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Closed Trauma of the Abdomen by Blast Effect

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Abstract **Case Report**

Introduction*:** Close abdominal trauma is common. These traumas occur in the context of road accidents, landslides, attacks. The mechanism of these injuries can be: by direct shock or by indirect shock (blast effect). We report a case of closed trauma of the abdomen. by blast effect following a mishandling of a firearm followed by a review of the literature. ***Observation: This is a 26-year-old young man, admitted to the emergency room of the G-point University Hospital for abdominal pain after trauma to the buttock by a firearm with closed trauma to the abdomen. The evolution 10 hours after the accident was marked by abdominal pain associated with hemodynamic instability which prompted an emergency laparotomy which led to the discovery of a parietal hematoma and a hematoma of the meso going from the sigmoid colon to the rectum. Treatment for evacuation of parietal hematoma, trimming of the entrance door.

Keywords: Closed Trauma, Abdomen, Blast Effect.

INTRODUCTION

Closed abdominal trauma, also called abdominal contusion, is lesion produced at the level of the abdomen, its contents or its walls, by trauma having respected parietal continuity. Blast trauma is an injury caused in an organism exposed to a shock wave during an explosion [1]. Its frequency is approximately 14% of hospitalizations [2]. It is the second cause of death of basté victims, after pulmonary lesions. Digestive lesions can result in painful symptoms (abdominal pain, tenesmus), digestive hemorrhages, and peritoneal syndrome due to digestive perforation [3]. The major problem is to recognize the indications for laparotomy, particularly in secondary perforations. We report a case of closed trauma of the abdomen by blast effect.

OBSERVATION

A 26-year-old man, with no particular medical or surgical history, was seen in the emergency department of Point G University Hospital for abdominal pain. The interrogation reveals a notion of trauma to the left buttock by firearm which occurred 10 hours previously. He was on a motorcycle and carried his rifle on his shoulder. He apparently lost control of his machine which led to his fall, and the triggering of his weapon with bullets hitting his left buttock. Taken to the nearest health center, he received local care and was then referred to us for further treatment. On admission, the clinical examination found abdominal pain, a flat abdomen with a left supra-umbilical arch. Palpation of the abdomen caused pain in the left hypochondrium. The proctological examination found a wound with a jagged edge (entrance) at the level of the supero external quadrant of the left buttock (fig. 1). The rectal examination was painless. Conjunctival pallor, body temperature was 37.4ºC, pulse 111beats/min, respiratory rate 32 cycles/min, blood pressure 90/50mmhg. The controlled hemoglobin level returned to 7g/dl. An x-ray of the pelvis made it possible to objectify the presence of multiple opaque nodular images in projection of the left iliac wing with a loss of continuity involving the left iliac wing.

Faced with this picture of abdominal pain associated with hemodynamic instability, we decided to urgently operate on the patient via a median above and below umbilical approach. At celiotomy, exploration finds a meso hematoma going from the sigmoid colon to the rectum, (fig. 2) and a left parietal hematoma with active bleeding from the epigastric vessels (fig. 3).

The remainder of the abdomen was unremarkable. The procedure performed was the evacuation of the parietal hematoma, hemostasis, closure

after the installation of a parietal drain, debridement of the buttock wound after extraction of the cartridge. The postoperative course was simple.

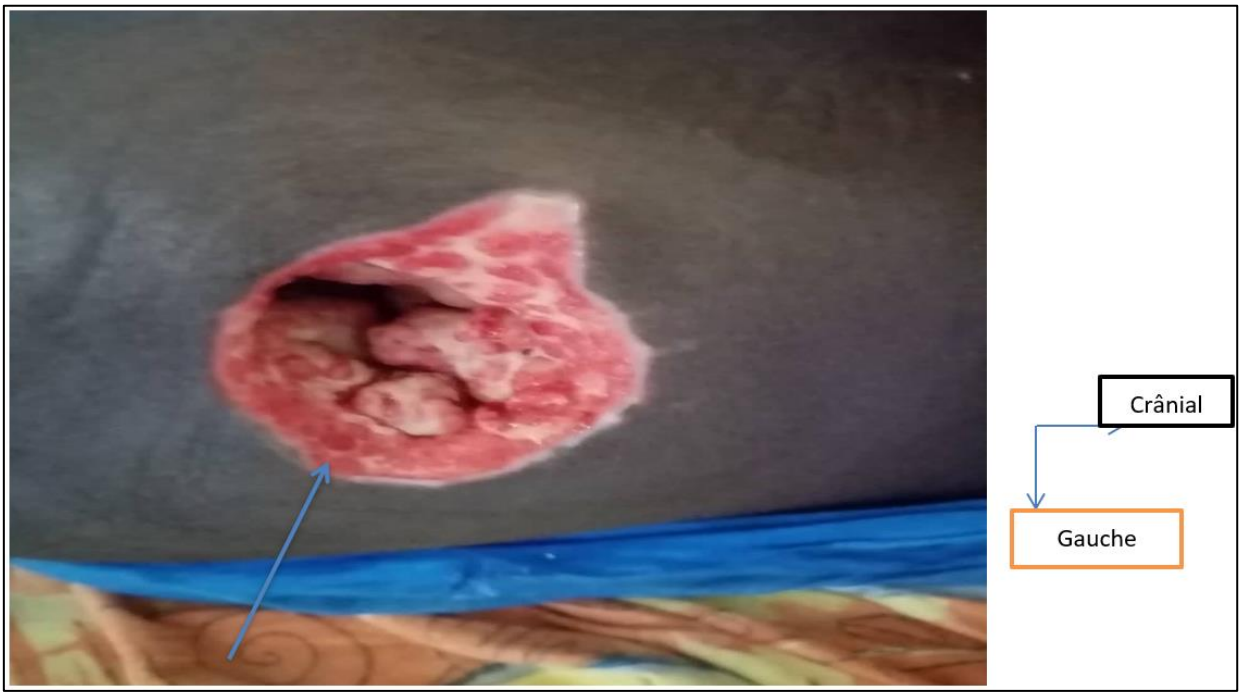

Figure 1: Image showing the front door

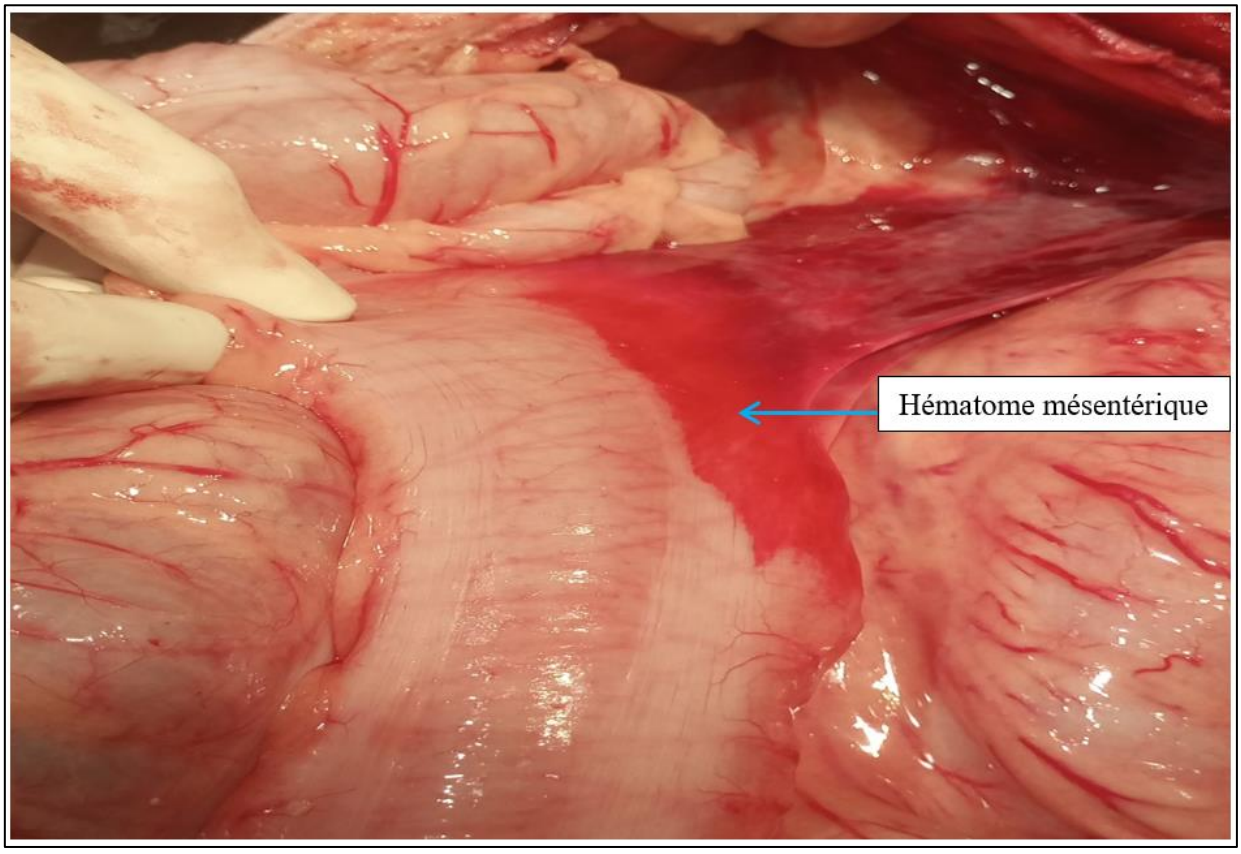

Figure 2: Image showing meso hematoma

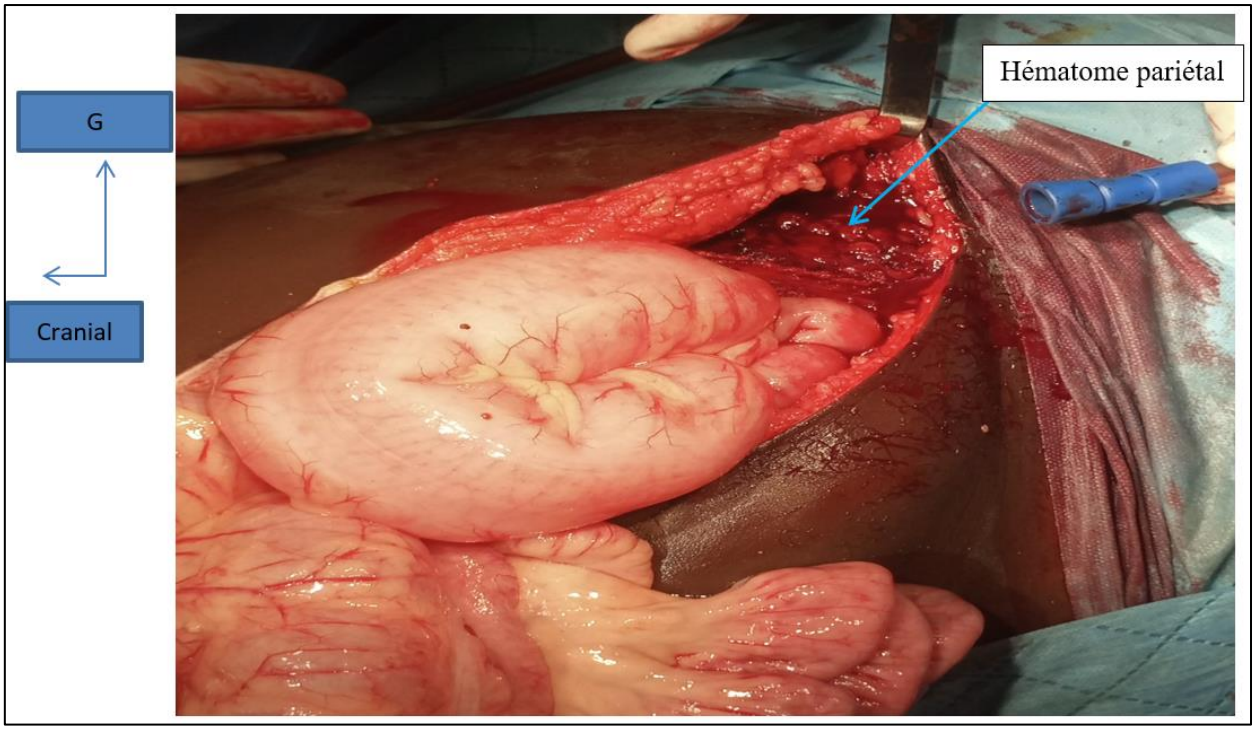

Figure 3: Image showing the parietal hematoma

DISCUSSION

The digestive blast was described during underwater explosions during the Second World War among sailors floating in a vertical position but also in pure aerial blasts or in a closed environment [2, 4]. These digestive lesions more frequently affect the colon than the small intestine [5, 6] and are due to the propagation of a shock wave. The severity of these lesions is linked to the speed of propagation of the shock wave.

Depending on the ambient environment within which the pressure wave propagates, we distinguish between air, liquid and solid-body blasts. In the air blast, the pressure wave only presents a peak of overpressure which travels at the speed of sound, and is quickly damped depending on the distance traveled. The target organs of air blast are, in decreasing order of frequency: the ear, lung and larynx, and the intestines. In the liquid blast, due to the incompressible nature of the liquid medium, the pressure wave comprises a succession of positive waves, propagating at a speed of around 1,500 m · s -1, the speed of sound propagation in water. The lesions are more serious during fluid blast, because the transmitted pressure is higher [7]. In the case of the solid-body blast, the pressure wave is transmitted by a solid and incompressible material in contact with the victim with a considerable speed (up to 5,000 m · s -1). The solid-body blast is characterized by predominant bone and vasculonervous lesions [8, 9]. In our case the medium in which the shock wave propagates is indeed a solid medium and the lesion concerned the colon found by certain authors [5, 6] this could be explained by the fact that the pressure is higher in the colon than in the small intestine.

Histologically, we describe different stages of lesions of increasing severity from inside out: hemorrhages or hematomas of the mucosa, accompanied by edema, hemorrhagic areas of hematomas or rupture of the muscularis. Severe forms are accompanied by subserosal hematomas or even immediate perforation [10]. In the present clinical case it was hematoma-type lesions accompanied by edema.

Clinically, victims present with abdominal pain, nausea, vomiting, tenesmus or testicular pain. In our case the clinical picture was dominated by abdominal pain associated with hemodynamic instability. Sometimes the diagnosis of closed abdominal blast trauma is difficult because certain patients can present perforations delayed sometimes up to 14 days after the explosion [11, 12]. This could be explained by the fact that these lesions initial are likely to evolve secondarily towards perforation according to several possible mechanisms: ischemia by localized thrombosis or lesion of the mucosa progressing towards the serosa.

Treatment for the ballistic lesion consisted of surgical trimming of the entry port after extraction of the cartridge. The principle of trimming is to eliminate tissues destined to necrosis in a certain manner, to achieve mechanical cleansing of the projectile path. Because any ballistic wound is dirty and possibly infected [13]. Skin closure will be delayed, because in the majority of cases a ballistic wound will be contaminated later [14]. The dressings are redone regularly every two to three days. Closure can be obtained depending on the skin defect either by directed healing, or by secondary surgical closure between 5 and

7 days, or by performing plastic surgery procedures to ensure coverage after a week.

It is in terms of triage that the treatment of victims of blast effect presents the most specificities. A person injured by a blast effect can present a very wide range of injuries ranging from minor injuries to very serious injuries. As superficially poly-crib patients represent the majority of victims, their treatment should not be to the detriment of the most serious patients. There is a significant risk of over-triage in these circumstances [15].

The present clinical case the patient presented a parietal lesion associated with a parietal hematoma and the treatment consisted of evacuation of the parietal hematoma, removal of necrotic tissues while respecting the hematoma in the mesocolon. The postoperative course was simple. On the 14th postoperative day, the patient was transferred to a trauma department after a clinical examination of the normal abdomen for the management of the iliac wing fracture.

CONCLUSION

Closed blast trauma to the abdomen is rare. The diagnosis of digestive lesions remains the most difficult diagnostic problem. The perforation of a hollow organ, sometimes secondary, must always remain in mind, and its diagnosis is as difficult in the blasted patient as after a blunt trauma. Computed tomography should probably play an important role (pneumoperitoneum, peritoneal effusion), but exploratory laparotomy often remains the key element in the diagnosis.

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