10.5005/jp-journals-10045-0038

CASE REPORT

Multidetector Computed Tomography Evaluation of Malignant Superior Vena Cava Syndrome

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ABSTRACT

Introduction: Superior vena cava syndrome results from the blockage of blood flow through the superior vena cava. It can be a medical emergency if it causes laryngeal or cerebral edema. Hence, prompt diagnosis is of utmost importance.

Case report: A 65-year-old male patient came with complaints of progressive dyspnea and cough since 3 weeks. A contrast-enhanced multidetector computed tomography (MDCT) scan was done for the patient, which showed thrombus in the superior vena cava with a rich network of collaterals. The three-dimensional reconstruction was also done to demonstrate the collaterals.

Conclusion: The MDCT provides an excellent tool to diagnose and assess the cause of superior vena cava obstruction.

Keywords: Multidetector computed tomography, Superior vena cava syndrome, Three-dimensional volume rendering technique.

How to cite this article: Backer PH, VVP Seetha, Shukla AK, Nagesh R. Multidetector Computed Tomography Evaluation of Malignant Superior Vena Cava Syndrome. J Med Sci 2016;2(3):53-55.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Superior vena cava syndrome (SVCS) is caused by the obstruction of blood flow through the superior vena cava secondary to intrinsic blockage or extrinsic compression. This syndrome comprises various symptoms of SVC obstruction like dyspnea, facial and periorbital puffiness, neck and arm swelling, stridor, cough, headache, altered mental status, and blurred vision. It can be a medical emergency if it leads to laryngeal edema or cerebral edema. Hence, prompt diagnosis and management are of utmost importance. Multidetector computed tomography (MDCT) is an excellent modality for diagnosing SVCS, as it combines cross-sectional imaging with multiplanar reconstruction to delineate the level and extent of the SVC obstruction. It can also demonstrate the collateral vascular channels well.

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CASE REPORT

A 65-year-old male patient came with complaints of progressive dyspnea and cough since 3 weeks, which worsened on lying down. He also complained of dilated veins on the right side of the chest. He also had significant loss of appetite and weight. There was no history of fever. The patient was a chronic smoker and alcoholic. On examination, the patient had pallor and raised jugular venous pressure. There was distention of veins in the neck and the right side of the chest.

The patient was referred to our department for contrast-enhanced MDCT scan of the chest. The scan showed a well-defined soft tissue density lesion with spiculated margins in the periphery of apicoanterior segments of right upper lobe measuring 4.6 × 3.7 × 3.9 cm (transverse × craniocaudal × anteroposterior) (Fig. 1). The lesion showed heterogeneous enhancement on contrast. There were no foci of hemorrhage or calcification within the lesion. The mass was seen to extend into the mediastinum. Nonenhancing hypodense filling defect was noted in the superior vena cava, which was suggestive of thrombosis (Fig. 2). The thrombus was seen extending proximally from just below the confluence

Fig. 1: Axial contrast-enhanced CT of the chest showing well-defined heterogeneously enhancing mass in the right upper lobe (arrow)

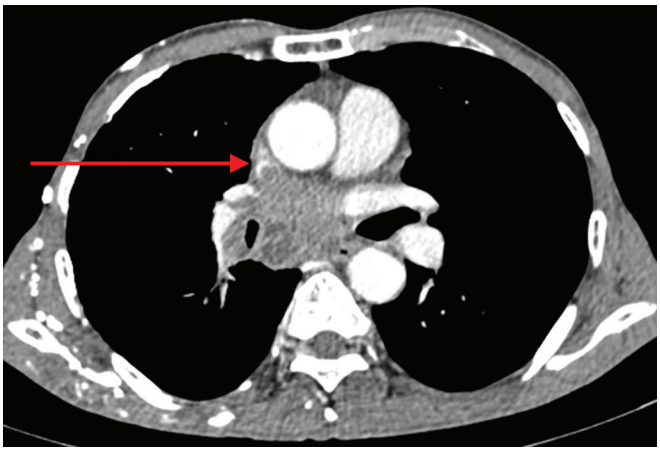

Fig. 2: Axial contrast-enhanced CT of the chest showing hypodense filling defect in the superior vena cava – thrombus (arrow)

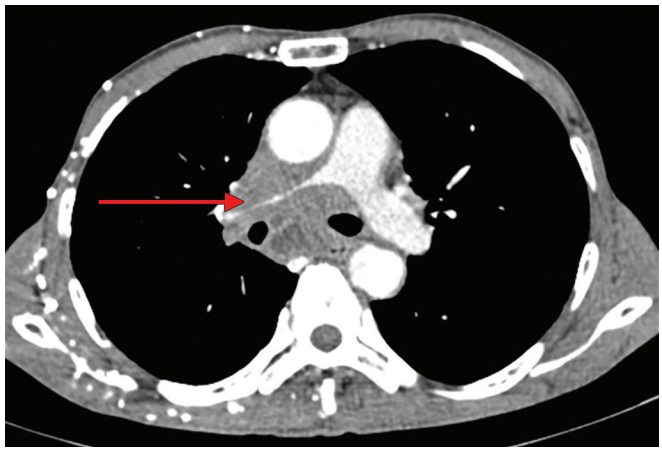

Fig. 3: Axial contrast-enhanced CT of the chest showing mass encasing and attenuating the right pulmonary artery (arrow)

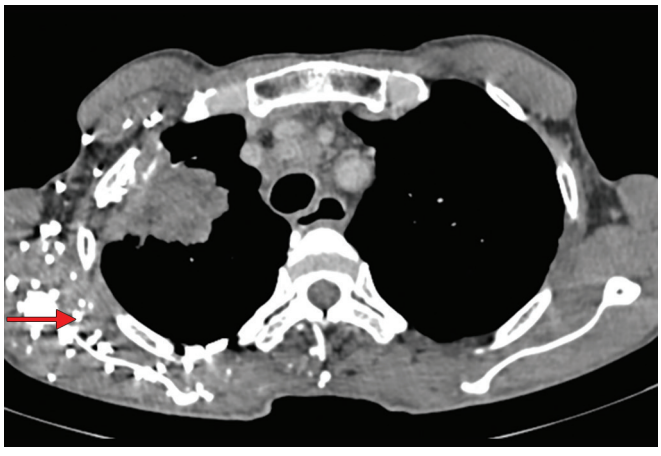

Fig. 4: Axial contrast-enhanced CT of the chest showing multiple collaterals along the scapula and axilla on the right side (arrow)

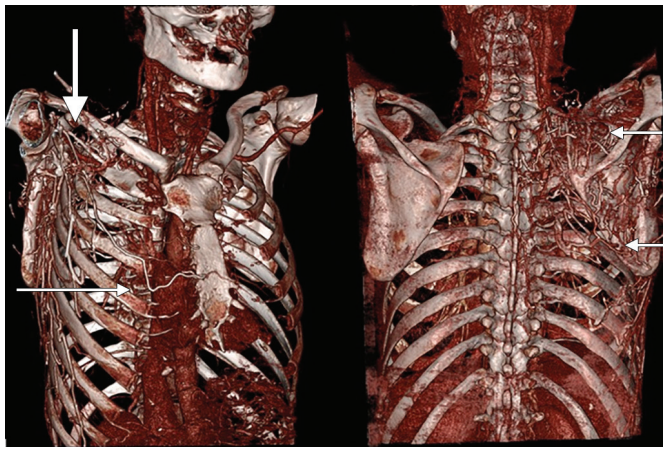

Fig. 5: The 3D-VRT image showing multiple collaterals along the chest wall on the right side. No collaterals are seen on the left side

of the brachiocephalic veins. Distally, the thrombus reached until the entry of the SVC into the right atrium. The thrombus caused near-total occlusion of the SVC. The arch of the azygous was also thrombosed. The right pulmonary artery was attenuated and encased by the mass (Fig. 3). Multiple collaterals were noted along the anterior, lateral, and posterior chest walls on the right side (Fig. 4). Intensely enhancing paravertebral, suprascapular, subscapular, and axillary collaterals were demonstrated. Three-dimensional volume rendering technique (3D-VRT) was used to visualize the collaterals better (Fig. 5). The left side chest wall was normal.

DISCUSSION

The SVCS was first described in 1757 by the Scottish physician William Hunter.[1] The patient had died of an aortic aneurysm and postmortem revealed the superior vena cava compressed by the dilated aorta. A study in 1954 of 274 cases of SVCS showed that 40% of the cases could be attributed to syphilitic aneurysms or tuberculosis.[2] Due to the decline of the burden of these diseases owing to better treatment, lung cancer is at present the major cause of SVCS.[3] The SVCS can be seen in about 10% of small cell lung cancer patients and 2 to 4% of all lung cancer cases.[4]

Obstruction of the SVC leads to impaired venous return from the head and the upper limbs. This leads to distention of the veins of the head, neck, and upper extremities. Hence, patients develop symptoms like facial and periorbital puffiness, swelling of the upper limbs, headache, blurred vision, and altered mental status in some cases. The severity of the symptoms depends on the level and the severity of the obstruction. As a result of the obstruction, a rich network of collaterals open up, which will bypass the obstruction.

Conventional venography had been used to assess the superior vena cava.[5] But now, with the advent of MDCT, it is has been widely replaced by MDCT. The MDCT with multiplanar reformation provides the exact level and degree of the obstruction, which is of great value for surgical planning and in interventional radiology.[6] In addition, it helps in diagnosing subclinical SVC obstruction.

When the obstruction to the SVC is not severe, the patient may not have many symptoms. The MDCT can be of help in diagnosing these subclinical cases. The MDCT can also assess the cause of the obstruction, such as lung cancer. It can demonstrate the location and margins of the lesion as well as internal characteristics like calcification, hemorrhage, or necrosis. Hence, it is helpful in identifying the cause of the SVC. Extrinsic compression by the mass can be seen clearly on contrast-enhanced MDCT scan. Lung cancers like small cell carcinoma can directly invade the vessel, while lymphomas tend to cause extrinsic compression.[5] It can also very well assess the level of extrinsic compression by other causes like aneurysms. The MDCT also acts as an excellent investigation to assess the collateral circulation that develops as a result of the SVC obstruction. Normally, the venous plexus in the thorax does not enhance. But, in patients with SVC, the veins are dilated and enhance on contrast-enhanced MDCT scan. The 3D-VRT helps in providing a 3D demonstration of the collaterals, which can be very helpful for surgical planning. It can also help the surgeon or the interventional radiologist to assess the site and extent of the thrombus. The MDCT also plays an important role in the postoperative assessment of the patient. If the collateral system is not seen in the postoperative MDCT scan, then it indicates the patency of the stent.

CONCLUSION

The MDCT plays an indispensable role in the accurate diagnosis and assessment of prognosis of SVCS. It can assess the level and cause of obstruction.

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