

Penetrating and Basilic Trauma of the Thorax in a Context of Difficult Diagnosis at the Pediatric Hospital of Bangui (Central African Republic)

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How to cite this paper: Ouäïmon, D.S., Sapiro, J.I.J., Packo, N.G. and Youssof, O. (2023) Penetrating and Basilic Trauma of the Thorax in a Context of Difficult Diagnosis at the Pediatric Hospital of Bangui (Central African Republic). *Open Journal of Pediatrics*, 13, 657-662.

<https://doi.org/10.4236/ojped.2023.135073>

Received: July 15, 2023

Accepted: September 4, 2023

Published: September 7, 2023

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Abstract

Appropriate management of penetrating trauma to the thorax requires knowledge of vulnating agents, as well as the principles of ballistic injury. The importance of the approach's choice for surgical exploration of these injuries, and parietal damage, is an essential factor in decision making in the management and definition of the therapeutic strategy for these injuries. The authors report a clinical case of a penetrating traumatic ballistic wound of the thorax managed in a context of difficult diagnosis in the surgical Unit of the CHUPB.

Keywords

Firearm Wound, Thorax Trauma, Child, CAR

1. Introduction

Ballistic trauma of the thorax is defined as all open or closed traumatic injuries of projectile origin, involving the thoracic walls and possibly the visceral contents, located between the base of the neck, the lower limit of the ribs and the diaphragm [1]. These are frequent and serious lesions, characterized by the multiplicity of clinical presentations and the frequency of associated lesions, particularly abdominal. They are life-threatening due to blood spoliation, respiratory distress and infectious risks. The vulnating agents involved in ballistic trauma are diverse and varied, and are essentially represented by projectiles of two types:

1) shrapnel of any size, shape, weight, velocity and nature from an explosive device (bomb, shell, rocket, grenade) 2) bullets fired from individual shoulder or handguns with well-defined ballistic behavior [2] [3]. The patient described in that study was victim of a shoulder-fired bullet. Multidisciplinary management can improve survival and prognosis, thanks to advances in resuscitation, treatment and modern imaging, combined with rapid medical evacuation to hospital if possible. We report a clinical case of a penetrating traumatic ballistic wound of the thorax in the surgical department of the CHUPB.

2. Medical Observation

On March 30th, 2023, a 12-year-old boy weighing 33 kg was admitted to the surgical emergency department of the CHUPB 45 minutes after a shooting incident resulting in a traumatic gunshot wound to the chest. He was evacuated to hospital by motorcycle cab, as no medical ambulance was available. As a circumstance, during a police ID check in one of the city's suburbs. The exchange between police and local youths was marked by gunfire. On his way to school, he was ambushed and shot in the chest around 6 am (Figure 1). He had no particular pathological antecedents.

On admission to the emergency department, the patient was unstable and on oxygen at 5 l/min. Examination on admission revealed stage I coma with altered consciousness of the obnubilatory type, temperature 37.8°C, SpO₂ 88%, blood pressure 09/06 mmHg, pulses thready, heart rate 102 beats/min, respiratory distress with 64 cycles/min, indicating hypovolemic shock. Physical examination revealed a traumatic gunshot wound to the right hemithorax with a costal flap, the portal of entry being at the base of the scapula, measuring 1 cm long with a regular edge, and the portal of exit opposite the 3rd and 4th right intercostal spaces, expelling part of the right lung, measuring 8 cm long with an irregular edge, with loss of bone substance, very haemorrhagic (Figure 2), pain and shortness of breath, the right hemithorax was immobile with abolition of vocal vibrations and vesicular murmur. The left lung, heart and abdomen were unremarkable, and the rest of the examination was normal. Management was carried out by a multidisciplinary team consisting of a resuscitator, a paediatrician and a paediatric surgeon, without thoraco-abdominal ultrasound, chest X-ray or chest CT scan, due to the parents' lack of financial resources. In view of this picture, an emergency blood count showed regenerative normocytic normochromic anaemia (haemoglobin level 8 g/dl), with GS/Rh (O+). Admitted to the OR after a 500 ml transfusion of iso group, iso rhesus blood and installed on an operating table under general anaesthesia, orotracheal intubation (OTI).

Careful trimming of the entry and exit ports was performed, followed by careful, gentle reintegration of the externalized portion of the right lung, saline flushing and thoracic drainage through the wound. The prescribed treatment was rehydration with saline alternated with Ringer lactate (30 ml/kg/24 h), prophylactic antibiotic therapy Ampicillin 1 g (200 mg/kg/24 h) every 6 h, gental-

line 80 mg (5 mg/kg/24 h), analgesics paracetamol 1 g (60 mg/kg/24 h) every 6 h. Vital parameters were monitored (pulse, respiratory rate, blood pressure, SpO₂, temperature). After 5 days in hospital, with hyperthermia at 39.5°C and respiratory distress at 60 cycles/min, a frontal chest X-ray was taken, revealing a right hemothorax (**Figure 3**), prompting thoracic drainage with a Ch16 chest tube, which yielded 480 ml of serosanguinating fluid. A second blood transfusion of 500 ml was performed. After 16 days in hospital, the evolution was unremarkable. The pleural drain was removed on the fifth day, and the follow-up chest X-ray revealed right parenchymal condensation with filling of the right costodiaphragmatic cul de sac. The patient's general condition improved, and discharge was decided. Reviewed 10 years later, in the light of favourable healing (**Figure 4**), the skin suture was completely removed.



Figure 1. Ballistic penetrating wound of the right hemithorax.

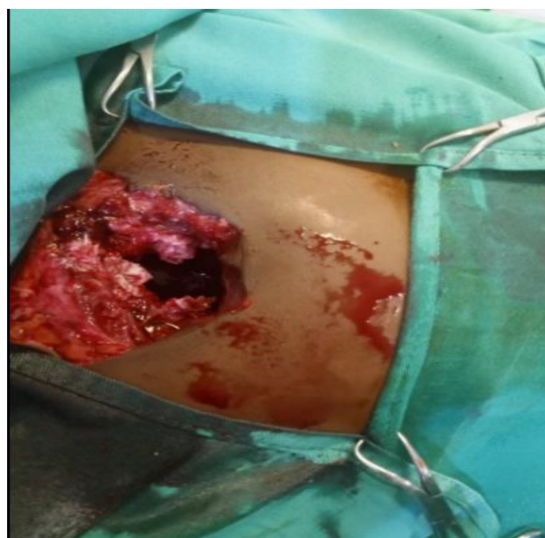


Figure 2. Right hemithorax penetrating wound after reduction of the right lung and demonstration of the right 3rd, 4th rib flap.



Figure 3. Right hemothorax.



Figure 4. Healing after 10 hours.

3. Discussion

Penetrating and ballistic trauma of the thorax is a frequent and serious injury, characterized by the multiplicity of clinical presentations and the frequency of associated injuries, particularly abdominal. They are life-threatening due to blood spoliation, respiratory distress, and the risk of infection due to contamination of the wound [2].

The vulnating agents involved in ballistic trauma are diverse and varied, and are essentially represented by projectiles of 2 types: shrapnel, which causes polycombing, and bullets fired from handguns or long guns.

A bullet is defined by several parameters: its calibre, its muzzle velocity (from 100 ms/s to 1280 m/s) and its weight, which varies from 3 to 30 g [2] [3]. In our context, the bullet has not been identified, according to the witnesses. The police used point weapons or pistols, but we have the entry and exit points attesting to

a ballistic thoracic wound. This act testifies to the mentality of the population, characterized by social violence, also found in the series by Adegboye, *et al.*, Nigeria, Yena, *et al.*, Mali, Randdriamananjara, *et al.*, Madagascar [3] [4] [5]. The clinical picture observed resembles that usually described in the case of penetrating ballistic chest wounds, the particularity being the direct communication of the thoracic cavity with the exterior through the entry and exit orifices, which emit a murmur in phase with the respiratory movements during the passage of air, accompanied by respiratory distress and haemodynamic disturbance [6] [7] [8] [9].

Management begins on admission, with conditioning of the injured patient: rehydration, blood transfusion, antibiotic therapy. This multidisciplinary approach has improved survival and prognosis, thanks to advances in resuscitation. The indication for surgery, the delay, was not contested, as the patient was taken into care immediately after resuscitation, despite the context of poor lesion diagnosis due to the absence of imaging. All authors agree that the delay for a thoracotomy indicated for a penetrating thoracic wound should be as short as possible if a good result is to be hoped for [10] [11] [12]. Modern imaging combined with rapid evacuation to hospital, if possible with medical assistance, may require urgent chest drainage and airway intubation, pending thoracotomy or even thoracoscopy [11] [12] [13]. Placement of a chest tube in the field is the essential procedure, often sufficient (70% - 80%), and essential for monitoring. Mortality in chest wounds improved markedly during the twentieth century, thanks to advances in resuscitation, transport time and surgery [14]. Management of penetrating chest trauma begins in the pre-hospital setting with life-saving measures: needle exsufflation followed by elementary surgical procedures: chest drainage, tracheotomy and thoracotomy. The surgical strategy is then determined by hemodynamic status, ultrasound and chest X-ray. In unstable patients (10% of cases), surgical hemostasis should not be delayed. In stable patients (90% of cases), a CT scan or endoscopy completes the assessment. Thoracoscopy allows exhaustive exploration of the cavity and simple hemostasis procedures.

The absence of mediastinal lesions or abdominal cavity organs, and the timely and appropriate management of our patient by a multidisciplinary team, enabled a favorable outcome. However, our patient's condition caused a two-month delay in his studies, and he is now back with his classmates.

4. Conclusion

Ballistic thoracic injuries are polymorphous, imaging is necessary to assess the injury, and the therapeutic approach is multidisciplinary. Treatment of projectile injuries must always be tailored to the wound, not the weapon. Initial management is based on emergency measures to ensure freedom of the upper airway and pleural vacuum, as well as treatment of visceral injuries. Emergency thoracic drainage remains an essential part of their management.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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