SELECTIVE TRANSCATHETER EMBOLIZATION FOR TREATMENT OF HEMOBILIA CAUSED BY POST-TRAUMATIC HEPATIC PSEUDOANEURYSM

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ABSTRACT

Post-traumatic hepatic pseudoaneurysms are rare. Hepatic pseudoaneurysm is one of the causes of hemobilia, which can be treated via transarterial embolization. Two cases of post-traumatic hepatic pseudoaneurysm causing hemobilia were treated using selective transcatheter embolization in Srinagarind Hospital, Khon Kaen, Thailand. There was no further hemobilia after transcatheter embolization.

INTRODUCTION

Post-traumatic hepatic artery pseudoaneurysms that develop following penetrating or blunt traumas are rare.[1,2] Other reported etiologies for hepatic pseudoaneurysms include percutaneous liver biopsies, percutaneous transhepatic cholangiograms, and infection or inflammation due to septic emboli or pancreatitis.[3,4] Hepatic artery pseudoaneurysms are one cause of hemobilia[5] and hemobilia can be treated via transarterial embolization.

In this report, we present two cases of hepatic artery pseudoaneurysm, which resulted in a clinical presentation of hemobilia. These two pseudoaneurysms were treated with transcatheter embolization.

MATERIALS AND METHODS

We retrospectively reviewed the medical records and imaging studies of two cases of hepatic artery pseudoaneurysms at Srinagarind Hospital. Follow-up clinical findings, ultrasonograms and CT were recorded prospectively.

CASE REPORTS

CASE 1

A 23 year-old man fell from a machine at work. At the referring hospital, he was diagnosed with fractures of the mandible, cervical spine, femur and a blunt abdominal injury. Two months later, the patient developed hemobilia and was referred to our hospital.

Abdominal computed tomography (CT) was performed and it revealed low attenuation areas with internal high density in the right lobe of the liver, diagnosed as an hepatic hematoma (Figure 1A). Contrast enhanced CT revealed a central area of contrast enhancement isodense with the aorta representing a hepatic pseudoaneurysm (Figure 1B). A Doppler sonogram demonstrated a hypoechoic area in the right lobe of the liver, with a central jet flow consistent with a pseudoaneurysm (Figure 1C). Digital subtraction angiography (DSA) confirmed a pseudoaneurysm arising from a branch of the right hepatic artery (Figure 1D,1E). A simple curve 4-French catheter was introduced into the branch supplying the aneurysm and on into the aneurysm. Four

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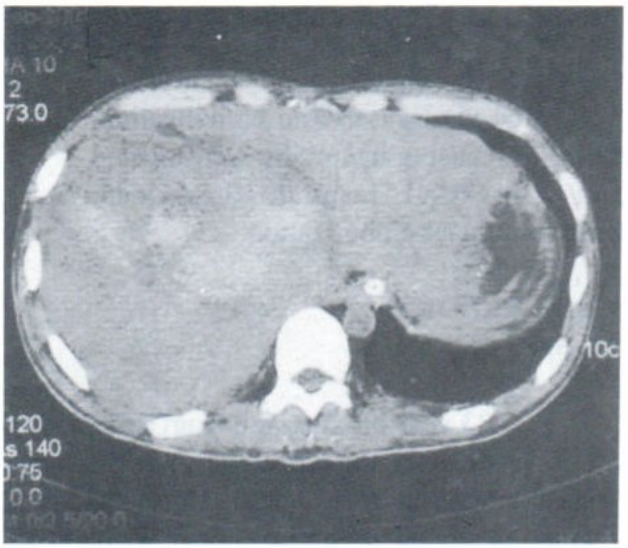
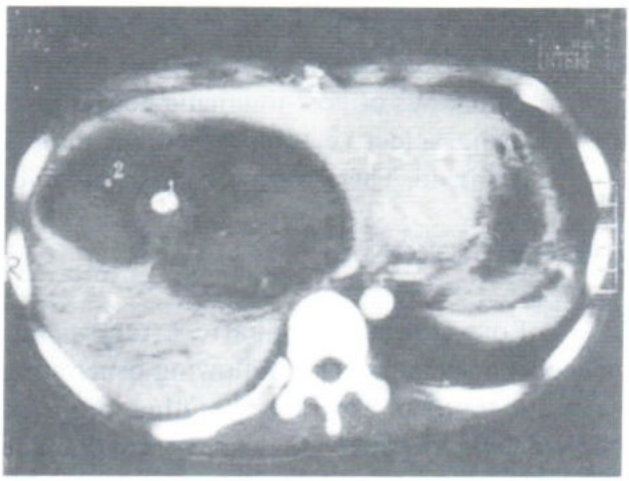
embolization coils (Cook, Bloomington) were deposited in the pseudoaneurysm. Gelfoam embolization into the aneurysm was the performed. Afterwards an embolization coil was deposited proximal to the aneurysm at the neck. Repeat contrast medium injection into the right hepatic artery demonstrated no contrast filling of the pseudoaneurysm (Figure 1F).

A follow-up Doppler sonogram was performed one week later and no remaining flow from the pseudoaneurysm was observed (Figure 1G). Four and eight months later, no remaining pseudoaneurysm was seen on the follow-up contrast enhanced CTs (Figure 1H). The patient remained asymptomatic during the entire follow-up period.



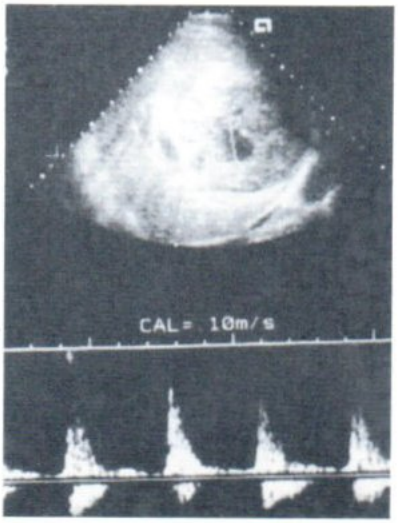
1A

Fig. 1A. Noncontrast enhanced CT demonstrates low density areas with internal high density in the right lobe of the liver, indicating a hepatic hematoma.



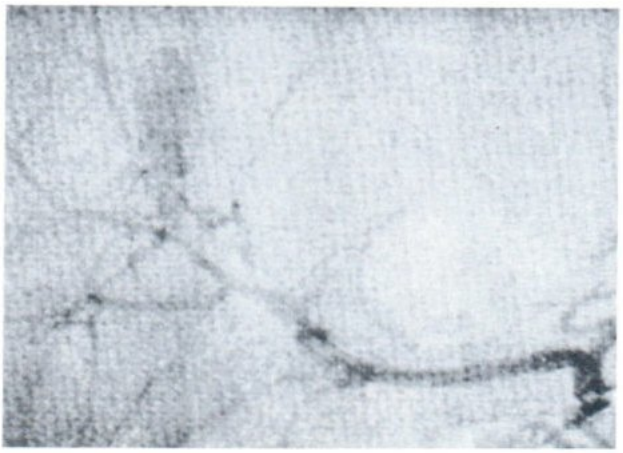
1B

Fig. 1B. Contrast enhanced CT demonstrates a central area of contrast enhancement isodense with the aorta indicates a hepatic pseudoaneurysm.



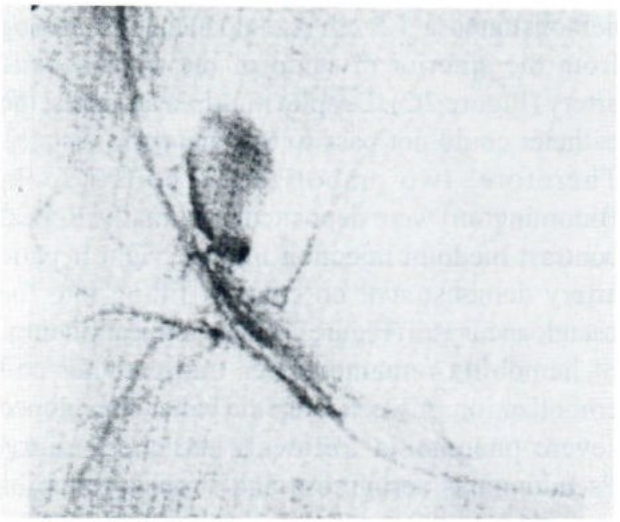
1C

Fig. 1C. Doppler ultrasound demonstrates hypoechoic areas in the right lobe of liver with a central jet of flow consistent with a pseudoaneurysm.



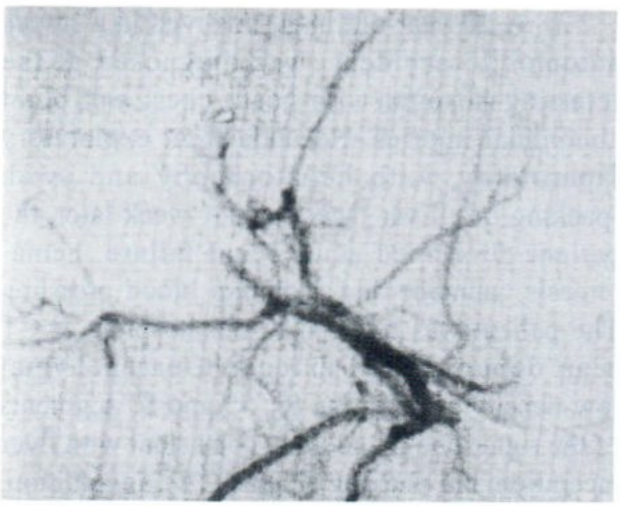
1D

Fig. 1D. Digital subtraction angiography confirms the presence of a pseudoaneurysm arising from a branch of the hepatic artery.



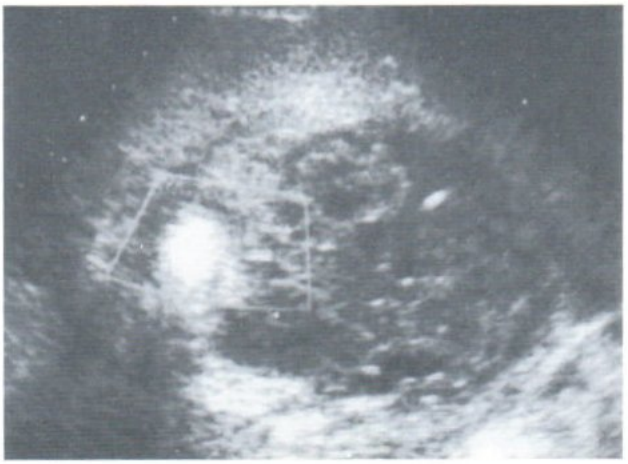
1E

Fig. 1E. Selective feeding artery branch digital substraction angiography shows pseudoaneurysm.



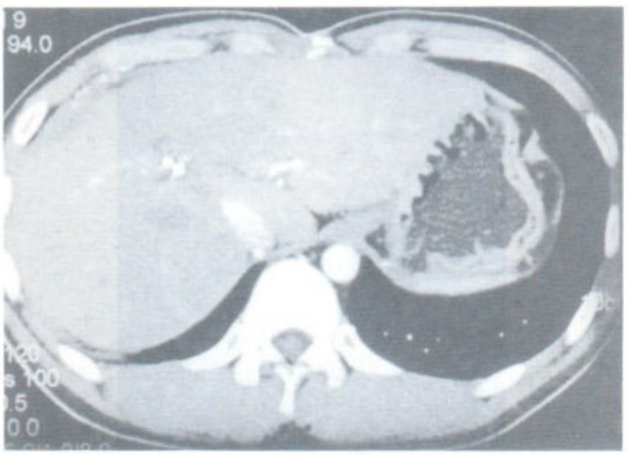
1E

Fig. 1F. Repeat contrast injection after coils and gelfoam embolization demonstrates no further filling of the pseudoaneurysm.



1G

Fig. 1G. Follow-up sonogram eight months later, no remaining area of central jet of flow of the pseudoaneurysm is demonstrated.



1H

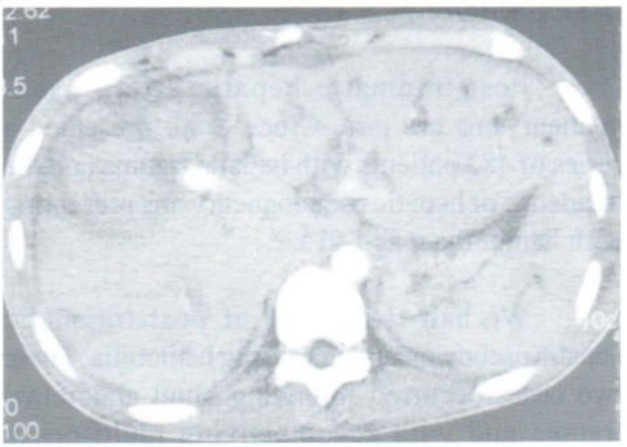
Fig. 1H. Follow-up contrast enhanced CT eight months later, no remaining aneurysm is evident.

CASE 2

A 20-year-old man, involved in a severe automobile accident, was diagnosed at the referring hospital with head, chest and blunt abdominal injuries. He underwent exploratory laparotomy, with hepatorhaphy and swab -packing of a liver laceration. A week later, the patient developed acute renal failure, hematemesis, jaundice and declining blood pressure. The patient was referred to our hospital. A CT scan demonstrated extensive parenchymal low-density areas in the 5th, 7th and 8th segments of the right lobe of the liver, consistent with liver laceration and packing (Figure 2A). In addition, an enhancing lesion was seen in the anterior segment of the right lobe of the liver consistent with a pseudoaneurysm (Figure 2B). An adjacent low-density area was consistent with hematoma (Figure 2B). The DSA of the hepatic artery demonstrated a 1.5 cm pseudoaneurysm arising from the anterior division of the right hepatic artery (Figure 2C). Despite multiple attempts, the catheter could not pass to the aneurysm distally. Therefore, two embolization coils (Cook, Bloomington) were deposited proximally. Repeat contrast medium injection into the right hepatic artery demonstrated no contrast filling into the pseudoaneurysm (Figure 2D). No clinical findings of hemobilia remained after transcatheter coil embolization. A week later, the patient developed severe pneumonia following the chest injury. Pseudomonas aeruginosa and Proteus mirabilis were cultured from the tracheal specimen. The patient's relatives declined further hospital treatment preferring to take the patient home for last rites.

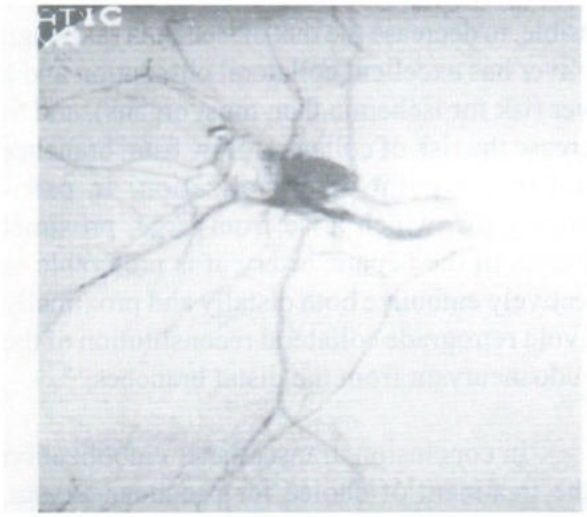
2A

Fig. 2A. Contrast enhanced CT demonstrates areas of low and high density in the anterior segment of the right lobe consistent with a liver laceration.



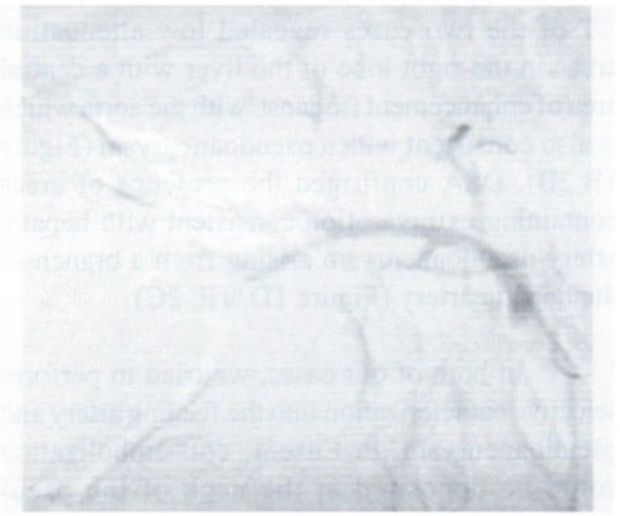
2B

Fig. 2B. Contrast enhanced CT demonstrates an enhanced lesion in the anterior segment of the right lobe consistent with a hepatic aneurysm.



2C

Fig. 2C. Digital subtraction angiography of the hepatic artery demonstrates a pseudoaneurysm arising from a branch of the right hepatic artery.



2D

Fig. 2D. Repeat contrast injection into the right hepatic artery demonstrates no further filling of the pseudoaneurysm.

DISCUSSION

Post-traumatic hepatic artery pseudoaneurysms are rare. Croce et al. presented a series of 482 patients with hepatic trauma and the incidence of hepatic pseudoaneurysms presenting with hemobilia was 1.2%.[5,6]

We had two cases of post-traumatic hepatic pseudoaneurysm causing hemobilia. These two cases occurred following blunt abdominal trauma and with accompanying multi-organ injury including hepatic laceration. We observed hepatic pseudoaneurysms in both cases using Doppler ultrasound, contrast enhanced CT and digital subtraction angiography (DSA). In each case, a Doppler sonogram demonstrated hypoechoeic areas in the right lobe of the liver, with a central jet flow consistent with a pseudoaneurysm (Figure 1C). Contrast enhanced CT of the two cases revealed low attenuation areas in the right lobe of the liver with a central area of enhancement isodense with the aorta which is also consistent with a pseudoaneurysm (Figure 1B,2B). DSA confirmed the presence of areas containing extravasation consistent with hepatic artery pseudoaneurysm arising from a branch of the hepatic artery (Figure 1D, 1E, 2C)

In both of our cases, we tried to perform selective catheterization into the feeding artery and pseudoaneurysm. In Case 1, coil embolization could be deposited at the neck of the pseudoaneurysm. Before depositing the coil, we put gelfoam into the pseudoaneurysm. In Case 2, we could not do selective catheterization into the neck of the aneurysm, therefore embolization coils were only deposited in the feeding artery proximal to the neck.

In general, angiography is the most sensitive technique for diagnosing and more accurately assessing hepatic pseudoaneurysms than ultrasonography and CT.[2,8]

Selective arterial transcatheter embolization is generally accepted for the treatment of hepatic vascular injury over operative repair because of its low mortality and morbidity.[1,3] A variety of embolic agents have been reported including silastic beads, detachable balloons, coils, gelfoam, polyvinyl alcohol, and a combination of coils and gelfoam.[1,2,7] Some investigators have suggested the use of both gelfoam and coil because the coils provide permanent occlusion and a structure on which to entrap gelfoam particles, while the gelfoam provides complete initial stasis.[4]

Embolization should be as selective as possible, to decrease the risk of ischemia (although the liver has excellent collateral circulation and a lower risk for ischemia than most organs), and to decrease the risk of collateral flow from branches distal to the point of embolization. In pseudoaneurysms, which arise from large, proximal branches of the hepatic artery, it is preferable to selectively embolize both distally and proximally to avoid retrograde collateral reconstitution of the pseudoaneurysm from the distal branches.[1,2]

In conclusion, transcatheter embolization is the treatment of choice for pseudoaneurysm. When technically possible, optimal treatment is superselective embolization both distally and proximally at the neck of aneurysm.

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REFERENCES

1. Schwart R, Teitelbaum G, Katz M, et al. Effectiveness of transcatheter embolization in the control of hepatic vascular injury. J Vasc interv Radiol.1993;4: 359-365.
2. Sidhu M, Shaw D, Daly D, et al. Post-traumatic hepatic pseudoaneurysm in children. Peddiatr Radiol. 1999;29: 46-52.
3. Knowdley D, Aggarwal A, Sachs P. Delayed hemorrhage after percutaneous liver biopsy: role of therapeutic angiography. J Clin Gastroenterol. 1994; 19:50-53.
4. Aboujaoude M, Noel B, Beaudoin M, et al. Pseudoaneurysm of proper hepatic artery with duodenal fistula appearing as a late complication of blunt abdominal trauma. J Trauma. 1996; 40: 123-125.
5. Gorich J, Rilinger N, Brado M, et al. Non-operative management of arterial liver hemorrhages. European Radiology 1999;9:85-88.
6. Croce M, Fabian T, Spiers J, et al. Traumatic hepatic artery pseudoaneurysm with hemobilia. Am J Surg. 1993; 168: 235-238.
7. Beningfield S, Bornman P, Krige E, et al. Control hemobilia by embolization of a false aneurym and arterioportobiliary fistula of hepatic artery. AJR 1991; 156: 1263-1265.
8. Tobben P, Zajko A, Sumkin J, et al. Pseudoaneuryms complicating organ transplantation: roles of CT, duplex sonography and angiography. Radiology. 1988; 169: 65-70.