. Distention or bloating may be present in the abdomen, chest, neck, and face. Palpebral closure resulting in visual distortion and phonation changes from vocal cord compression may also be present [6, 7].

A chest radiograph is the first diagnostic step to identify thoracic injuries and confirm the diagnosis of PM and PP [8]. An anterior-posterior radiograph would demonstrate a thin gas line around the different mediastinal structures: multiple thin and lucent streaks in pneumomediastinum and a broad band (halo sign), often with visible thickening of the pericardium, in pneumopericardium.

Treatment of the underlying cause or precipitating factor should be considered first because it usually leads to gradual resolution of the subcutaneous emphysema. For mild cases that do not cause significant patient discomfort, observation is appropriate [9]. Resolution of subcutaneous emphysema will likely resolve in less than 10 days if source controlled [10].

Most cases are self-limiting, and recovery usually occurs in 2 weeks, but life-threatening events can result when PM or PP leads to compression of the heart and the major vessels in the mediastinum, similar to cardiac tamponade, as reported occasionally in pediatric patients. Surgical intervention to decompress a tension pneumopericardium or pneumomediastinum is occasionally indicated in these post traumatic conditions [11]. The majority of subcutaneous emphysema is nonfatal and self-limited [9].

CONCLUSION

In children, pneumomediastinum and pneumopericardium are rarely reported simultaneously [12, 13] and even less often as complications of trauma during sports [14, 15]. The apparently simple resolution of most cases of them should not mask the real risk of severe complications, such as mediastinitis and pericardial effusion with cardiac tamponade.

A child who complains of pain after chest trauma during a match needs adequate evaluation, and coaches must be alert to injuries. Then referred the nearest emergency department to have immediate management. A short hospitalization can limit the risk of complications. Management should be tailored, depending on the history, age, and clinical conditions of the child [16].

Conflicts of interest

There are no conflicts of interest.

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