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Posttraumatic intrahepatic pseudoaneurysm in a child managed by coil angioembolization: a case report and literature review

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Abstract This case report details the management of a posttraumatic pseudoaneurysm in the right lobe of the liver in an 8-year-old child with the use of angioembolization. Because this was considered to be an uncommon injury in this age group, a pseudoaneurysm-specific literature review was performed, which is discussed in the light of the index patient.

1. Case report

An 8-year-old male child presented to a rural regional base hospital with limited imaging facilities approximately an hour after a concrete wall collapsed onto his abdomen and lower body. On assessment at the hospital, he was found to be conscious with an intact primary survey with no head, chest, or long-bone injury. His c-spine was cleared, but he was noted to have an acute abdomen. Because of the clinical picture, he was prepared for urgent laparotomy. At laparotomy, a grade II/III American Association for the Surgery of Trauma injury grading (AAST grading) liver laceration of the right lobe on the dome of the liver was noted, and this was noted to not be actively bleeding. Gelfoam sponge was placed over the area to control oozing. No other injury was found, and the abdomen was closed. The child proceeded to an uneventful recovery and was discharged home on postoperative day 6.

On postoperative day 11, the child re-presented to the regional base hospital with abdominal pain and vomiting, but no hematemesis or malena. His hemoglobin was found to be low, and a bedside ultrasound revealed a hypoechoic mass in the right liver lobe with flow on color Doppler. The child was then referred to this urban level 1 trauma unit for further assessment and management.

On arrival at this institution, the child was reassessed, where he was found to have a hemoglobin level of 6.5g/dL, but all other parameters were within normal limits. He underwent a computed tomography (CT) scan of the

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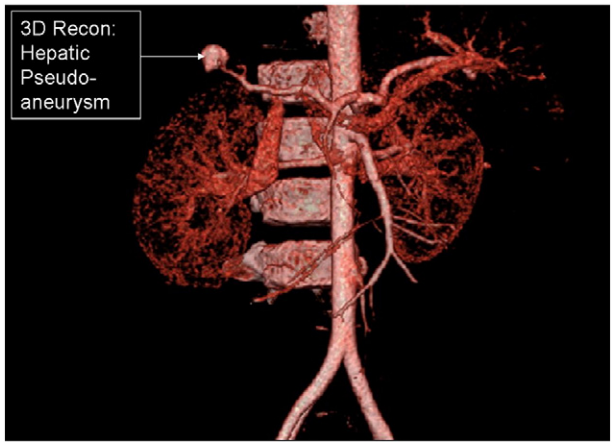

Fig. 1 Three-dimensional CT angiography reconstruction of the hepatic vascular tree demonstrating right hepatic pseudoaneurysm.

Fig. 2 Postembolization view of the right hepatic vascular tree demonstrating complete occlusion of the pseudoaneurysm by the 4- and 3-mm embolization coils.

abdomen with angiogram and portal venous phases, which confirmed the presence of a pseudoaneurysm of the right hepatic artery, with no venous component and a large amount of old free-fluid in the abdomen. There was no evidence of biliary radical involvement, thus explaining the absence of hemobilia Fig. 1.

Surgical reintervention was thought to be potentially problematic, and it was decided to proceed to angiographic embolization. The following morning, after confirmation of normal blood parameters and a general anesthesia induction, the interventional radiologist proceeded to right groin puncture, placing a 4-French Berenstein sheath-introducer catheter (Cordis, Bridgewater, NJ) with a Terumo 035-in guide wire for catheter placement. Access was achieved with selective catheterization of the right hepatic vessels and the placement of a 4-mm and subsequently a 3-mm hemostatic

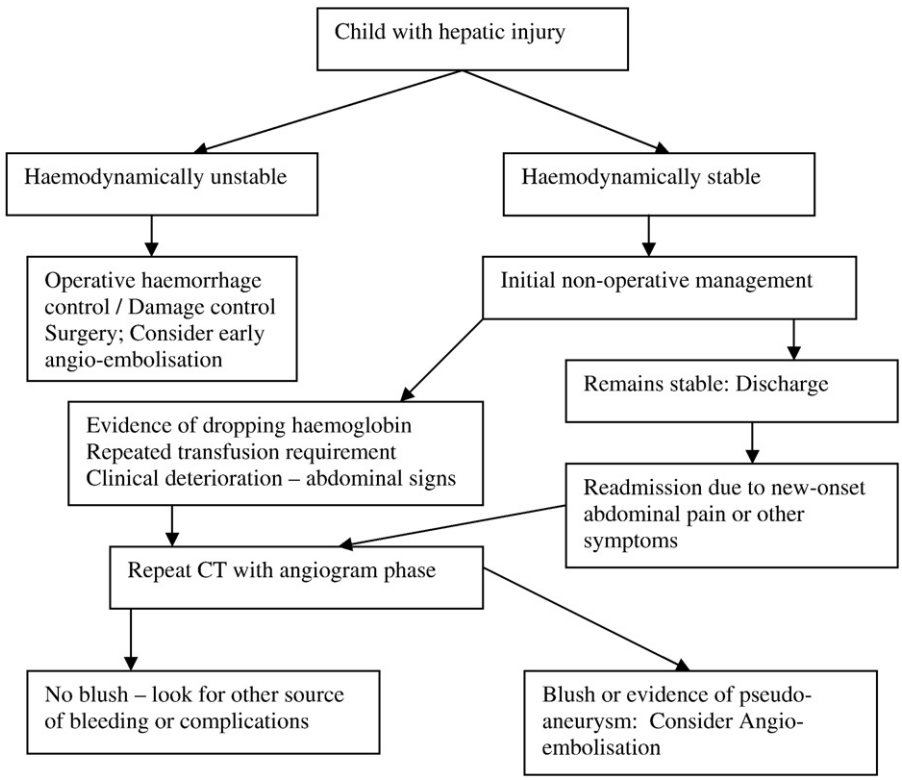

Fig. 3 Flow chart: approach to hepatic injury in childhood.

coil (MReye, Cook, Bloomington, Ill). Completion runs revealed complete occlusion of the pseudoaneurysm (Fig. 2). The patient was discharged home on postprocedure day 2 with no adverse events recorded.

2. Discussion

In the literature, there are a limited number of publications relating to angioembolization in children. A number of these articles relate to the treatment of hemobilia, both traumatic and iatrogenic, or tumor complications. Only 8 applicable references were retrieved.

Angioembolization of solid organ trauma was described initially in adults during the early 1980s [1,2]. Only 7 publications [2-8] were identified that specifically addressed hepatic pseudoaneurysm in children. Sclafani and coworkers described a case series including only 1 child of their 17 patients who were successfully managed by either embolization or other interventional procedures with no mortality and a low morbidity [1].

Pseudoaneurysm seems to be a rarity in the child with hepatic trauma, and the reported incidence is around 3% [4,5,8]. The reports in the literature vary in their description of the techniques used to manage the pseudoaneurysm, both in terms of the timing and the method of hemostasis. The timing varies from early angiography and attempted embolization during the resuscitation phase [3,6], to later angiography after CT scan–detected blush [3], or to those where the repeat CT scan was performed for delayed complications, usually around days 10 to 14 postinjury [1-4,7]. Eubanks and coworkers [5] highlighted that most children had minor extravasation on CT scan, and most injuries seemed to be self-limiting.

Various options for the management of the pseudoaneurysm are used by different authors, including Gelfoam [2], detachable occlusion balloons [2], and microcoils [3,6,7]. In our patient, microcoils were used. The consequences of failed embolization include multiple transfusions, laparotomy, and hepatic resection [4,5], whereas the complications encountered during successful embolization include the small but relevant risk of hepatic ischemia [6].

Embolization of pseudoaneurysm in the liver is noted to have low morbidity or mortality. The liver is particularly suitable to this option, given the double blood supply from the portal circulation [8]. However, there have been some recent concerns expressed regarding the risk of hepatic necrosis subsequent to angioembolization, although these seem to occur in patients with multiple other risk factors, such as high injury severity, clinical or biochemical instability, and multiple or proximal embolization [9]. The benefit probably still outweighs the risk in this delayed presentation subgroup.

3. Conclusions

In summary, the initial procedure in this child was clinically indicated and the site of the pseudoaneurysm was not visible at initial laparotomy. With the risk of open reexploration and the availability of interventional radiology, the benefit outweighed the small risk of procedural complications. The flow chart (Fig. 3) provides an approach to this rare pathology in the injured child and places the role of angioembolization into appropriate context. Endovascular therapy is effective and carries a low risk of complications in the stable patient with a delayed rebleed.

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