Post-traumatic hepatic artery pseudoaneurysm with recurrent hemoperitoneum and repeated laparotomies treated by endovascular coil embolization

Post-traumatic hepatic artery pseudoaneurysm (HAP) formation is an uncommon, delayed, but potentially life-threatening complication of blunt trauma to the abdomen (BTA) that warrants treatment as uncontrolled bleeding will lead to hemorrhagic shock and mortality. It has a rupture risk of 14% and occurs in about 1 to 1.2% of cases.[1,2]

We present the case of a 30-year-old male patient who had a blunt trauma abdomen two and half months back with liver laceration, hemoperitoneum, and right pleural effusion. There was no pseudoaneurysm in the pre-operative computed tomography (CT) abdomen scan, which showed a large hypodense liver laceration with subcapsular hematoma indicating an AAST (American Association for the Surgery of Trauma) grade IV liver injury.

Exploratory laparotomy with peritoneal toileting and liver injury repair was done in a local hospital. However, he again presented with hemoperitoneum after one month with hemodynamic instability and a fall in hemoglobin level to 4 g/dl and underwent exploratory laparotomy under general anesthesia in another referral center. About 1.5 liters of hematoma was removed from the subdiaphragmatic surface of the liver. As per his outside medical records, no preoperative CT abdomen scan was done before this second laparotomy. When the patient was stabilized, a contrast-enhanced computed tomography (CECT) abdomen scan was done on the seventh post-op day, which showed extravasation into segment VIII, indicating vascular injury along with a large liver laceration. The patient again suddenly bled through the drain on the 11th postoperative day, which was managed conservatively. A CECT abdomen scan with angiography was performed after stabilization, which showed an avidly enhancing lesion measuring 19 × 13 mm in segment VIII arising from the right hepatic artery branch surrounded by a hematoma indicating vascular injury with pseudoaneurysm formation [Figure 1a and b]. A surrounding laceration of size 7.3 × 8.0 × 8.7 cm involving segments V and VIII extending up to the hilum (AAST grade IV injury) was also seen [Figure 1a]. The patient was referred to our institution for possible embolization of this pseudoaneurysm.

He was hemodynamically stable. The liver function test (LFT), serum urea and creatinine levels, bleeding time, clotting time, prothrombin time, international normalized ratio, complete blood count, and total platelet counts were within normal limits. Vascular access was obtained through the right common femoral artery using the Seldinger technique. Selective catheterization of the hepatic artery was done [Figure 2a]. Superselective catheter angiography of the anterior branch of the right hepatic artery by a 2.7 F Progreat® (Terumo, Europe) microcatheter showed contrast filling of the pseudoaneurysm [Figure 2b], and this vessel was embolized with the help of 2 mm × 2 cm and 3 mm × 4 cm platinum push coils. No contrast filling was seen within the pseudoaneurysm on the post coil check angiogram [Figure 2c]. Follow up color Doppler after three weeks and six weeks post embolization showed no color filling within the pseudoaneurysm, and the patient was doing well.

The commonest cause of HAP is BTA causing laceration of the artery.[1] The pseudoaneurysm may present with melena, hemobilia, abdominal pain, blood through the drain, hemoperitoneum leading to falling hemoglobin level, and hemodynamic instability.[1,3] CECT abdomen scan with angiography is the investigation of choice to detect the HAP.[2,4]

With the widespread availability of better resolution multidetector computed tomography (MDCT) scanners, most liver injuries are managed conservatively in recent times instead of surgery.[1,5] Few authors have reported the spontaneous resolution of small pseudoaneurysms (10-13 mm). However, due to the very high risk of rupture, all HAPs should be treated by interventional radiology or surgery.[5] Endovascular embolization is currently the treatment of choice for HAP in hemodynamically stable patients, while unstable patients or those with failed angioembolisation are candidates for surgery.[1,2]

The treatment options in interventional radiology are endovascular embolization, stent placement across the affected artery, and percutaneous thrombin injection. Coils are the most commonly used embolic agents and should be placed in the artery at distal and proximal aspects of the pseudoaneurysm. Glue n-butyl cyanoacrylate (NBCA) can be used as an

Figure 1: (a) The axial CECT image acquired during the arterial phase shows a well-defined, intensely enhancing lesion arising from the anterior branch of the right hepatic artery in segment VIII, representing a pseudoaneurysm. The surrounding hypodense non-enhancing area extending from the surface till the hilum suggests a laceration; (b) The 3D volume-rendered image shows the hepatic arterial pseudoaneurysm arising from the right hepatic arterial branch.
endovascular embolic agent, especially if the pseudoaneurysm is arising from the distal branch and not amenable to treatment by coil or stent placements. Other embolizing agents are gelfoam and polyvinyl alcohol (PVA) particles. Gelfoam is a temporary embolizing agent with subsequent recanalization of the vessel. Many authors have also described the use of ethanol (which is now abandoned due to side-effects) and detachable balloons. Angioembolization is a very safe and effective procedure without major complications. As the liver has a dual blood supply with 80% blood supply from the portal vein and 20% from the hepatic artery, hepatic artery blockage does not lead to significant hepatic ischemia. The LFT rises with hepatic necrosis but slowly normalizes within a week. The necrosis may get infected, leading to abscess formation, and prevented by post-procedure antibiotic prophylaxis.

The HAP in our case was detected on angiography later after recurrent hemoperitoneum. Thus, even after laparotomy of a hemodynamically unstable patient, the pseudoaneurysm may develop with a delayed presentation. We recommend to perform a CECT abdomen scan with angiography in such patients after stabilization. Endovascular embolization is a very minimally invasive procedure avoiding major surgical procedures under general anesthesia. In the present patient who had undergone two previous laparotomies, treatment by endovascular coil embolization was life-saving and reduced patient morbidity.

Declaration of patient consent
The authors certify that appropriate patient consent was obtained.

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