

Case Report

Hepatic Artery Injury and Arterio-Portal Shunting During Transjugular Liver Biopsy: A Case Based Teaching

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Abstract: Transjugular liver biopsy is a safe modality of tissue acquisition in the presence of advanced liver disease, obesity and conditions that preclude percutaneous approach, but not without complications. High volume liver centres experience minor and major complications of this procedure with although with good outcomes in the presence of multimodal approach to salvage. In this short review, we present a rare case of arterio portal shunting and capsular perforation in a patient who underwent transvenous liver biopsy and briefly review the procedure and its complications.

Keywords: cirrhosis, portal hypertension, liver biopsy, Transjugular, transvenous, liver capsule, interventional radiology, coil embolization.

INTRODUCTION

Liver biopsy is the gold standard for diagnosis of acute and chronic liver diseases. This histopathological aspect is currently changing with regards to cirrhosis as hepatic venous pressure gradient measurement has been shown to be a better modality for diagnosis (measures sinusoidal pressure and hence larger area of liver parenchymal coverage) rather than focally obtained tissue diagnosis [1]. Paul Ehrlich first described percutaneous liver biopsy in 1883 [2]. In patients with severe coagulation failure, ascites, morbid obesity or peliosis hepatis, a percutaneous route is contraindicated. In such instances, a transvenous approach, commonly transjugular is undertaken. Transjugular biopsy performed from cardiac muscle of right ventricle in dogs was first described by Dotter in 1964 [3]. Access to the biliary tree through hepatic veins was first described clinically by Hanafee in 1967 [4].

CASE SCENARIO

A 38 year old woman presented to our step down intensive unit with one month history of non cholestatic jaundice followed by progressive ascites and alteration in mental status since 2 days. Elsewhere, she was diagnosed as a case of acute on chronic liver

failure. Her baseline reports revealed haemoglobin 9.6 g/L, total count $12.6 \times 10^3/\text{mm}^3$, platelets $12000/\text{mm}^3$, total bilirubin 28.8 mg/dL with direct fraction 12.8 mg/dL and aspartate transaminase 886 U/L, alanine transaminase 123 U/L, serum albumin 2.1 g/dL and INR 6.8. In view of severe coagulation failure and ascites, after correction with fresh frozen plasma and platelets, she underwent a TJLB procedure. Three hours post procedure, the patient developed hypotension, rising arterial lactate levels, respiratory embarrassment leading to intubation and mechanical ventilator requirement. Computed tomography (CT) angiogram of abdomen done immediately after resuscitation revealed sub capsular hepatic arterial branch injury at the periphery, contrast enhancement of portal vein in arterial phase with hyper dense fluid (Figure 1A and 1B) surrounding the lateral aspect of right lobe of liver suggestive of arterio-portal shunting and active contrast extravasations. Conventional angiography revealed a tortuous hepatic artery branch filling the portal vein and sub capsular leak at the periphery (Figure 1C). Micro-catheter directed gel foam embolization of the AP shunt was done followed by percutaneous coil embolization of sub capsular surface vessel (Figure 1D), resulting in hemostasis.

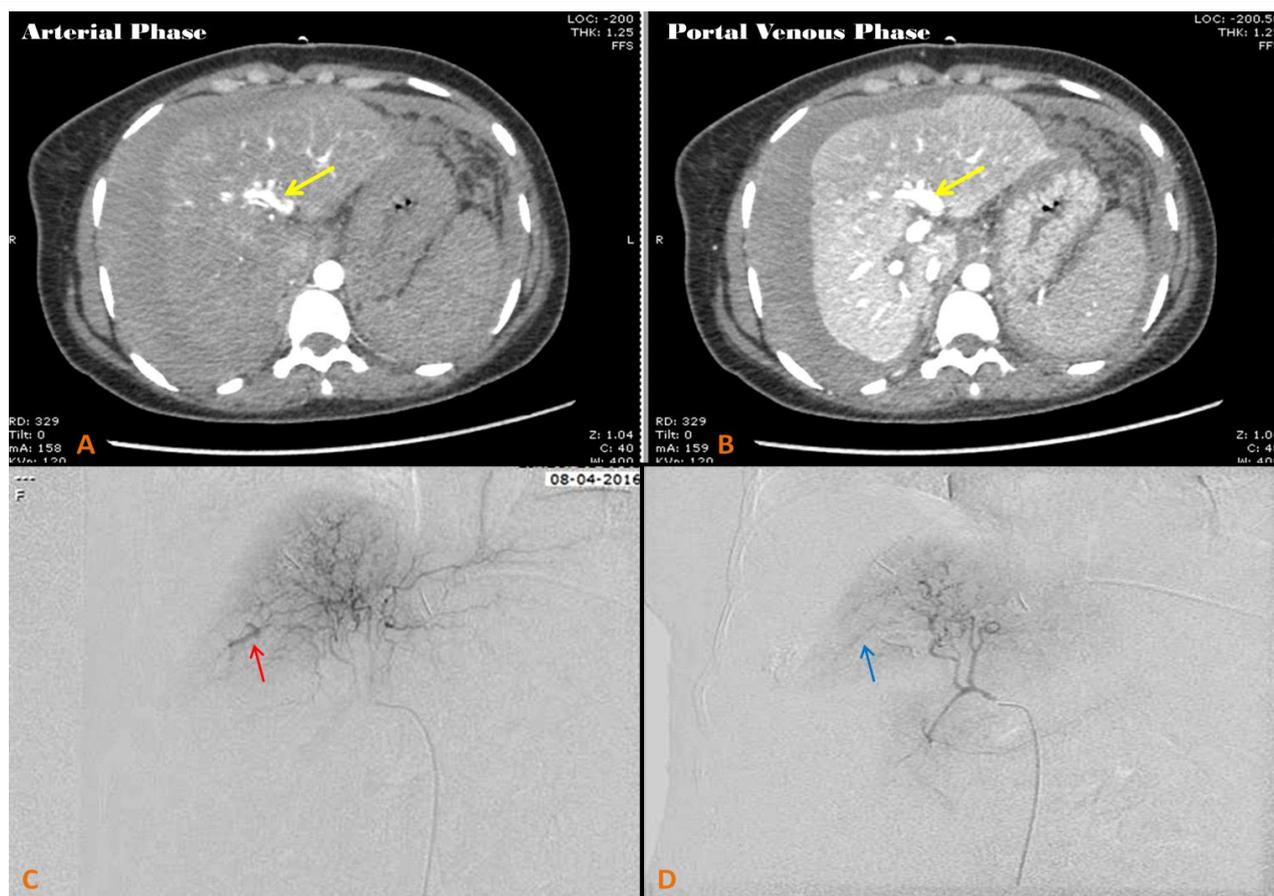


Fig 1: CT angiography imaging of the abdomen showing contrast enhancement of the portal vein in arterial phase (yellow arrow, A) in comparison with portal venous phase (yellow arrow, B); Fluoroscopy guided digital subtraction angiography showing a small leak from a peripheral sub capsular hepatic arterial branch (red arrow, C) and subsequent hemostasis post glue injection (blue arrow, D).

Transjugular liver biopsy

In the presence of acceptable indications for transjugular route, the procedure is done under aseptic precautions in an angiography suite. The United States Food and Drug Administration has recommended TJLB-sets with stiff cannula/sheath diameter 7F, 18 or 19 gauge core needles with trocar length of 60 cm, needle notch length 15 mm and needle throw length 20 mm. An ultrasonography machine with 7.5 Hz transducer and multipurpose catheters are additionally required. Coagulopathy is not a contraindication [5]. However, correction of underlying coagulation failure depends on institutional policies. In some institutes, correction is done when international normalized ratio (INR) is > 2.5 and platelet count is $< 50,000 \times 10^9/L$ whereas elsewhere, cut offs of INR > 3.5 and platelet counts $< 10,000 \times 10^9/L$ are utilized. In the presence of centrally placed space occupying lesions and polycystic or hydatid disease of the liver, TJLB is usually avoided, even though some high volume centres still go ahead with the procedure with guided ultrasonography. At least 6 hours fasting is required prior to procedure for use of conscious sedation. In patients who have contrast

allergy or deranged renal functions, carbon-dioxide is utilized [6].

Important Aspects in Technique

Jugular venous access is obtained under real time ultrasound guidance and the vascular sheath is advanced into the inferior vena cava. A multipurpose catheter is used to selectively catheterize the right or middle (more central, better) hepatic vein. In the presence of an acute entry from the cava to the hepatic vein, a reverse curve catheter (for example, Launcher Coronary Catheter) can be used to access the hepatic vein. A cannula is then advanced over the stiff wire and automatic cutting type Tru-Cut biopsy needle thereafter. Two samples from the periphery and 2 samples from the central parenchymal region are ideal, yielding histological details from different anatomical regions within the liver. Three individual non fragmented specimens on TJLB are as adequate as percutaneous full core biopsy samples. The mean duration for the procedure is around 40 minutes, mean fluoroscopy time 6 minutes, and radiation dose range 0.5 to 1 mSv. Range of technical success can be upto 97%. Post procedure, patients should be maintained in sitting or

semi recumbent posture and continuous monitoring of vitals done for 8 hours [7].

Complications

Complication rates vary between 2 to 7% and most commonly related to bleeding at puncture site or abdominal pain due to small hematoma distending the liver capsule. Major complications are seen in 0.6% of patients with reported mortality of <0.1%, mostly related to hemorrhage and extra-capsular liver puncture or capsular perforation after wedge injection, perforation of hepatic artery or ventricular arrhythmias leading to sudden death [8].

Further Course of Patient in Discussion

Post procedural hemostasis achievement, the patient showed stability in haemoglobin levels and arterial lactate levels were in a declining trend. On the 2nd day post interventional procedure, the patient's transaminases raised 15 times the baseline values and new onset worsening lactic acidosis and renal injury. A repeat imaging did not reveal new onset bleeding. The current worsening situation was attributed to new onset sepsis and progressive liver failure secondary to underlying liver disease. The TJLB histopathology report was suggestive of autoimmune hepatitis with multi acinar necrosis. The patient died 10 days after the salvage intervention because of multi organ failure.

CONCLUSION

Techniques for liver biopsy have come a long way after its initial description in the 1800's. Transjugular liver biopsy is a safe procedure when done with astute focus and under expert guidance and improves with experience. Even then, high volume centres do bear the brunt of seeing rare complications leading to mortality. Major complications such as seen in our patient can become difficult to manage considering the presence of advanced liver disease, intercurrent infections and propensity to develop multi organ failures at a fast pace. A multi disciplinary support especially from interventional radiology is of utmost importance in managing and salvaging a dying patient.

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