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## CASE REPORT

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# Hepatic Subcapsular Haemorrhage: Watering-can Appearance

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### ABSTRACT

*We report a case of intra-abdominal bleeding from a ruptured liver tumour and a subcapsular haematoma. The characteristic 'watering-can' appearance indicates a poor prognosis. This appearance is due to contrast extravasation from multiple torn surface vessels secondary to the liver capsule being stripped off by the expanding subcapsular haematoma. Although the initial aim should be to 'save the liver' with limited embolisation, the finding of this appearance should prompt an aggressive approach to save life.*

*Key Words: Embolization, therapeutic; Hematoma; Hemorrhage; Liver diseases*

## 中文摘要

### 血管造影像「澆花噴壺」樣肝包膜下出血

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本文報告破裂肝腫瘤和包膜下血腫而出現腹腔出血。血管造影顯示像「澆花噴壺」表現，提示此病例預後不良。主要是由於包膜下血腫膨脹致肝包膜被扯斷繼而引發器官表面的多條血管外滲。雖然最初的醫治目標是進行有限栓塞來「救肝」，但血管造影的「澆花噴壺」影像顯示應及時進行搶救。

### INTRODUCTION

Liver tumour rupture is an uncommon cause of intraperitoneal haemorrhage. Rarely, liver tumour rupture may lead to haemorrhagic shock requiring emergency treatment.<sup>1</sup> In this article, we describe a characteristic finding on digital subtraction angiography (DSA) of 'watering-can' appearance of the hepatic artery that has not been previously reported in the literature.

### CASE REPORT

A 25-year-old woman presented to the casualty department with acute abdominal pain in April 2015. On examination, tachycardia (110 beats/min) and hypotension (90/60 mm Hg) were noted. Investigations revealed a low haemoglobin level (59 g/l) with normal coagulation and bleeding profile. Liver function tests were deranged (aspartate aminotransferase 428 U/l, alanine transaminase 553 U/l, bilirubin 8.6 µmol/l).

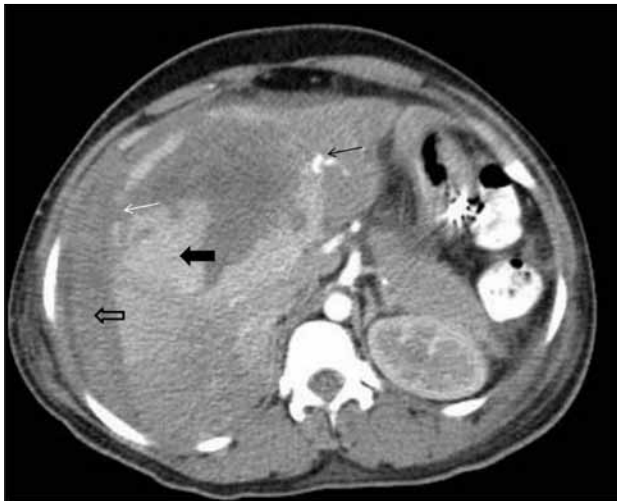
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Emergency sonography and computed tomographic (CT) scan of the abdomen revealed a large enhancing mass measuring 13 x 10 cm in segments 4 and 8 of the liver with rupture, a large subcapsular haematoma with intraperitoneal haemorrhage, and patent portal vein (Figure 1). The imaging findings were suggestive

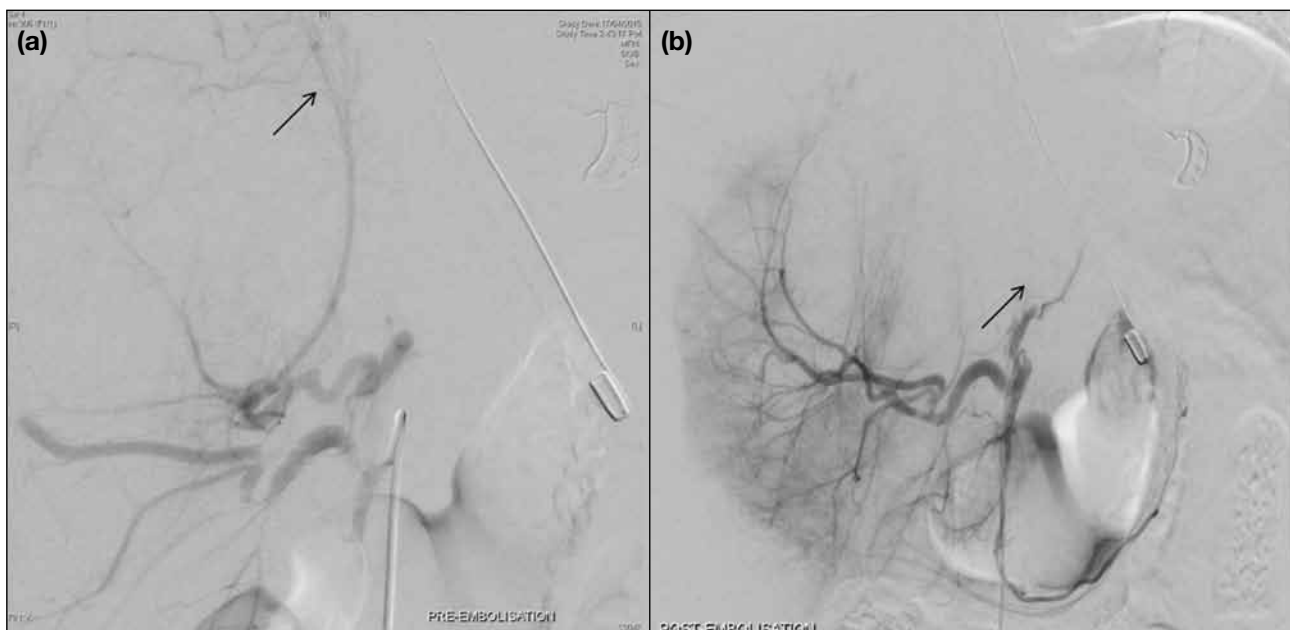


**Figure 1.** Axial section of computed tomography of the abdomen in arterial phase shows a large mass (thick black arrow) in the liver with rupture (white arrow) and hepatic subcapsular haematoma (hollow arrow) and intraperitoneal haemorrhage from an active extravasation from the branch of left hepatic artery (black arrow).

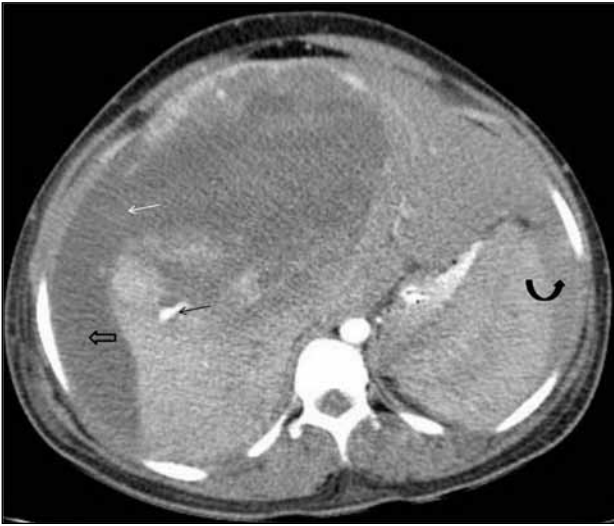
of a hepatic adenoma. She was haemodynamically unstable and required multiple blood transfusions. DSA revealed a hypertrophied segmental artery supplying segment 4, arising from the left hepatic artery with splaying and tumour blush (Figure 2a). Embolisation of the hypertrophied segment 4 artery arising from the left hepatic artery was performed using 300  $\mu$  polyvinyl alcohol particles (Figure 2b). She was subsequently managed conservatively in the surgical intensive care unit with fluids and blood transfusions. On the ninth day, she suddenly deteriorated with worsening of haemodynamic status. A repeated CT scan showed an increase in the size of the hepatic subcapsular haematoma with active extravasation (Figure 3). Since her general condition was poor, surgery was deferred. Repeated DSA revealed multiple punctate bleeding spots over the liver surface supplied by the right hepatic artery, giving the characteristic ‘watering-can’ appearance (Figure 4). Embolisation of the right hepatic artery was performed (Figure 5) but the patient succumbed the following day due to ventilator-associated pneumonia and worsening liver function due to significant liver damage.

## DISCUSSION

Non-traumatic liver tumour rupture leading to hepatic subcapsular haematoma and haemoperitoneum is an uncommon but fatal condition. It can be caused by



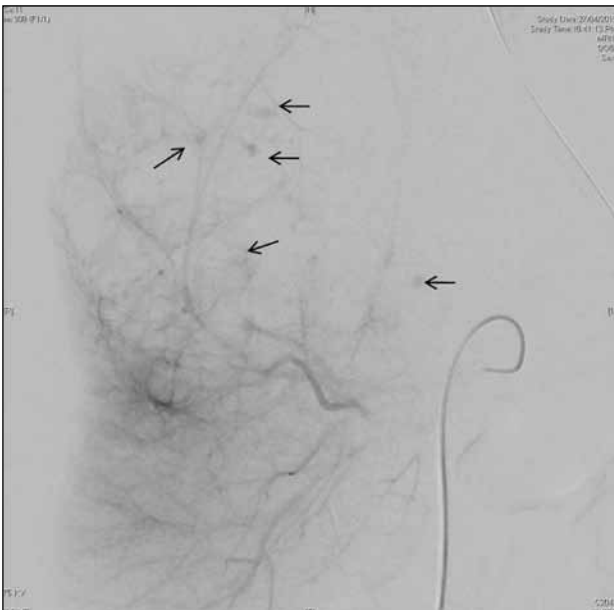
**Figure 2.** Digital subtraction angiography of celiac artery shows (a) abnormal splayed hepatic arteries (arrow) by the liver mass and (b) the embolisation of the left hepatic artery (arrow) using polyvinyl alcohol particles.



**Figure 3.** Axial section of computed tomography of the abdomen in arterial phase (in the same patient on the ninth day after sudden deterioration) shows liver rupture (white arrow) with increased hepatic subcapsular haematoma (hollow arrow) and intraperitoneal haemorrhage (curved arrow). Active extravasation from a branch of right hepatic artery is also noted (black arrow).



**Figure 5.** Digital subtraction angiography of celiac artery shows complete avascularity in right hypochondrial region (arrow) after embolisation of both hepatic arteries.



**Figure 4.** Repeated digital subtraction angiography of celiac artery on the ninth day shows multiple punctate bleeding points over the liver surface (arrows) giving the characteristic 'watering-can' appearance.

benign or malignant tumours of the liver.<sup>2</sup> A serious complication of hepatic adenoma is intratumoural or intraperitoneal haemorrhage which occurs in 50% to 60% of patients. The mortality rate of free rupture of

hepatic adenoma is 5% to 10%. CT can help identify the source of intra-abdominal bleeding.<sup>3</sup> The probable mechanisms of hepatic tumour rupture may be attributed to several factors such as high vascularity, necrosis, or direct pressure of the tumour against the liver capsule.<sup>4</sup>

The treatment of liver tumour rupture with subcapsular haematoma and haemoperitoneum is not well-defined. Endovascular embolisation of the ruptured tumour followed later by a surgical resection was planned in our case. After selective catheterisation of the bleeding arteries supplying the tumour, embolisation was performed using polyvinyl alcohol. The advantage of endovascular embolisation over resection especially in high-risk patients is that it carries less risk than an emergency laparotomy and does not require general anaesthesia. With endovascular embolisation, resection can be deferred until the patient's physical condition improves, or if embolisation fails to control the bleeding.<sup>2</sup>

We describe the characteristic 'watering-can' appearance on DSA due to contrast extravasation from multiple torn surface vessels secondary to the stripped-off liver capsule by the expanding subcapsular haematoma. The stripping of the liver capsule from the underlying liver results in the tearing of adjacent cortical arteries that further increases bleeding. Unlike the tiny aneurysms of polyarteritis nodosa, these multiple

bleeding points are along the surface and not within the parenchyma.

The 'watering-can' appearance refers to the multiple pin point surface bleeds which resemble the spout of a watering can with multiple holes that break up the stream of water into droplets as noted in our case. This appearance indicates a poor prognosis and should prompt a more aggressive approach to embolisation or resection, as it was originally described in the kidney.<sup>5,6</sup> We believe that this appearance may be seen in any encapsulated visceral solid organs such as the liver or kidney when the capsule is stripped off due to any cause such as ruptured tumour or trauma, allowing the surface arterioles to bleed at multiple points. Unfortunately, our patient expired the following day, despite the second more aggressive approach of embolising both the right and left hepatic arteries. The outcome in these patients is also determined by the severity of damage to the liver, the degree of haemorrhage, the speed of diagnosis, and the type of therapy.

The teaching point of this brief case report is that

limited embolisation with attempts to save the organ may be appropriate in the setting of an acute hepatic bleed, but a more aggressive embolisation as an attempt to save life rather than the organ, may be indicated in the presence of a 'watering-can' pattern of bleeding.

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