Case Report

Selective Transcatheter Embolization for Treatment of Post-Traumatic Hepatic Artery and Portal Vein Pseudoaneurysms

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The authors report a case of post-traumatic hepatic artery and portal vein pseudoaneurysms caused by blunt abdominal trauma, with multiple organ injuries including liver laceration. Abdominal spiral CT, CDS and DSA were performed to confirm the diagnosis. Both pseudoaneurysms were treated successfully with selective transcatheter embolization.

Keywords: *Hepatic artery pseudoaneurysm, Portal vein pseudoaneurysm, Trauma, Embolization*

J Med Assoc Thai 2006; 89 (2): 248-52
Full text. e-Journal: *http://www.medassocthai.org/journal*

Post-traumatic hepatic psudoaneurysm is rare, particularly in children[1]. Only a small number of cases of traumatic hepatic aneurysm in children have been reported[2,3]. Post-traumatic portal vein pseudoaneurysm is also rare, especially in association with simultaneous hepatic artery pseudoaneurysm. The splenic artery is the most common site of intra-abdominal artery aneurysm. Causes include ateriosclerosis, mycotic aneurysms due to perivascular inflammation (e.g. pancreatitis), systemic vasculitis (e.g. polyarteritis nodosa, lupus erythematosus), fibromuscular dysplasia, soft tissue disorders (e.g. Marfan's syndrome), and traumatic pseudoaneurysm[4].

Case Report

A nine-year-old girl fell from a high tree. At the first hospital, liver, lung and right kidney injuries were suspected. She underwent exploratory laparotomy, and swabs were packed around the major lacerations in the liver and right kidney.

A few days later, the patient developed acute renal failure, with declining hematocrit and hypotension. The patient was referred to Khon Kaen hospital.

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Abdominal spiral CT revealed liver laceration and pseudoaneurysm in the right lobe of the liver. Contrast enhanced CT confirmed two pseudoaneurysms related to a branch of the right hepatic artery, and of the right portal vein (Fig. 1). Color Doppler sonography demonstrated a 3-cm hypoechoic lesion with color flow jet in the pseudoaneurysm in the right lobe of the liver (Fig. 2). Digital subtraction angiography (DSA) demonstrated two pseudoa-neurysms arising from branches of the right hepatic artery and portal vein (Fig. 3). A simple curve 4-Fr catheter was selectively placed into the branches supplying the aneurysms. Embolization coils (Cook Inc., Bloomington, Indiana) were deposited at the neck of the pseudoaneurysms. Repeated injection of contrast medium into the right hepatic artery demonstrated no filling of the pseudoaneurysm (Fig. 4).

Two weeks later, the patient had recovered from renal failure and shock but colour flow sonography demonstrated persistent pseudoaneurysm flow (Fig. 5). Contrast enhanced CT confirmed a large pseudoaneurysm arising from a branch of the right portal vein (Fig. 6). She was taken to the operating room, where transileocecal vein portography was performed at laparotomy. A 5-Fr Cobra catheter was used to select the right portal vein. Selective portography

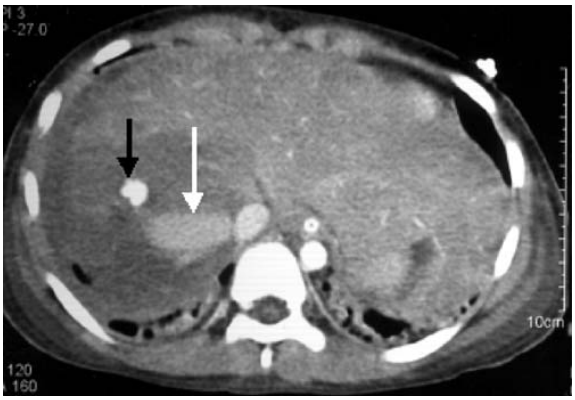

Fig. 1 Contrast enhanced CT demonstrates two pseudoaneurysms in right lobe of liver (black and white arrows)

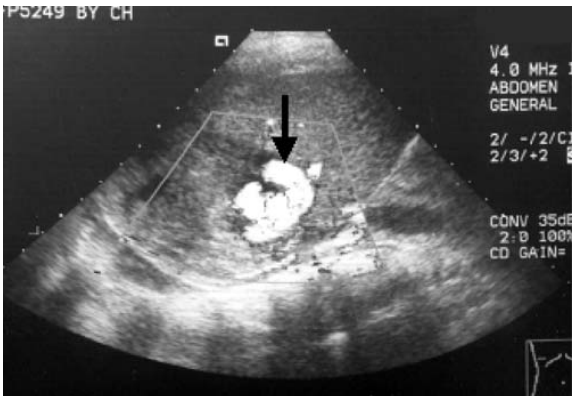

Fig. 2 Color Doppler sonogram demonstrates an area in the right lobe, with a turbulent flow (arrow) consistent with a pseudoaneurysm

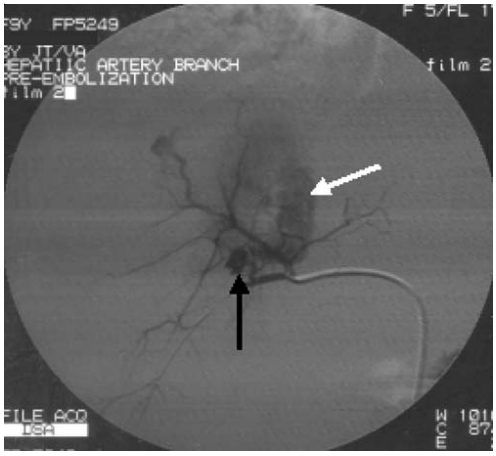

Fig. 3 DSA, selective right hepatic artery demonstrates two pseudoaneurysms arising from a branch of the right hepatic artery (black arrow)

Fig. 4 Repeated injection of contrast medium into the right hepatic artery demonstrates no filling of contrast into the pseudoaneurysm after coils embolization

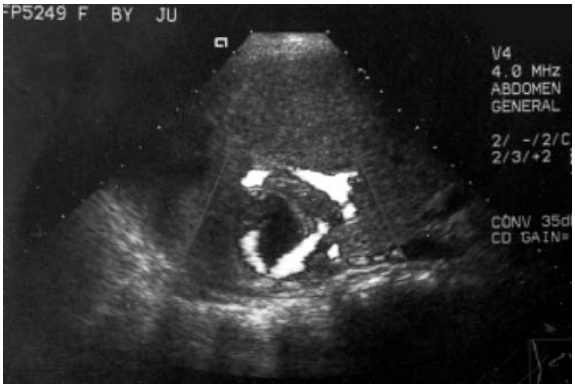

Fig. 5 Follow up color Doppler sonogram demonstrates residual color flow surrounding the pseudoaneurysm

Fig. 6 Repeat contrast enhanced CT confirms a residual pseudoaneurysm arising from a branch of right portal vein (arrow)

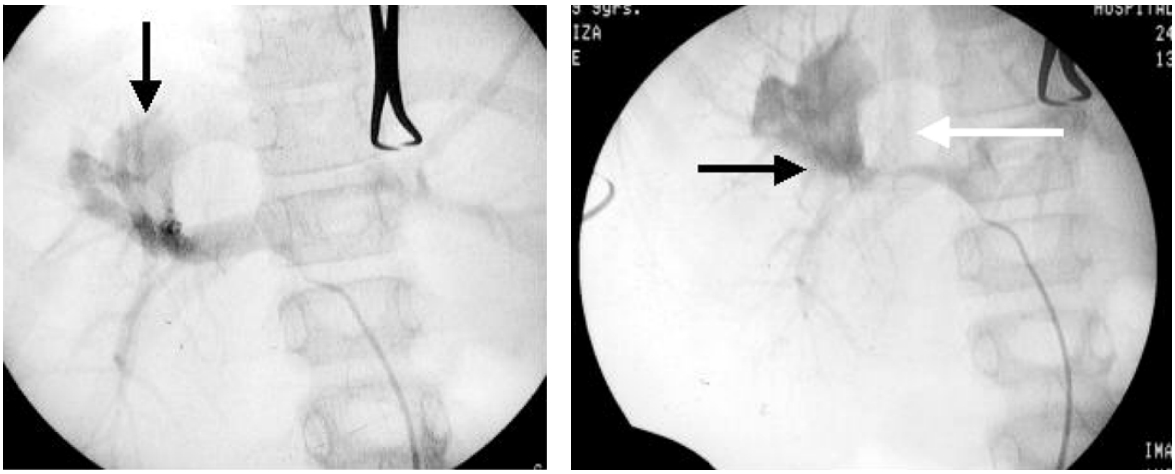

Fig. 7 Selective portogram demonstrates the large pseudoaneurysm (black arrow) arising from a branch of the right portal vein with associated shunt to the hepatic vein and opacified IVC (white arrow)

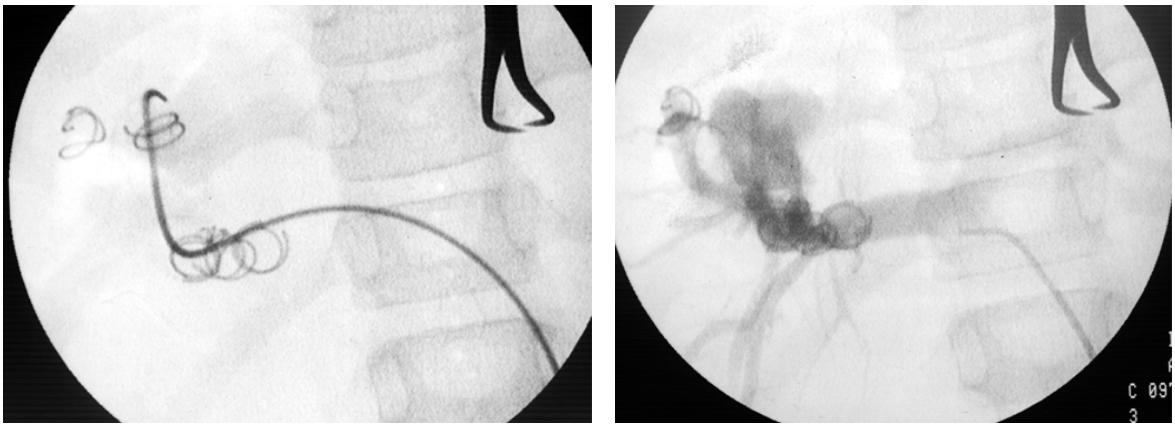

Fig. 8 Multiple embolized coils are deposited in the pseudoaneurysm of the portal vein branch

confirmed the large pseudoaneurysm arising from a branch of the right portal vein (Fig. 7), with associated shunt through the hepatic vein to the inferior vena cava. Two embolization coils (Cook Inc., Bloomington, Indiana) were placed in the pseudoa-neurysm. Three embolization coils were also deposited in the right portal vein branches adjacent to the pseudoaneurysm. Subsequent contrast injection demonstrated decreased flow in the pseudoaneurysm (Fig. 8).

The patient was well on clinical follow-up 6 months later, with no symptoms. A follow-up contrast enhanced CT demonstrated no sign of pseudoaneurysm (Fig. 9).

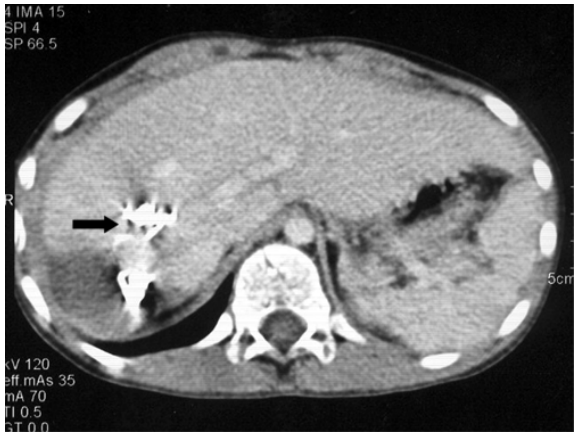

Fig. 9 The follow up contrast enhanced CT at 6 months later demonstrates no remaining pseudoaneurysm. Visualized multiple embolized coil (black arrow)

Discussion

The rate of non-operative management for traumatic injuries has increased significantly at many

trauma centers. Computed tomography has improved initial injury assessment, decreasing the need for laparotomy. Non-operative management has become recognized as an appropriate treatment option for both pediatric and adult patients with blunt hepatic injury. The development and improvement of non-operative intervention techniques, particularly selective angiographic embolization, to treat the potential complication of the liver trauma has supported the trend toward non-operative management[2,5], which has become widely accepted because of its low morbidity and mortality[4,6].

In general, hepatic artery arteriography and portography are the most specific methods for diagnosing and accurately assessing pseudoaneurysms of hepatic artery and portal vein. They provide more reliable information than ultrasonography and CT.

However, spiral CT is often used as the first imaging method in trauma centers. If CT demonstrates extravasation of contrast medium, this facilitates quicker selective angiography targeted directly to the site of bleeding. The liver has excellent collateral circulation and has a lower risk for ischemia than most organs. However, hepatic artery embolization should be as selective as possible, both to decrease the risks of ischemia, and also to reduce the risk of collateral flow from branches distal to the point of embolization[4,7-9]. In pseudoaneurysms which arises from a large proximal branch, it is preferable to selectively embolize both distally and proximally to avoid retrograde collateral reconstitution of the pseudoaneurysm from a distal branch[7].

A variety of embolic materials have been reported including silastic beads, glue, detachable balloon, coils, Gelfoam, polyvinyl alcohol and a combination of coils and Gelfoam[2,4,7,10]. The authors used coils for this portal vein pseudoaneurysm to prevent dislodgement of embolic material because the selective portography had revealed communication between the pseudoanerysm through the hepatic vein to the inferior vena cava.

In conclusion, transcatheter embolization may now be regarded as the treatment of choice for hepatic artery and portal vein pseudoaneurysm because of its safety and effectiveness.

Acknowledgements

The authors acknowledge the support and help of the medical, nursing, and health worker colleagues who were involved in patient care and follow-up, especially radiology department. The authors also wish to thank Professor Gile Stevenson for editing.

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การรักษาภาวะเส้นเลือดแดงเฮปาติกและเส้นเลือดดำพอร์ทัลโป่งพองในเด็กที่ได้รับบาดเจ็บ ด้วย selective transcatheter embolization

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รายงานผู้ป่วยเด็กหญิงอายุ 9 ปี ตกจากต้นไม้และถูกกระแทกบริเวณช่องท้อง ได้รับการวินิจฉัยภาวะเส้นเลือดแดงเฮปาติกและเส้นเลือดดำพอร์ทัลโป่งพอง จากการตรวจช่องท้องด้วย Spiral CT, Color Doppler Sonography และ Digital subtraction angiography จึงได้รับการรักษาด้วย selective transcatheter embolization อาการผู้ป่วยดีขึ้นเป็นลำดับ จากการติดตามผลการรักษาเป็นเวลา 6 เดือน พบว่าผู้ป่วยหายเป็นปกติ และไม่พบเส้นเลือดโป่งพอง จากการตรวจด้วย CT scan