

# Percutaneous Drainage of Liver Abscess Complicated by Hepato-venous Fistula

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## ABSTRACT

Severe systemic sepsis after percutaneous drainage of liver abscess is rare. We report two cases of hepato-venous fistulas between hepatic abscesses and hepatic/portal veins documented on abscessography during percutaneous drainage of liver abscesses, which resulted in severe sepsis and a stormy post drainage clinical course. Liver abscesses can rupture into the portal and hepatic veins causing worsening of systemic sepsis especially when they are in close proximity to each other. During percutaneous drainage, care must also be taken to avoid overinjection of the abscess, which can worsen the fistula. The ensuing sepsis is severe and requires aggressive intensive medical care and ventilatory support to tide the patient over the septic episode.

**Keywords:** hepato-venous fistula, liver abscess, percutaneous drainage, sepsis

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## INTRODUCTION

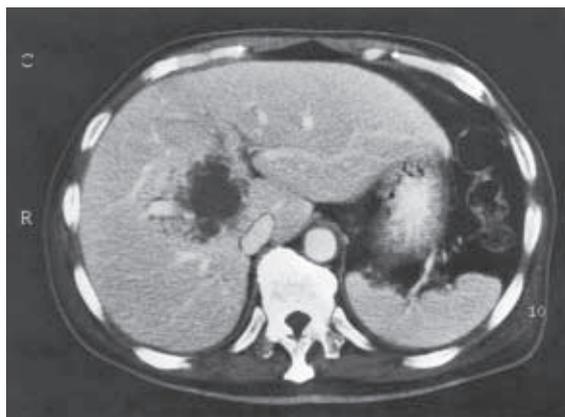
Radiologically guided percutaneous drainage coupled with parenteral antibiotic therapy is a well-accepted and effective primary treatment for pyogenic liver abscess<sup>(1,2)</sup>. This minimally invasive approach has high clinical success rate, low complication rate<sup>(3,4)</sup> and avoids general anaesthesia and its attendant risks. As such, surgery is generally reserved for concurrent surgical disease, abscess rupture or failed percutaneous treatment<sup>(5-7)</sup>.

Bacteraemia during percutaneous abscess drainage can occur but severe and life-threatening sepsis as a result is uncommon<sup>(3,8)</sup>. We report two cases of fistulous communications between hepatic abscesses and hepatic/portal veins (which we termed hepato-venous fistulas) documented on abscessography during percutaneous drainage of pyogenic liver abscesses which resulted in severe sepsis and a stormy post drainage clinical course.

## CASE REPORTS

### Case 1

A 65-year-old diabetic Chinese gentleman was admitted with a one-week history of abdominal pain and fever



**Fig. 1** CT scan of the liver showing the close anatomical relationship of the segment VIII liver abscess and right portal vein.

with chills and rigors. He was febrile with tender hepatomegaly.

Computed tomography (CT) scan revealed a 5 cm multi-lobulated abscess in segment VIII of the liver, in close proximity to the right portal vein (Fig. 1). The gallbladder and biliary ducts were normal. He was started on intravenous antibiotics and the abscess was drained percutaneously. Under fluoroscopic guidance, a 22G Chiba needle (Inrad, Kentwood, MI, USA) was introduced into the abscess cavity in a single pass. Pus was aspirated and dilute contrast (Iopamiro 370, Bracco, Milan, Italy) was injected to delineate the cavity. The abscess cavity was punctured with a 19 G sheathed needle (Cook Australia) alongside the Chiba needle to allow passage of a 0.035 inch guidewire (3 mm J tip PTFE coated guidewire, Bard Angiomed, Karlsruhe, Germany). Further injection of contrast demonstrated a communication between the abscess cavity and the right portal vein (Fig. 2). In view of the communication, only aspiration of the abscess was performed and a drainage catheter was not inserted.

The patient became tachypnoeic with worsening tachycardia of 160 beats/min soon after the procedure. A chest X-ray was performed which showed no pneumothorax. The patient had to be intubated for deteriorating respiratory function secondary to sepsis. He was treated aggressively with the appropriate antibiotic to klebsiella spp and required ventilatory

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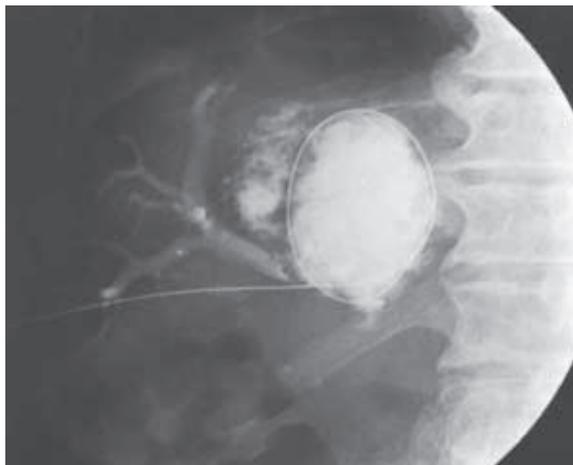
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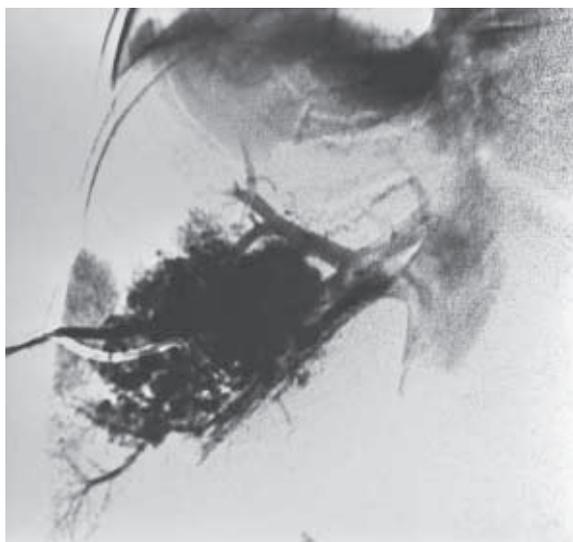
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**Fig. 2** Contrast injection into the abscess cavity opacified the right portal vein indicating the presence of a fistulous communication between the abscess cavity and right portal vein.



**Fig. 3** Abscessogram showing the abscess cavity communicating with the right hepatic vein. The inferior vena cava was also opacified.



**Fig. 4** Post percutaneous drainage CT scan of the liver showing the drainage catheter in good position within the abscess cavity. The close anatomical relationship of the segment VII liver abscess and right hepatic vein was again noted. There was no evidence of haematoma formation or contrast extravasation to suggest active bleeding from the right hepatic vein.

support for two days. A follow-up CT scan two days later did not reveal any liver haematoma or bleeding from the right portal vein or worsening of the abscess. He recovered well to be discharged with no further intervention after a total of two weeks hospital stay. An ultrasound scan of the liver five months later revealed resolution of the abscess cavity.

### Case 2

A 62-year-old Chinese lady with no previous medical history had complained of a one-day history of right hypochondrium pain with fever. She was hypotensive with a systolic blood pressure of 70 mmHg, which responded to fluid resuscitation, but subsequently required ventilatory support for respiratory compromise. A bedside ultrasound scan of the abdomen revealed gallstones and a 5 cm abscess in segment VII of the liver. She had acute renal impairment and disseminated intravascular coagulopathy secondary to sepsis.

Percutaneous drainage of the liver abscess was performed under fresh frozen plasma and platelet cover. The abscess was punctured at the first attempt using a 19G-sheathed needle (Cook Australia) under ultrasound guidance. Dilute contrast (Iopamiro 370, Bracco, Milan, Italy) was injected to delineate the abscess cavity under fluoroscopy. Over a 0.035 inch guidewire (3 mm J tip polytetrafluoroethylene (PTFE) coated guidewire, Bard Angiomed, Karlsruhe, Germany), an 8.5Fr self-retaining drainage catheter (Nephrostomy Cope loop, Cook Australia) was introduced into the cavity following serial tract dilatation. Further contrast injection into the abscess cavity showed opacification of the right hepatic vein and inferior vena cava indicating the presence of a fistulous communication between the abscess cavity and right hepatic vein (Fig. 3). There was no evidence of bleeding coming from the catheter and thus the drainage catheter was left in-situ, attached to an external drainage bag.

She had worsening sepsis soon after the drainage procedure with supraventricular tachycardias requiring both intravenous anti-arrhythmic drugs and increased ventilatory support for the subsequent five days. An immediate follow-up CT scan (Fig. 4) showed no liver haematoma or contrast extravasation to suggest bleeding from the right hepatic vein. She subsequently had cholecystectomy with closure of a cholecysto-duodenal fistula at the same admission.

### DISCUSSION

Bacteraemia following percutaneous abscess (hepatic and other abscesses) drainage can occur presumably due to venous or lymphatic backflow of septic material into the circulation<sup>(8)</sup>. These communications between the abscess cavity and the veins/lymphatics are small and

are usually not demonstrated on abscessography. The sepsis that ensues is usually minor, often responding to general supportive measures without adverse sequelae<sup>(3,8)</sup>.

To our best knowledge, fistulous communications between liver abscesses and major hepatic/portal veins documented on abscessography have not been reported previously. When a major vessel communicates with an abscess cavity, massive bacterial dissemination leading to severe septic deterioration can be expected to occur as demonstrated in these two cases.

The etiology of these fistulas was probably due to weakening of the vein walls by the inflammatory process. These fistulas were probably not the result of the needle punctures as these were performed under image guidance and the abscessograms showed that the fistulas and the site of needle entries into the abscesses were separate from each other. The contrast injections could have increased the pressure within the abscess cavities and precipitated the fistulous communications or that the fistulas were already present before percutaneous drainage, but we postulated that the latter was probably true in Case Number Two as the patient was already very ill from severe sepsis even before drainage of the abscess.

The presence of a major venous structure in close proximity to a liver abscess on cross sectional imaging should alert the clinician and interventional radiologist to the possibility of a hepato-venous fistula during percutaneous drainage. Close haemodynamic monitoring is essential. The interventionist should be cautious about contrast injection into the abscess to minimise the risk of bacteraemia and need only small amount for optimal catheter positioning. In the presence of a hepato-venous fistula, it is crucial that excessive contrast injections be avoided so that septic material would not be flushed through the fistula into the circulation.

On a clinical note, when a hepato-venous fistula is encountered during percutaneous drainage of liver abscess, acute septic deterioration that may require

intensive medical care and ventilatory support must be anticipated, having excluded other causes such as pneumothorax, bleeding and intraperitoneal rupture of the abscess, of which the latter may require surgery<sup>(5)</sup>. Similarly, the sudden deterioration in a seemingly well patient known to have a pyogenic liver abscess should raise the suspicion of rupture of the abscess into major hepatic or portal veins (i.e. hepato-venous fistula). Indications for surgery in liver abscess with hepato-venous fistula should not be different from those without<sup>(5-7)</sup> as exemplified by these two cases.

In conclusion, pyogenic liver abscesses can rupture into the portal and hepatic veins (hepato-venous fistulas) causing worsening of systemic sepsis. In our experience, the ensuing sepsis is severe and requires aggressive intensive medical care and ventilatory support to tide the patient over the septic episode. Clinicians and radiologists managing patients with liver abscesses should be aware of and be prepared to deal with the consequences of such a complication, especially when imaging studies show a major portal or hepatic vein coursing nearby the abscess.

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