Case Report

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Ultrasound Guided Fine-Needle Aspiration Cytology (FNAC) of Portal Vein Thrombus: A Novel Diagnostic and Staging Technique for Occult Hepatocellular Carcinoma

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Abstract

Introduction: The diagnosis of Hepatocellular Carcinoma (HCC) is usually established using non-invasive radiological imaging and tumor markers. The stage at diagnosis is a critical factor in the treatment, course and prognosis of HCC. Patients with Tumor Portal vein thrombus (PVT) are considered to have an advanced disease and are only offered palliative therapy. Therefore, every possible attempt should be made to accurately stage HCC. Fine-needle aspiration cytology (FNAC) of PVT is an effective procedure for diagnosing and staging HCC. We present a case where we used Ultrasound (USG) guided FNAC of a PVT to successfully diagnose and stage HCC in the absence of a well-defined liver mass on imaging.

Case report: A 43-year-old Hepatitis B surface antigen positive male presented with a 3-month history of fatigue, jaundice and fever. On examination he had hepatomegaly. His liver function tests were elevated, but his alpha-fetoprotein was normal. USG and Computed Tomography (CT) showed a thrombus in the portal vein but failed to show a well-defined liver lesion. FNAC was taken from the PVT, which was positive for malignancy. He was offered palliative chemotherapy and a steroid for his pyrexia. He is on follow-up.

Conclusion: FNAC is a safe, quick, easy and economical technique to diagnose and stage HCC in the presence of portal vein thrombus, especially in patients where the tumor is occult on imaging. It also affords an accurate method to differentiate between malignant and nonmalignant PVT, thereby aiding appropriate therapeutic decision making.

Key words: *Portal vein thrombus, fine-needle aspiration cytology, occult hepatocellular carcinoma, staging and diagnosis*

Introduction

HCC is a fatal complication of cirrhosis but recent treatment advancements, including liver transplantation, have made HCC a potentially curable disease [1]. Curative treatment options are attempted only in the absence of extensive vascular invasion or extra-hepatic spread [1,2]. In patients with HCC, neoplastic PVT gravely affects prognosis and subsequent treatment choices, and these patients are deemed unsuitable for any of the available therapeutic options.

The diagnosis of HCC is usually established by non-invasive radiological imaging, as other currently available diagnostic modalities have inadequate sensitivity or specificity [1-3]. HCC has a myriad of presentation on imaging: the most difficult pattern to detect, particularly in patients with a background of underlying parenchymal liver disease, is the diffuse infiltrative pattern [3]. This was the pattern seen in our patient where the tumor was occult on imaging and where tumor markers were normal. FNAC helped clinch the diagnosis and also stage the disease at the same time, thereby obviating unnecessary emotional, financial and diagnostic morbidity for the patient.

Case Report

A 43-year-old male presented with a 3-month history of fatigue, jaundice and a quotidian type of fever. He had no past history of liver disease or alcohol abuse. His past surgical history was unremarkable, except for an appendectomy nine years ago. On general examination, he was icteric with no evidence suggestive of chronic liver disease. Abdominal examination revealed hepatomegaly, and there was clinically no free fluid. His laboratory studies were remarkable for a total serum bilirubin of 12.6 mg/dl (normal, 0-1 mg/dl) with the direct fraction being 8.7 mg/dl (normal, 0-0.25 mg/dl). His alkaline phosphatase was raised at 619 U/L (normal, 80–290 U/L); alanine aminotransferase was 96 U/L (normal, 0–40 U/L) and aspartate aminotransferase was 77 U/L (normal, 0–37 U/L). He was also detected to be positive for Hepatitis B surface antigen. The patient's alpha-fetoprotein (AFP) was normal {7.5 ng/mL (normal, 1–9 ng/mL)}. His USG showed altered liver echotexture suggestive of cirrhosis, with an irregular ill-defined isoechoic lesion involving both lobes of the liver. The portal vein and its branches were dilated and filled with thrombus, with flow seen within the thrombus on a power flow Doppler (Figure 1). Free fluid was noted in the abdomen along with splenomegaly. Abdominal CT showed an ill-defined lesion in the right lobe of the liver with portal vein thrombus (Figure 2). This picture raised suspicions of an occult HCC. His coagulation profile was confirmed to be normal and an FNAC was performed under USG guidance on the PVT using a 25-gauge needle (Figure 3). Following a single pass into the portal vein, multiple passes were made into the thrombus, making sure that the needle was within the lumen of the portal vein at all times. This was done to avoid repeated punctures of the portal vein, thereby reducing any chance of bleeding. During FNAC, care was taken to avoid any injury to adjacent

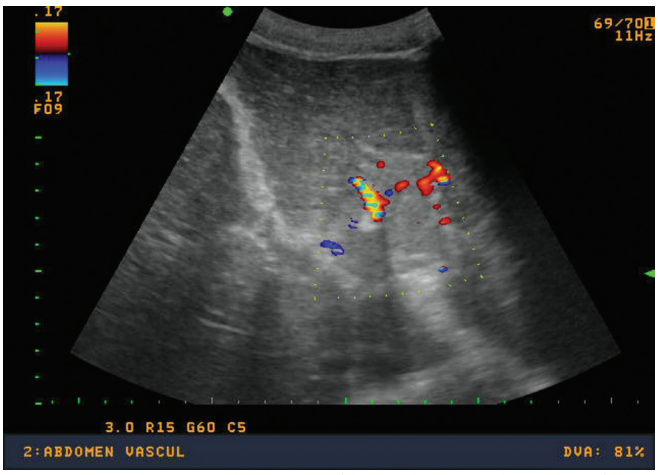

Figure 1. Color Doppler USG of liver showing thrombus filling the entire lumen of the portal vein with flow within the thrombus.

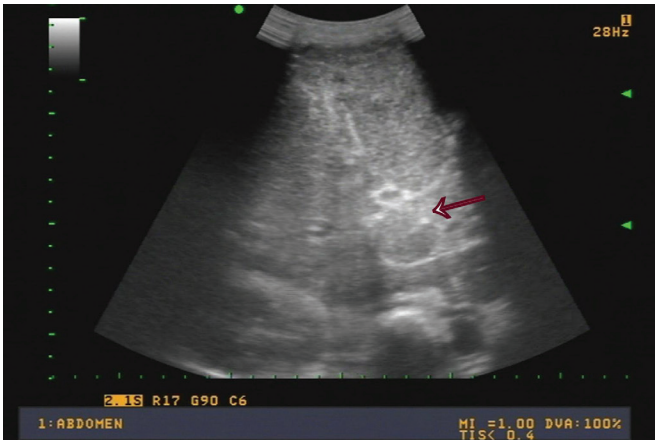

Figure 2. Abdominal CT showed an ill-defined lesion in the right lobe of the liver with portal vein thrombus.

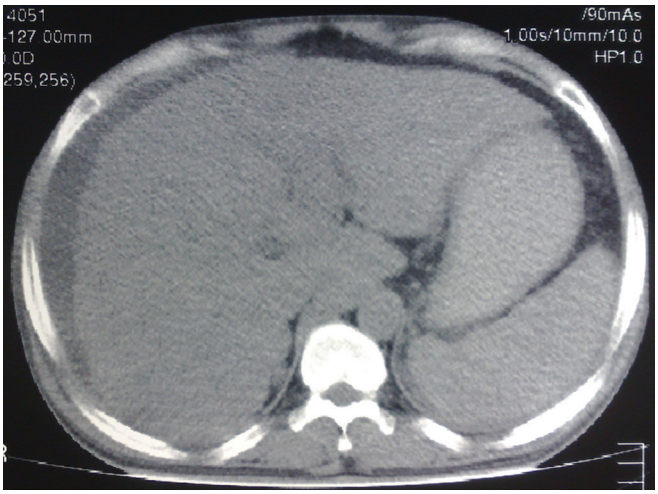

Figure 3. Gray-scale USG of liver showing thrombus in the portal vein with a needle (arrow) visualized within the portal vein thrombus.

vascular or biliary structures. The aspirate was fixed with 95% ethanol and was read by a cytopathologist. Cytopathologic examination of the specimen revealed malignant cells consistent with moderately differentiated HCC. The patient tolerated the procedure very well. Following the FNAC report, he was offered palliative chemotherapy. He was also started on a course of steroids and a diuretic to palliate his febrile episodes and ascites respectively. He is now on a regular follow-up at our liver clinic.

Discussion

Noninvasive radiologic imaging modalities are most often used to diagnose HCC, but there are limitations to the accuracy of these techniques, as the diagnosis is made without tissue sampling [1,2,4]. Three main growth patterns of HCC are seen on imaging: diffuse infiltrative, solitary massive, and multinodular [5]. On USG, HCC has variable and relatively nonspecific appearances: hypoechogenicity, mixed echogenicity, or hyperechogenicity [3,5,6]. An elevated AFP level (>200 ng/mL), or a rising AFP level, in the presence of a mass on imaging has a very high positive predictive value for the diagnosis of HCC. Even in the absence of a visible lesion on imaging, a significant elevation in the AFP level (>1,000 ng/mL) is again highly suggestive of an occult HCC, particularly in the presence of cirrhosis [3,5,7]. Our patient fulfilled none of the above-mentioned criteria. Patients infected with Hepatitis B surface antigen have an approximate 7-fold increased risk of HCC [2,3].

PVT occurs in cirrhosis, the most common cause being sluggish or reversed portal venous blood flow due to portal hypertension [4,5,7]. PVT in patients with cirrhosis may be attributed to malignancy, inflammatory and infectious diseases and hypercoagulable states[5,7]. PVT can also be caused by iatrogenic intervention in cirrhosis [2,5,7,8]. Endoscopic sclerotherapy of esophageal varices and percutaneous ablation therapies for HCC have been shown to provoke PVT [2,5,7,8]. None of the above-mentioned causes, apart from malignancy, are a contraindication for therapeutic intervention in HCC [1-8]. Malignant PVT is a usual complication of HCC in cirrhosis and signals an advanced tumoral stage. Tumor thrombus, unlike nontumor PVT, shows arterial enhancement along with distortion of the portal vein lumen on CT or MRI [3-5,7]. The diagnosis of a tumor thrombus is relatively easy when patients present with a liver mass suggestive of HCC and a PVT that enhances on the arterial phase of CT or MRI. However, the diagnosis of tumor PVT is difficult in the absence of a discrete or infiltrating liver mass or when there is non- diagnostic elevation of AFP levels [2,3,5].

The clinical value of recognizing malignant PVT in a patient with HCC relies on the effect that malignant PVT has on the therapeutic strategy. Five-year survival after surgical resection is 12%–39% in patients with neoplastic PVT and 59% in those without [1,2,5]. Therefore, patients with neoplastic PVT are excluded from surgical or nonsurgical ablative treatment. When liver transplantation or a curative resection is planned, a firm diagnosis or exclusion of tumor thrombus becomes critically important. In a small percentage of patients, PVT may be the initial sign of an undetected HCC [2,5,7,8]. There might even be an argument for PVT FNAC when a liver mass and PVT coexist; tissue sampling of the PVT might be preferred in order to avoid difficulty in diagnosing well-differentiated HCC as well as simultaneously providing easy, rapid and accurate staging information [5]. As with any other investigation, this technique appears to have its shortcomings. It is operator-dependent; the need for a skilled interventional radiologist is thus imperative [1,2,4,8]. There have also been unsubstantiated concerns of bleeding or injury to the adjacent bile duct or hepatic artery due to multiple punctures of the portal vein, especially on a background of cirrhosis [2-4,6,8]. The theoretical risk of such an occurrence can be reduced by the use of a very fine bore needle, and multiple punctures can be avoided by taking extra care not to withdraw the needle from the lumen during multiple passages into the thrombus.

Conclusion

We have attempted to highlight the ease, safety, and efficacy of this technique, along with its clinical application. We believe that FNAC should be utilized to diagnose the etiology of portal vein thrombosis and to stage HCC, especially when the findings of other imaging modalities are equivocal. FNAC of PVT is important as a firm diagnosis, or exclusion of neoplastic PVT

is critically important before subjecting a patient to a therapeutic intervention. We have described a simple technique that can be extremely useful for the diagnosis and staging of advanced HCC. There is certainly a need for large, prospective clinical studies before FNAC of the PVT can be recommended as a part of the routine investigative protocol for patients with HCC and PVT.

Conflict of interest statement

The above doctors have no conflicts of interest or financial ties to disclose.

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