The Focal Hepatic ‘Hot Spot’ Sign of Superior Vena Cava Obstruction in Contrast-enhanced Computed Tomography

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ABSTRACT

In patients with superior vena caval obstruction, computed tomography of the liver in its arterial or early portal phase may show abnormal hyperattenuation in segment IV of the left hepatic lobe. This abnormal enhancement is due to porto-systemic venous shunting between the superior vena cava and portal vein. The 3 major collateral pathways after central venous obstruction in the thorax are the superior, posterior, and the anterolateral routes. In one of the anterolateral pathways, collateral veins return blood to the left hepatic lobe via the internal mammary and paraumbilical veins, thereby creating a ‘hot spot’ in the left hepatic lobe, around the union of the paraumbilical vein and left main branch of the portal vein. This is the equivalent of a similar sign described initially for radionuclide liver scans. The focal hepatic ‘hot spot’ sign in computed tomography should strongly suggest central venous obstruction in the thorax. We report a rare case, in which a radiological diagnosis of lung cancer and associated superior vena cava obstruction yielded an abnormal strong enhancement in the medial segment of left lobe of the liver during the arterial phase of helical computed tomography.

Key Words: Liver; Portal vein; Superior vena cava syndrome; Technetium Tc 99m sulfur colloid; Tomography, X-ray computed

INTRODUCTION

In the presence of obstruction of the superior vena cava (SVC), the left lobe of liver may show increased blood flow due to collaterals, which can be visualised by imaging. Collateral flow to the left lobe is through internal mammary and paraumbilical veins, thus creat-
ing a ‘hot spot’ where the paraumbilical vein and left main branch of the portal vein join. The equivalent of this sign, which was initially described in radionuclide scans, can be appreciated as areas of hyperattenuation in post-contrast computed tomography (CT). We report a case of radiological lung cancer with SVC infiltration, in which an abnormal strong enhancement (‘hot spot’) was noted in the medial segment of left lobe of the liver during the arterial phase of helical CT.

CASE REPORT
A 40-year-old male presented with respiratory distress and facial oedema. Clinically there were signs of SVC obstruction. Chest radiography revealed a mass lesion in right hilar region.

Contrast-enhanced CT scan in our department revealed a mass lesion in the right hilum infiltrating and obstructing the SVC with abnormal collaterals in the anterior and posterior chest wall (Figure 1). The CT also revealed a hyperdense area involving segment IV of left lobe of liver in the early arterial phase, which was consistent with the focal hepatic ‘hot spot’ sign of SVC obstruction due to collateral drainage (Figure 2). In the portal venous phase, the lesion was much less apparent (Figure 3) and isodense in delayed images.

DISCUSSION
In the presence of SVC obstruction, the left hepatic lobe may occasionally demonstrate areas of focally increased blood flow in the collateral veins, which can be detected by imaging. Typically, the collateral venous pathway comprises the internal mammary and paraumbilical veins, which create a ‘hot spot’ due to high blood flow around the area of union of the paraumbilical vein and the left main branch of the portal vein.

This was initially described in radionuclide imaging of liver, i.e. on 99mTc-sulfur colloid scans, as an area of increased activity, specifically in segment IV of the liver (i.e. the medial segment of the left hepatic lobe in what

![Figure 1. Post-contrast computed tomographic image of the thorax showing a mass lesion in right hilum with infiltration and thrombosis in the superior vena cava and abnormal collaterals in anterior and posterior walls of the chest.](image1)

![Figure 2. Early arterial phase image of the liver showing an ill-defined hyperdense area involving segment IV of the left lobe of the liver. Contrast is also noted in the inferior vena cava as well as abnormal collaterals in the anterior abdominal wall.](image2)

![Figure 3. In late portal venous phase, the area is faintly hyperattenuated and much less apparent.](image3)
was formerly known as the quadrate lobe). This feature was referred to as the focal hepatic ‘hot spot’ sign.² Its equivalent may rarely also be seen on post-contrast CT scans, as a focal area of hyperattenuation in segment IV during the arterial or early portal venous phases.¹ This appearance has been well documented in patients with SVC obstruction and is described as the focal hepatic ‘hot spot’ sign.²,³ Surprisingly, such focal liver enhancement was seen in only one of 22 patients with either SVC, brachiocephalic, or subclavian vein obstruction in a series reported by Bashist et al.⁴

To conclude, abnormal arterial phase enhancement of segment IV of the liver in CT scans is seen in SVC obstruction, and is described as the focal hepatic ‘hot spot’ sign. It should not be mistaken as a hepatic lesion and more importantly, its detection should immediately prompt the radiologist to search for central venous obstruction within the thorax.³,⁶

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REFERENCES