

## **Contrast enhanced Ultrasound (CEUS) of a post-trans-jugular liver biopsy hepatic artery pseudoaneurysm in a transplant liver.**

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**Section:** Abdominal imaging

**Area of Interest:** Liver

**Procedure:** Diagnostic procedure

**Procedure:** Contrast agent-intravenous

**Imaging Technique:** Catheter arteriography

**Imaging Technique:** Ultrasound

**Imaging Technique:** Ultrasound-Colour Doppler

**Imaging Technique:** CT

**Special Focus:** Aneurysms Cysts Case Type: Clinical Cases

**Authors:** Leenknecht B, Zebari S, Rufai O, Kibriya N, Sidhu PS.

**Patient:** 34 years, female

### **Clinical History:**

A 34-year old woman with a transplant liver 3 years previously for Wilson's disease was referred for an ultrasound (US) examination of the liver, for monitoring of abnormal liver function tests and work-up for re-transplantation. The patient had undergone a trans-jugular liver biopsy 10 days before, with no complications recorded.

### **Imaging Findings:**

A B-mode US (Fig. 1) demonstrated an intrahepatic anechoic area, close to the portal vein. A colour Doppler US (Fig. 2) depicted turbulent flow within the anechoic area with the "ying-yang" appearance of a pseudoaneurysm. Contrast-enhanced ultrasound (CEUS) (Fig. 3-4) demonstrated the feeding hepatic artery branch. The pseudoaneurysm drained into the adjacent hepatic vein. A biphasic contrast-enhanced CT (Fig. 5) shows a 4.1 x 2.2 cm bi-lobulated intrahepatic lesion. The CEUS features were confirmed, and a pseudoaneurysm arising from the liver biopsy likely. Angiography was performed to proceed to coil embolization (Fig. 6). The pseudoaneurysm, arising from the right hepatic artery, was not embolized; because of a risk of ischaemia due to the proximal position of the pseudoaneurysm, the tortuosity of the feeding artery and the prominent drainage into the hepatic vein. In addition, re-transplantation was scheduled, and occurred 10 days following the detection of the pseudoaneurysm.

### **Discussion:**

Hepatic artery pseudoaneurysm (HAP) is a rare vascular complication of liver transplantation [1-5], with a reported incidence between 0.27–3 % [2, 3, 5]. HAP is classified according to location as intrahepatic or extrahepatic, with a different pathogenesis [2, 4, 6]. Intrahepatic HAP is most commonly related to an interventional procedures such as liver biopsy, percutaneous trans-hepatic cholangiography or trans-hepatic biliary drainage [4, 6] and is often an incidental finding on surveillance US [2, 3]. Extra-hepatic pseudo-aneurysm are most frequently secondary to an

infectious aetiology. This can be systemic haematogenous spread or local sepsis following a biliary leak, breakdown of the Roux-en-Y hepatico-jejunostomy or a small bowel perforation [2, 4, 6]. Rupture of HAP - with consequent haemobilia or intraperitoneal hemorrhage - has a high mortality rate [2, 5, 7]. B-mode US and colour Doppler US are the first-line imaging modality to evaluate vascular complications in the post-transplant liver [1, 2, 4]. On US the HAP appears as a pulsatile anechoic area of varying size close to the hepatic artery, often abutting the vessel [1, 2, 8]. Colour Doppler US depicts the typical “ying-yang” pattern. Spectral Doppler US can show a turbulent, bidirectional or - in rare cases - slow monophasic flow [1, 2, 8, 9]. Contrast-enhanced ultrasound has been used to assess vascular complications following liver transplantation [8, 10-12]. CEUS can depict a HAP as a circular area of contrast perfusion in the hepatic arterial phase [8, 13]. Angiography is the reference standard for diagnosis and treatment planning of vascular complications post-liver transplant [2, 7]. It should be performed in cases of suspected HAP with negative imaging findings [2]. In case of rupture, coil embolization can be used emergently to achieve hemostasis in hemodynamically unstable patients [7]. Using super-selective embolization techniques, graft ischemia resulting from hepatic artery occlusion sometimes can be avoided. In cases of a ruptured HAP involving the anastomosis or main hepatic artery, occlusion of the inflow – which renders the graft ischaemic – can be used as a temporary measure pending emergency re- transplantation. If no bleeding is present, a decision regarding intervention depends on the likely outcome of acute ischemia, the status of the graft and feasibility of revascularization or re-transplantation [2]. In selected cases (i.e. a narrow neck of the HAP), stent graft placement with balloon angioplasty can be a therapeutic option [14].

Written informed patient consent for publication has been obtained.

**Differential Diagnosis List:** Angiography confirmed the diagnosis of pseudoaneurysm of the hepatic artery., Simple hepatic cyst, Hepatic abscess

**Final Diagnosis:** Angiography confirmed the diagnosis of pseudoaneurysm of the hepatic artery.

#### References:

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# Figure 1

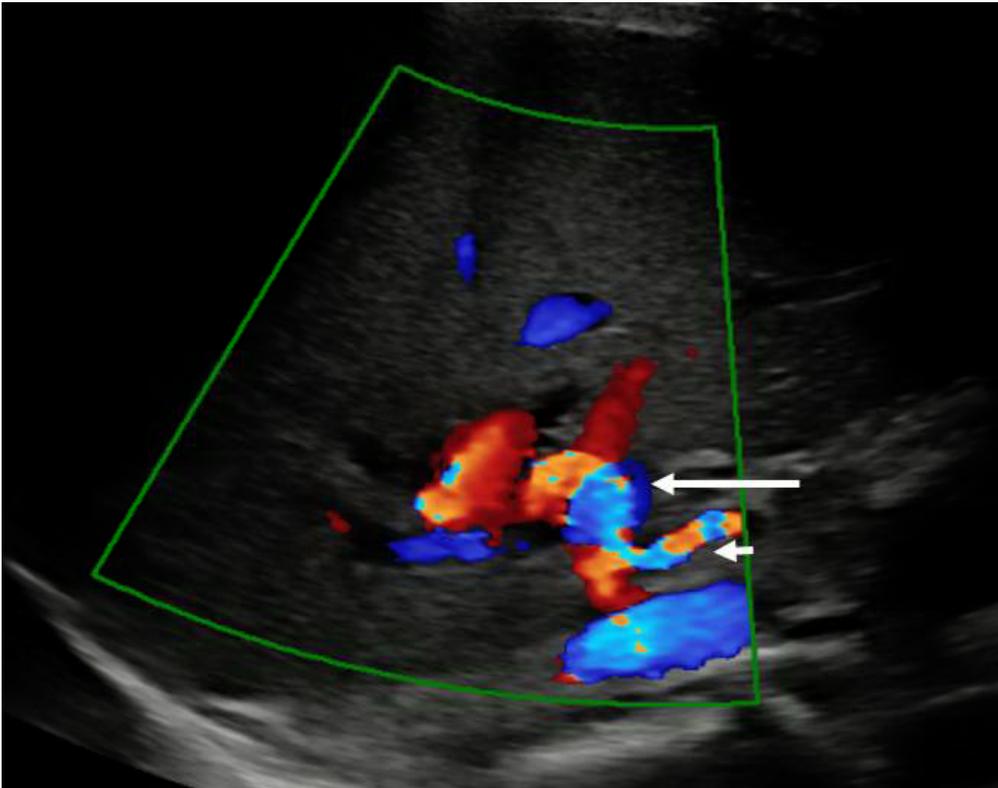
a



**Description:** A longitudinal view through the right lobe of the liver, depicting the hepatic artery (short arrow), the portal vein (star) and a low reflective area of indeterminate nature on the B-mode ultrasound (long arrow). **Origin:** Sidhu PS, Department of Radiology, King's College Hospital, Denmark Hill, London, United Kingdom.

## Figure 2

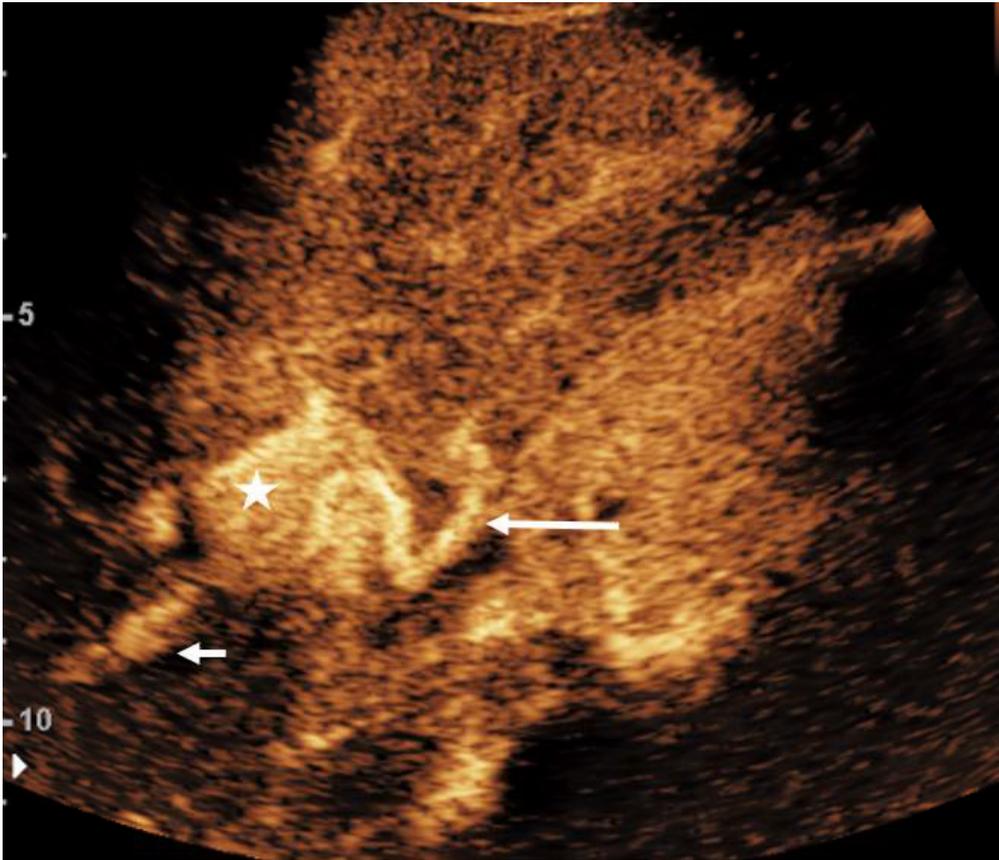
a



**Description:** A longitudinal view with colour Doppler, demonstrating the hepatic artery pseudoaneurysm (long arrow) with the 'ying yang' sign of flow reversal, depicted. The hepatic artery is also seen (short arrow). **Origin:** Sidhu PS, Department of Radiology, King's College Hospital, Denmark Hill, London, United Kingdom.

### Figure 3

a



**Description:** A longitudinal view using CEUS, during the late arterial phase, depicting the tortuous hepatic artery (long arrow), the enhancement of the pseudoaneurysm (star) and the early filling of the hepatic vein (short arrow). **Origin:** Sidhu PS, Department of Radiology, King's College Hospital, Denmark Hill, London, United Kingdom.

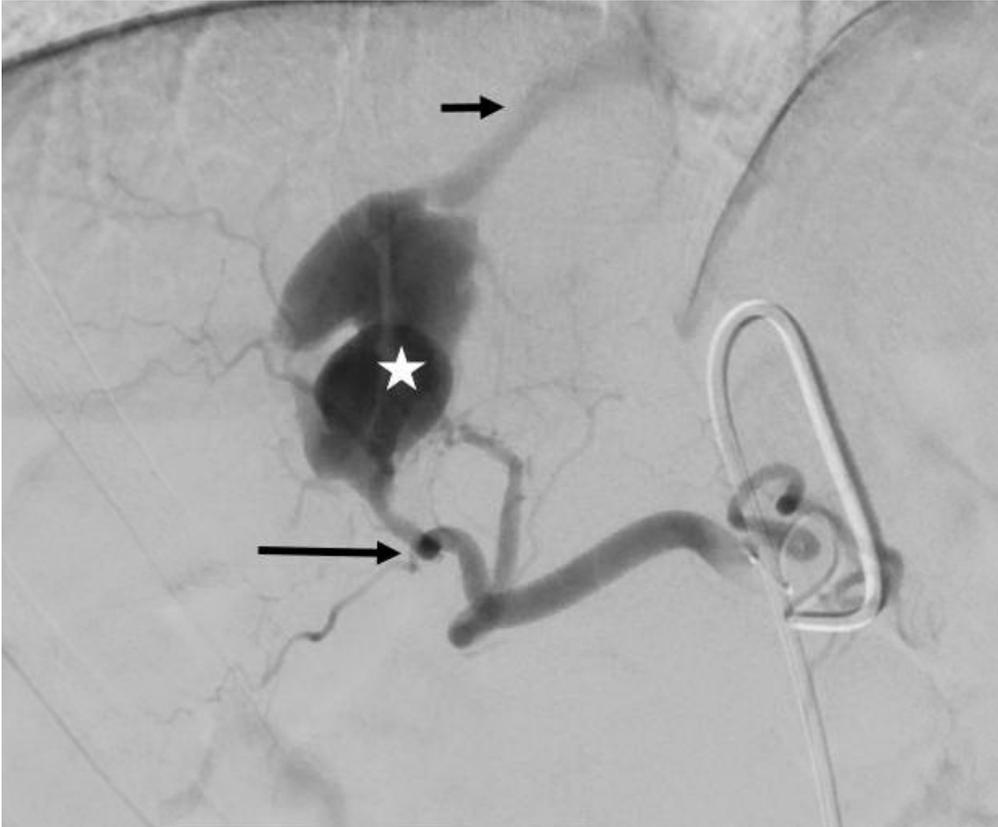
**Figure 4**



**Description:** A longitudinal view in the portal venous phase of the CEUS examination, depicting the continuing enhancement of the pseudoaneurysm (star), and prominent enhancement of the draining hepatic vein (short arrow). **Origin:** Sidhu PS, Department of Radiology, King's College Hospital, Denmark Hill, London, United Kingdom.

## Figure 5

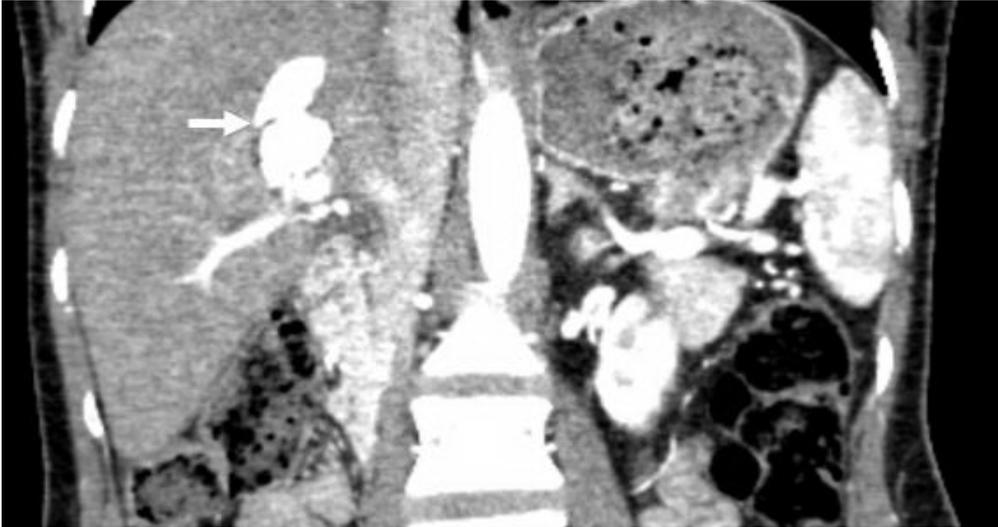
a



**Description:** The catheter is positioned selectively within the main hepatic artery, with depiction of the tortuous right hepatic artery (long arrow), feeding the pseudoaneurysm (star) and the early draining hepatic vein (short arrow). **Origin:** Department of Radiology, King's College Hospital, Denmark Hill, London, United Kingdom.

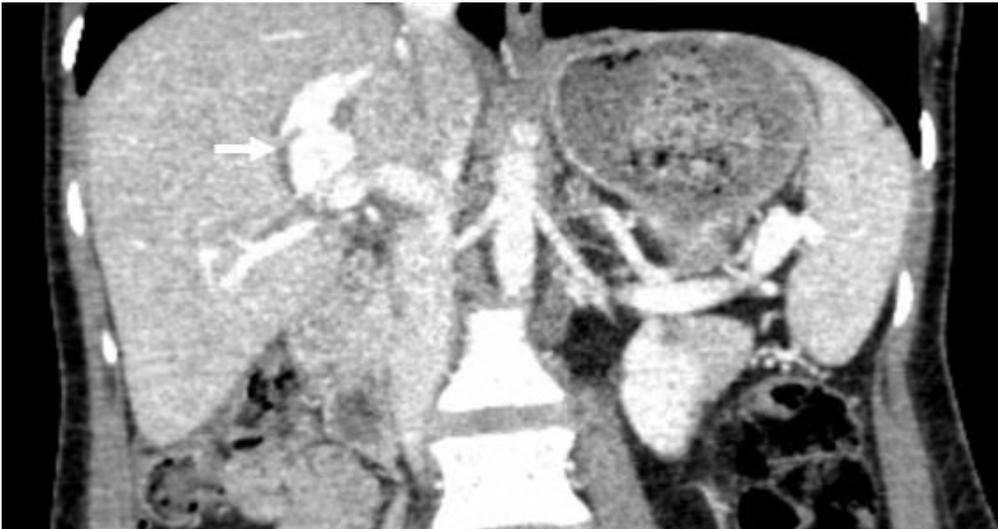
## Figure 6

a



**Description:** A coronal image from the arterial phase of the CT examination. A bilobulated pseudoaneurysm is demonstrated (arrow). **Origin:** Department of Radiology, King's College Hospital, Denmark Hill, London, United Kingdom.

b



**Description:** A coronal image from the portal-venous phase of the CT examination. A bilobulated pseudoaneurysm is demonstrated (arrow). **Origin:** Department of Radiology, King's College Hospital, Denmark Hill, London, United Kingdom.