Case Report

Extensive tumor thrombus of hepatocellular carcinoma in the entire portal venous system detected on fluorodeoxyglucose positron emission tomography computed tomography

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ABSTRACT

Detection of thrombus is usually an incidental finding on fluorodeoxyglucose positron emission tomography/computed tomography studies. Nevertheless this is an important finding in terms of disease prognostication and in planning the treatment strategy. We herein report a case of a 50-years-old male, a diagnosed case of hepatocellular carcinoma with extensive hypermetabolic thrombus involving the entire portal venous system.

Keywords: Fluorodeoxyglucose positron emission tomography computed tomography, hepatocellular carcinoma, portal vein thrombus, tumor thrombus

INTRODUCTION

Thrombosis of the portal vein is commonly seen with hepatocellular cancer but such extensive thrombosis involving the entire portal venous system is very rare and indicates a very poor prognosis.

CASE REPORT

A 50-years-old male, a case of hepatocellular carcinoma (HCC) was referred for a fluorodeoxyglucose (FDG) positron emission tomography (PET) computed tomography (CT) scan for a pre trans arterial radio embolization (TARE) evaluation. He was positive for hepatitis B virus infection. His alpha feto-protien levels were significantly elevated at 34,700.50 ng/ml (normal values 0-15 ng/ml). His scan revealed a moderately hypermetabolic mass in the right lobe of liver, which was the site of the primary HCC. In addition to the primary mass there was extensive hypermetabolic thrombus involving the portal vein and its branches, the splenic vein and the superior mesenteric vein. The maximum intensity projection image shows hypermetabolic thrombus involving the right and left branches of the portal vein (thin arrows), the main portal vein (block arrow), splenic (arrow head) and superior mesenteric (curved arrow) veins [Figure 1]. The CT images show a filling defect completely occluding the lumen of the right and left portal veins and the main portal vein. All these vessels were expanded and were enhancing when compared with the plain baseline images. The mass in the right lobe of liver directly invades the portal vein branches and shows attenuation characteristics same as that of the tumor [Figure 2, left panel]. The fused PET CT image shows the hypermetabolic tumor thrombus in the branches of portal and in the main portal vein [Figure 2, right panel]. Hypermetabolic filling defects were also seen in superior mesenteric vein [Figure 3, upper panel] and splenic vein [Figure 3, lower panel]. These characteristics of an expanded filling defect in the vessels, enhancing on post contrast images with intense FDG avidity and more over being directly invaded by the tumor itself led to the diagnosis of tumor thrombus over a bland thrombus. Though the patient was referred for a pre TARE evaluation, with such large tumor with extensive malignant thrombus, the patient opted against any invasive treatment option and the patient was put on oral Tyrosine kinase inhibitor.

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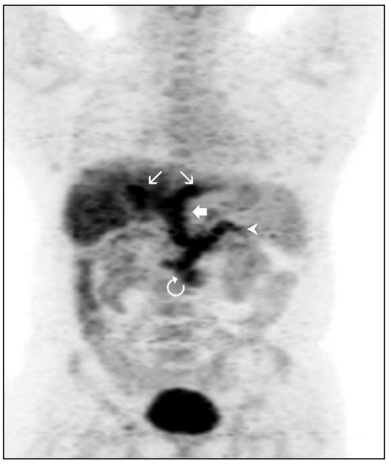

Figure 1: Fluorodeoxyglucose positron emission tomography, maximum intensity projection image showing the hypermetabolic thrombus involving the right and left branches of the portal vein (thin arrows), the main portal vein (block arrow), splenic (arrowhead) and superior mesenteric (curved arrow) veins

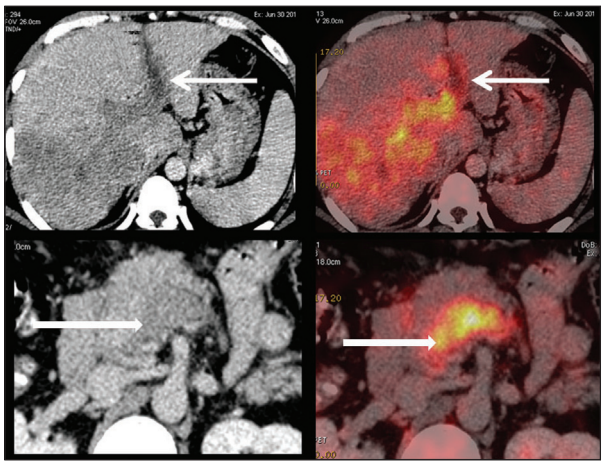

Figure 2: The left panel shows the computed tomography (CT) images and the right panel shows the fused positron emission tomography CT images. The CT images in the left panel shows a filling defect completely occluding the lumen of the right and left portal veins and the main portal vein. The arrow in the right upper panel shows the hypermetabolic tumor thrombus in the branches of the portal vein and in the lower panel the thrombus in the main portal vein

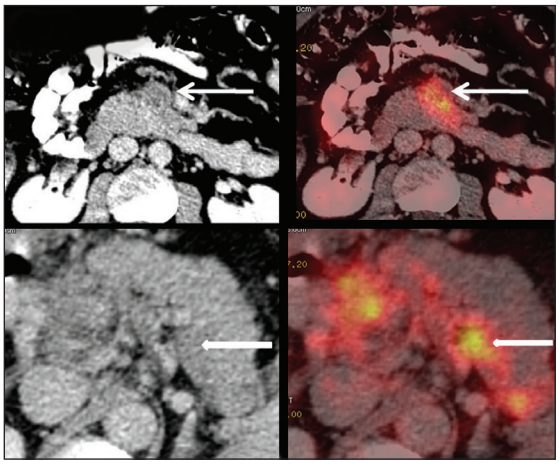

Figure 3: The left panel shows the computed tomography (CT) images and the right panel shows the fused positron emission tomography CT images. The arrow in the right upper panel shows the hypermetabolic tumor thrombus in superior mesenteric vein and in the lower panel the thrombus in the splenic vein

DISCUSSION

HCCs have a propensity to invade large veins of which portal veins are the commonest. Tumor thrombus in the portal veins is seen in approximately 64% of patients.[1] Extensive tumor thrombi are noted in more advanced tumors.[2] Few reports have demonstrated tumor thrombi in recanalised para-umbilical veins in cases of HCC.[3] In a tumor thrombus the neoplastic tissue is transported into a blood vessel from a primary tumor. They are usually diagnosed incidentally and the patients are often asymptomatic. It is important to discriminate a bland thrombus from a tumor thrombus due to different treatment strategies in each.[4] The increased FDG uptake in a tumor thrombus is due to high metabolic neoplastic activity.[5] However, a differentiation between a benign (bland) thrombus from a malignant (tumor) thrombus based on increased FDG uptake often cannot be made since varied FDG uptake has also been observed in inflammatory and infectious processes. The administration of IV contrast and the morphological characteristics based on CT provide some differentiating characteristics between a tumor and bland thrombus.[6,7] A direct continuity between the primary tumor and the thrombus is indicative of a tumor thrombus. In a remote thrombus, venous expansion and intra-thrombus neovascularity are features which are suggestive of tumor thrombosis.[4] Few studies have well depicted the role of FDG PET CT in differentiating between a bland and a malignant tumor thrombus. Intense FDG uptake is seen in malignant tumor thrombus in patients with HCC.[8,9] Portal vein invasion in a case of HCC renders a patient unsuitable for surgical resection, orthotopic liver transplantation, transarterial chemoembolization and even ethanol ablation. This is because such patients have a high incidence of tumor recurrence and also poor survival.[10,11] Though venous thrombosis is a common entity in HCC, in our case the malignant tumor thrombus was involving the right and left portal vein branches, the main portal vein and its confluence and also extending into the splenic and the superior mesenteric veins. Such extensive tumor thrombus indicates a dismal prognosis and to our knowledge such extensive thrombi involving the entire portal venous system has not been reported earlier.

REFERENCES

1. Nakashima T, Okuda K, Kojiro M, Jimi A, Yamaguchi R, Sakamoto K, *et al.* Pathology of hepatocellular carcinoma in Japan. 232 Consecutive cases autopsied in ten years. Cancer 1983;51:863-77.
2. Chang JS, Chen SC, Chuang WL, Wang LY, Chang WY. Paraumbilical vein tumor thrombosis in hepatocellular carcinoma. Am J Gastroenterol 1994;89:1099-102.
3. Beadsmoore CJ, Cheow HK, Sala E, Lomas DJ, Gibbs P, Save V, *et al.* Hepatocellular carcinoma tumour thrombus in a re-canalised para-umbilical vein: Detection by 18-fluoro-2-deoxyglucose positron emission tomography imaging. Br J Radiol 2005;78:841-4.
4. Sopov V, Bernstine H, Stern D, Yefremov N, Sosna J, Groshar D. The metabolic spectrum of venous thrombotic disorders found on PET/CT. AJR Am J Roentgenol 2009;193:W530-9.

5. Ozülker T, Ozülker F, Eker O, Ozpaçaci T, Ozcan D. Tumour thrombus from follicular thyroid cancer detected by 18F-FDG-PET/CT. Hell J Nucl Med 2009;12:66-7.
6. Tublin ME, Dodd GD 3rd, Baron RL. Benign and malignant portal vein thrombosis: Differentiation by CT characteristics. AJR Am J Roentgenol 1997;168:719-23.
7. Shah ZK, McKernan MG, Hahn PF, Sahani DV. Enhancing and expansile portal vein thrombosis: Value in the diagnosis of hepatocellular carcinoma in patients with multiple hepatic lesions. AJR Am J Roentgenol 2007;188:1320-3.
8. Sun L, Guan YS, Pan WM, Chen GB, Luo ZM, Wei JH, *et al*. Highly metabolic thrombus of the portal vein: 18F fluorodeoxyglucose positron emission tomography/computer tomography demonstration and clinical significance in hepatocellular carcinoma. World J Gastroenterol 2008;14:1212-7.
9. Sun L, Wu H, Pan WM, Guan YS. Positron emission tomography/computed tomography with (18)F-fluorodeoxyglucose identifies tumor growth or thrombosis in the portal vein with hepatocellular carcinoma. World J Gastroenterol 2007;13:4529-32.
10. Takizawa D, Kakizaki S, Sohara N, Sato K, Takagi H, Arai H, *et al*. Hepatocellular carcinoma with portal vein tumor thrombosis: Clinical characteristics, prognosis, and patient survival analysis. Dig Dis Sci 2007;52:3290-5.
11. Catalano OA, Choy G, Zhu A, Hahn PF, Sahani DV. Differentiation of malignant thrombus from bland thrombus of the portal vein in patients with hepatocellular carcinoma: Application of diffusion-weighted MR imaging. Radiology 2010;254:154-62.

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