

Blunt abdominal trauma managed with mesenteric embolization: case report

Traumatismo abdominal contuso manejado con embolización mesentérica: reporte de caso

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Abstract

Blunt abdominal trauma occurs in 20% of polytraumatized patients, of which approximately 5% may have mesenteric lesions. We present a case of a woman suffering from a blunt abdominal trauma, who underwent computed tomography with evidence of hematoma on the right flank, which was controlled by angioembolization of the superior mesenteric artery. Treatment of mesenteric lesions will be determined according to the hemodynamic status of the patient, since in view of stability, a choice can be made between open surgery and embolization, but in case of instability, laparotomy is recommended.

Keywords: Mesenteric injury. Treatment. Embolization. Laparotomy.

Resumen

El trauma abdominal cerrado se presenta en el 20% de los pacientes politraumatizados, de los cuales aproximadamente el 5% pueden llegar a tener lesiones mesentéricas. Presentamos el caso de una mujer que sufre un traumatismo abdominal cerrado a la cual se le realizó tomografía computarizada con evidencia de un hematoma en el flanco derecho, que se logra controlar por angioembolización de la arteria mesentérica superior. El tratamiento de las lesiones mesentéricas se determinará según el estado hemodinámico del paciente, pues ante la estabilidad se puede escoger entre cirugía abierta y embolización, pero en caso de inestabilidad se recomienda la laparotomía.

Palabras clave: Lesión mesentérica. Tratamiento. Embolización. Laparotomía.

Introduction

Closed abdominal trauma occurs in 20% of multiple trauma patients¹. These types of injuries have a high mortality when diagnosis and treatment are delayed², since they can compromise several organs, such as

the spleen (40-55%) and the liver (35-45%), among others^{3,4}.

Mesenteric injury is a rare complication, occurring in less than 5% of patients with direct abdominal injuries^{1,2,5,6}; however, it has been on the rise in recent times due to seat belt-related car accidents^{1,2}.

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The treatment of choice is laparotomy², but in recent years it has been seen that embolization is a safe option^{1,2}. We present the case of a patient managed with mesenteric embolization after blunt abdominal trauma to the right flank and iliac fossa, and a review of the literature.

Clinical case

A 20-year-old woman who was transferred to the emergency department with a 1-hour history of abdominal trauma to the flank and right iliac fossa, after being hit by a bicycle. On admission, vital signs were: blood pressure 106/75 mmHg, heart rate 66 beats per minute, respiratory rate 14 breaths per minute, and oxygen saturation 96%. On physical examination, she revealed pain of great intensity on palpation in the right hemiabdomen, with no signs of peritoneal irritation and no stigmata of penetrating trauma.

Within the paraclinical tests on admission, hemoglobin was 12.2 g/dl. FAST (*Focused Abdominal Sonography for Trauma*) protocol was performed and adequate myocardial contractility was observed, with no presence of free intraperitoneal or pericardial fluid. In addition, due to the high-impact trauma, contrast-enhanced abdominal computed tomography and transfer to the intensive care unit (ICU) for hemodynamic monitoring were indicated, considering a high risk of hemodynamic instability, in the context of blunt abdominal trauma and with possible solid viscus injury.

In the tomographic study, perforation of the hollow viscus and solid organ injury were ruled out, and a moderate amount of perihepatic and perisplenic fluid was reported, in parietocolic leaks, iliac fossa, and minor pelvis. On the right flank there is a rounded image with regular contours, slightly hyperdense, with an average density of 58 HU, measuring 42 × 101 × 64 mm and exerting a mass effect on the intestinal loops, suggesting a hematoma as the first possibility (Fig. 1).

During the stay in the ICU, hemoglobin decreased progressively, with a value of 7.9 g/dl on the third day, for which a transfusion of three units of red blood cells was indicated and assessment by the interventional radiology service for percutaneous arterial embolization.

The interventional radiology service performed a selective arteriography of the abdominal circulation, specifically of the superior mesenteric artery, with a 5 Fr Cobra catheter, obtaining a confirmatory image of a large hematoma in the flank and right hypochondrium

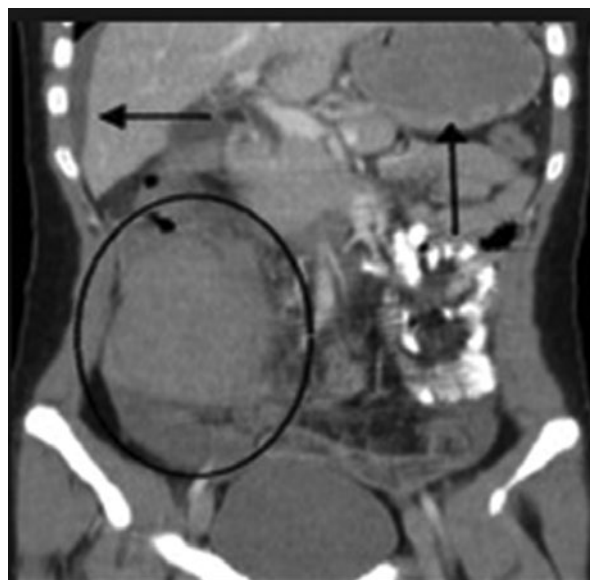


Figure 1. Intra-abdominal hematoma in the right flank and iliac fossa (circle), and perihepatic (horizontal arrow) and perisplenic (vertical arrow) fluid.



Figure 2. Embolized bicecoappendiculocolic ileus artery and decreased hematoma.

that exerts a mass effect, in addition of bleeding from the branches of the superior mesenteric artery, for which embolization of the blood vessel that gave rise to the hematoma was indicated. A 2.7 Fr microcatheter was inserted up to the nutrient branches described, which underwent embolization with 100-300 μ m coil microparticles, obtaining a slowdown in blood flow, and

later three *coils* were advanced through the same catheter (spiral catheter) and occlusion of the blood vessel that supplied the hematoma was achieved. A control arteriography was performed which showed adequate occlusion of the flow of the vessel (Fig. 2).

The patient had a satisfactory evolution after the procedure, maintaining stable hemoglobin at 10.7 g/dl, without episodes of hemodynamic instability and with improvement in pain. Therefore, hospital discharge was indicated on the eighth day. In the subsequent outpatient control there was no evidence of complications.

Discussion

Mesenteric injuries are caused by different mechanisms: increased pressure, deceleration, contusion or direct compression⁷. They occur mainly at the level of the ileocecal valve and the suspensory duodenum muscle^{2,8}. Among the main complications is the alteration of the mesenteric artery that will lead to active bleeding and over time to develop compressive hematomas at the intestinal level, which will end in an ischemic process².

Mortality rises when diagnosis and treatment are not timely^{2,5,9}, since if these are established in less than 8 hours it can be 2%, but if more than 24 hours pass, it can increase up to 30.8%⁵. Ideally, the institution where the patient is treated should have a surgeon, anesthesiologist, intensivist, and interventional radiologist available¹.

The diagnosis cannot be based solely on physical examination, since at first the injured may be asymptomatic or present pain and involuntary contraction of the abdomen. Although these are important signs after trauma, they are not indications for any intervention. On the other hand, it should be taken into account that after a trauma there may be alterations in the state of consciousness or spinal cord injuries, which would affect the semiological interpretation of the signs; In addition, patients may be under the influence of alcohol or psychoactive substances. For all these reasons, the physical evaluation must be correlated with the imaging study for a more specific opinion⁹.

The primary evaluation of these patients should include the hemodynamic status and the identification of life-threatening lesions, to define the need for expectant or surgical management^{1,2,8}. Those with hemodynamic instability require FAST to establish the presence of air or free fluid, and whether the source of the hemorrhagic *shock* is intra-abdominal. On the

other hand, stable patients and those who respond to fluid management have an indication for contrast-enhanced abdominal computed tomography¹ to determine the source of bleeding and rule out injuries secondary to trauma^{1,10}; furthermore, as reported by Frandon et al.¹, the use of this diagnostic test helps to reduce mortality and hospital costs. In our hospital we perform FAST per protocol on all patients for training, for which this stable patient underwent said ultrasound.

The treatment of these lesions can be done in two different ways: surgery or embolization^{2,11}. The open surgical technique is still the choice^{2,4}. Although embolization was already described in 1974 by Books-tein, it fell into disuse by medical personnel¹² and is now being used again because it has proven to be reliable and effective^{1,2}, as seen in our patient.

Hemodynamically unstable patients who do not respond to initial management and who show free fluid in the peritoneal cavity on ultrasound should be taken to emergency laparotomy to control bleeding, review the abdominal cavity, and decompress the hematoma if it has formed^{1,2}. However, it has been seen that embolization can also be performed in these patients if open surgery is delayed, since it allows initial bleeding control and surgical intervention is facilitated. Using a combined approach reduces hemorrhagic *shock* due to blood loss before reaching the operating room¹³. Otherwise, those who do respond or are hemodynamically stable from the start should be treated according to their injury. When the superior mesenteric artery is affected, the main approach is embolization to control bleeding, as in the case described, and this is because access to this vessel by open surgery is complicated, and when there is intestinal perforation it can be performed a second operation after control of bleeding, by laparotomy or laparoscopy, depending on the surgeon's experience and resources. On the other hand, when the inferior mesenteric is affected, the preferred approach is laparotomy, since it is more difficult to embolize this artery^{1,2}.

After mesenteric embolization, strict monitoring of the patients should be carried out, since previously this technique was not considered because this type of lesions was associated with intestinal perforation. Follow-up should be with serial physical examinations and imaging control. If any abnormality is detected, surgical exploration should be considered¹³.

In a retrospective study conducted in 2015 by Ghelfi et al.², among 335 patients treated between

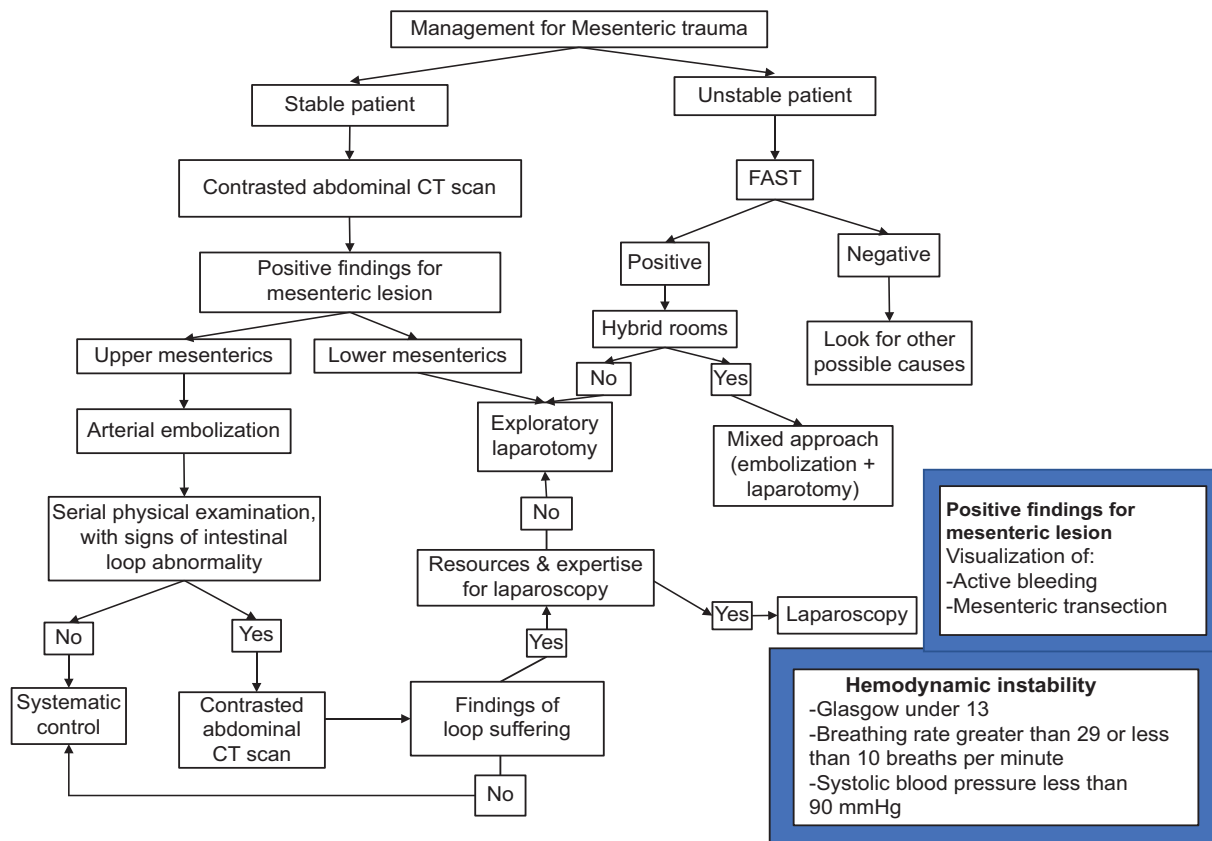


Figure 3. Management algorithm for mesenteric trauma, according to our experience and a review of the literature. FAST: Focused Abdominal Sonography for Trauma; CT: computed tomography.

2007 and 2014 for blunt abdominal trauma, seven had a mesenteric lesion without signs of ischemia and with hemodynamic stability, and were taken for arterial embolization. Success was achieved in six of the intervened, since one case had to be converted to emergency laparotomy to control the bleeding. Among the complications after the initial procedure, intestinal ischemia occurred in one patient. On the other hand, in a case report presented in 2019 by Nakama et al.¹³, in which the mesenteric embolization treatment was evaluated in a patient after a car accident, who presented clinical deterioration during the serial physical examination and required a new imaging evaluation, which confirmed intestinal necrosis and therefore the patient was taken to laparotomy. For this reason, importance is attached to serial physical examination after embolization, as was done in our case.

The management of mesenteric injuries is not well established and many of the surgeons who deal with these cases do not have enough experience to recognize them due to their infrequent appearance^{11,14}. Its

presentation carries a high risk of mortality because the mesenteric vessels are responsible for 20-25% of cardiac output¹¹. For this reason, we have developed an algorithm based on the literature and our experience for this type of alterations (Fig. 3).

Conclusions

Mesenteric injury is a rare complication that occurs after blunt abdominal trauma. Management will depend on the hemodynamic status of the patient. In those with hemodynamic deterioration, the best technique is laparotomy, and if there is hemodynamic stability, a more complete evaluation can be made using computed tomography to determine the compromised vascular structure and decide which is the best method between embolization or open surgery.

Conflicts of interest

The authors declare that they have no conflicts of interest regarding the publication of this document.

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Ethical disclosures

Protection of people and animals. The authors declare that no experiments were carried out on humans or animals for this research.

Data confidentiality. The authors declare that they have followed the protocols of their work center regarding the publication of patient data.

Right to privacy and informed consent. The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the authors.

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