Conservative treatment of suprahepatic pseudoaneurysm in a pediatric patient

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ABSTRACT

Introduction. Suprahepatic and inferior vena cava (IVC) pseudoaneurysms are rare in children. Most cases in adults are treated surgically due to the high risk of rupture.

Clinical case. Seven-year-old girl referred for a thoracic-abdominal trauma of unknown origin. Hemodynamically stable, with a hemoglobin level of 9.1 g/dl. An emergency CT scan was performed, showing a pseudoaneurysm at the confluence of the IVC with the middle and left suprahepatic veins, with active bleeding contained by the hepatic capsule. Given the hemodynamic stability and surgical risk, conservative treatment was decided upon. CT-scan at 24 hours showed cessation of bleeding. A control CT-scan was performed one month, three months, one year, and one and a half years later, showing the lesion had disappeared.

Discussion. Conservative treatment of suprahepatic vein pseudoaneurysm/ICV is feasible in the case of hemodynamic stability provided that strict clinical and radiological surveillance is maintained.

KEY WORDS: Suprahepatic pseudoaneurysm; Conservative management; Pediatrics.

MANEJO CONSERVADOR DE UN PSEUDOANEURISMA SUPRAHEPÁTICO EN UN PACIENTE PEDIÁTRICO

RESUMEN

Introducción. Los pseudoaneurismas suprahepáticos y de la vena cava inferior (VCI) son excepcionales en niños. La mayoría de casos en adultos se manejan quirúrgicamente debido al alto riesgo de rotura.

Caso clínico. Niña de siete años remitida por traumatismo tóraco-abdominal no presenciado. Hemodinámicamente estable, con hemoglobina de 9,1 g/dL. Se realiza un TC urgente, objetivándose un pseudoaneurisma en la confluencia de la VCI con las suprahepáticas media e izquierda, con sangrado activo contenido por la cápsula hepática. Dada la estabilidad hemodinámica y el riesgo quirúrgico, se optó por un manejo conservador. En el TC a las veinticuatro horas se observó cese del sangrado. Se realizó un TC de control al mes, tres meses, un año y año y medio, con desaparición de la lesión.

Comentarios. El manejo conservador del pseudoaneurisma de las venas suprahepáticas/VCI es factible en caso de estabilidad hemodinámica siempre que se mantenga una vigilancia clínica y radiológica estrechas.

PALABRAS CLAVE: Pseudoaneurisma suprahepático; Manejo conservador; Pediatría.

INTRODUCTION

Pseudoaneurysm is defined as a pulsatile hematoma with disruption of one or more vessel layers, and it is always an acquired lesion[1,2]. The slow extravasation of blood leads to the formation of an unstable sac with a high risk of rupture[2]. Aneurysms and pseudoaneurysms of the inferior vena cava (IVC) are rare, with an incidence of less than 1% in blunt trauma[1-3]. Deceleration causes shearing of the vessel, which can lead to rapid and uncontrollable bleeding[1]. Among the five segments into which the IVC is divided (infrarenal, pararenal, suprarenal, retrohepatic, and suprahepatic), the most frequently involved is the infrarenal (39%), with the suprahepatic being the least frequently affected[1].

Predictors of mortality include the level at which the pseudoaneurysm is located, hemodynamic stability, the number of associated lesions, blood loss, and the need for transfusions[1]. Of the 39 published cases of IVC aneurysms and pseudoaneurysms, only a small number were located in the suprahepatic segment, and most were treated surgically[1]. Two articles describe the conservative treatment of suprahepatic IVC pseudoaneurysm in two adult women[1,2], but no such reports have been found in pediatric patients. This is why we present the case of a girl with pseudoaneurysm at the confluence of the middle and left

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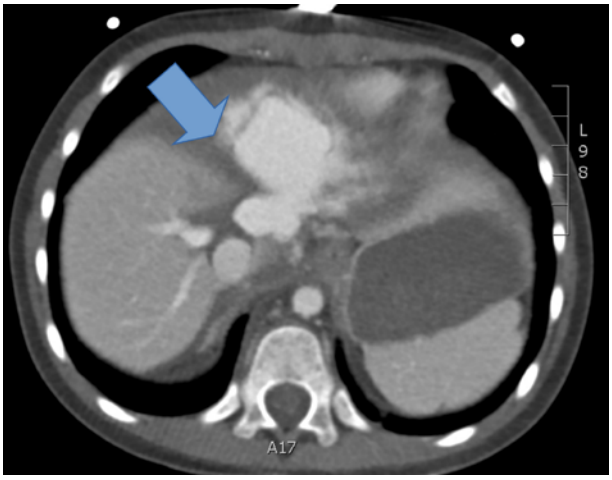

Figure 1. Abdominal CT-scan revealing an image consistent with pseudoaneurysm at the confluence of the middle and left hepatic veins with the inferior vena cava. Contrast extravasation is observed (arrow), indicative of active bleeding but contained by the hepatic capsule.

suprahepatic veins with the IVC, which was successfully treated conservatively.

CLINICAL CASE

7-year-old girl referred to our institution as a result of thoracic-abdominal trauma of unknown origin. The suspected cause of the trauma was a kick, as the patient was found in the garden a few meters away from a horse. She suffered a momentary loss of consciousness, lasting a few seconds, with spontaneous recovery.

At her referral hospital, the patient required expansion with saline solution due to hypotension, and subsequently maintained hemodynamic stability. On examination, she manifested pain and ecchymosis at the right thoracic inframamillary level, as well as abdominal distension and pain on palpation in the right hypochondrium, with no signs suggestive of peritoneal irritation. Laboratory tests revealed slight anemia, with a hemoglobin level of 9.1 g/dl, with no need for transfusion.

An emergency abdominal CT-scan was performed. It showed a hepatic laceration in segment V-VIII, and a 3x2.3 cm venous pseudoaneurysm at the confluence of the IVC with the middle and left suprahepatic veins. In addition, a hepatic subcapsular collection suggestive of active bleeding contained by the surrounding hematoma was observed (Fig. 1).

After assessing the various therapeutic options, we decided to maintain a wait-and-see approach for several reasons: the hemodynamic stability of the patient, the high risk of rupture of the pseudoaneurysm with endovascular treatment, and the absence of signs of active bleeding in

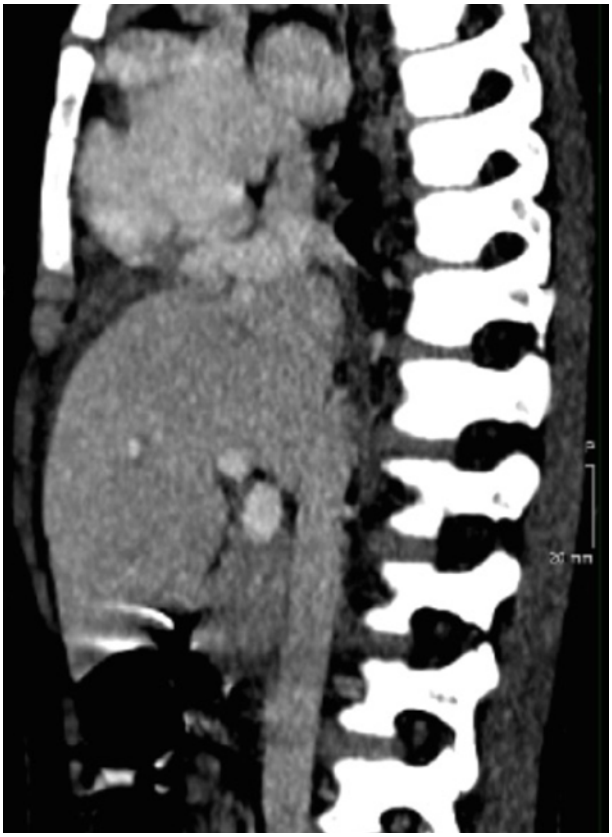

Figure 2. CT-scan performed 24 hours after the traumatic event. The lesion is observed (arrow) but without contrast extravasation.

the CT-scan at 24 hours (Fig. 2). In addition, the surgical risk of the lesion was high, since the location of the pseudoaneurysm meant that the area for venous clamping was small and insufficient to ensure surgical success. Finally, we applied the theoretical reasoning that, since the suprahepatic veins are a low-pressure venous system, the natural progression of the lesion would be thrombosis, progressive reduction and fibrosis, and ultimately disappearance. Based on this set of circumstances, conservative treatment was decided upon. It consisted of complete rest, strict clinical observation, control of vital signs, and regular blood tests to rule out worsening of the anemia. Ten days after the event, a cavography was performed, with no alterations being observed.

The patient remained hospitalized for 32 days with complete rest, showing good progress. The pain reported gradually disappeared, and after a few days, she became asymptomatic, with physical examination showing no alterations and normalization of hemoglobin levels. After observing a discrete decrease in the lesion at a CT-scan conducted one month after the event, she was discharged from hospital and gradually resumed daily activities, avoiding sports. Control CT-scans were performed at 3, 12, and 18 months, with complete healing of the pseudoaneurysm

Figure 3. A) CT-scan at 3 months, where the lesion is still visible but smaller, and B) CT-scan at 18 months, where the lesion is no longer visible.

being observed. The progression of the lesion is featured in Figure 3.

DISCUSSION

Pseudoaneurysms of the IVC are extremely rare and are usually associated with arteriovenous fistulas or arterial damage in the context of trauma[4]. In the differential diagnosis, it is important to rule out the presence of congenital anomalies, such as Abernethy's malformation[5]. The association of IVC pseudoaneurysms with the removal of IVC filters[6] or as a complication of infectious processes[7] has also been described. The literature includes some cases of IVC aneurysms and pseudoaneuryss [1,2], but no articles that deal specifically with pseudoaneurysms of the suprahepatic veins have been found, as in the case of the patient described in this article, probably because of its rarity. Bearing in mind that the suprahepatic portion of the IVC is the least frequently affected[1], and that in most cases treatment is surgical, only three articles on the conservative treatment of this type of lesions in adults have been found[1-3], and none in children.

IVC lesions have a high morbidity, with a rate of 70%[8]. Clinically, they may be asymptomatic or show nonspecific clinical symptoms that go unnoticed in the context of polytrauma, making diagnosis difficult[6]. Liver lacerations associated with retrohepatic IVC injury are classified as grade V according to the guidelines of the American Association for the Surgery of Trauma[8]. IVC lesions are usually associated with parenchymal lacerations, the vascular lesion being found in the trajectory of the latter[8]. This was the case in our patient, who showed laceration in hepatic segments V and VIII.

CT-scan is essential for the diagnosis and characterization of the lesions, as well as for follow-up[1,2,4,8]. The anatomical description of the lesion is important for guiding treatment and estimating survival[8]. As for treatment options, these include surgery, endovascular treatment, and conservative treatment. Although surgery is the traditional treatment[2], the decision to repair the lesion will be based on location, extent, and hemodynamic status. Stable and asymptomatic patients in whom the vascular lesion has been spontaneously contained by the hepatic capsule, diaphragm, or suspensory ligament, as in the case presented here, can be treated conservatively[3]. However, in case of hemodynamic instability, extensive defects, or uncontained hematomas, open surgery is the treatment of choice[1-3]. The suprahepatic region is a challenge in the surgical approach since it requires the division of the falciform ligament, clamping, and mobilization of the damaged vascular segment[3]. It is also a complex operation that requires a joint approach with cardiac surgeons through sternotomy and extracorporeal surgery. In our patient, the space for venous clamping was limited. This made it impossible to conduct the procedure safely, which was one of the reasons for rejecting surgery. Moreover, the procedure is associated with high perioperative mortality and long-term morbidity, such as stenosis or thrombosis of the IVC[3]. Endovascular treatment is a therapeutic option in hemodynamically stable but symptomatic patients, and includes stenting, balloon occlusion, or electrothrombosis[1,2,4]. In children, endovascular treatment is more limited due to the size of the stents, which can also collapse or migrate as the patient grows[9]. In our patient, this type of approach was discussed with the interventional radiologists, but was ruled out due to the location of the lesion, which entailed a high risk of pseudoaneurysm rupture with manipulation.

In the event of conservative treatment of this pathology, strict clinical follow-up and regular imaging controls are essential[1]. Our patient remained asymptomatic throughout hospitalization, with pain disappearing at examination within the first few days of complete rest. In addition to ultrasound examinations to reduce radiation exposure,

tomographic examinations were performed at 1, 3, 12, and 18 months after the event. Cheaito et al.[1] and Kunkala et al.[2], who describe two cases of suprahepatic IVC pseudoaneurysms successfully treated conservatively, recommend CT-scans at 1 month, 6 months, and 1 year, or until healing.

In conclusion, although an isolated case is not sufficient to provide guidelines for the treatment of suprahepatic pseudoaneurysms, conservative treatment is a valid option in hemodynamically stable and asymptomatic patients. This is especially the case in lesions that are difficult to treat due to their characteristics, since the natural progression of these lesions is towards thrombosis, fibrosis, and disappearance. Strict clinical and radiological follow-up of these patients is essential in order to anticipate potential complications, and surgery is necessary in the event of instability. We recommend observation in third-level institutions equipped with surgeons trained to perform this type of surgery if necessary, as well as CT-scan controls until complete healing.

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