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Radio-anatomy of the superior vena cava syndrome and therapeutic orientations

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KEYWORDS
Superior vena cava syndrome;
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Central catheter

Abstract Superior vena cava syndrome (SVCS) groups all the signs secondary to the obstruction of superior vena cava drainage and the increase in the venous pressure in the territories upstream. There are two major causes of SVCS: malignant, dominated by bronchopulmonary cancer, and benign, often secondary to the presence of poorly positioned implantable venous devices. CT scan is the key examination for the exploration of SVCS. It specifies the characteristics of the stenosis, its aetiology and detects collateral venous routes. Scannography reconstructions provide a true map of the obstacle, indispensable in planning the endovascular treatment.
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SVCS groups all the signs secondary to the obstruction of SVC and the increase in the venous pressure in the territories upstream. Malignant aetiologies are most common (74 to 95% of the cases) (Fig. 1), dominated by bronchopulmonary cancer (85% of the cases) [1,2]. It most often consists of small cell cancers [3]. The lymphomas are the second leading malignant aetiology (about 12% of the cases) [1]. Benign aetiologies are less common (3 to 20% of the cases) [1]. It often involves a thrombus around a central catheter, much more

Abbreviations: SVCS, Superior Vena Cava Syndrome; SVC, Superior Vena Cava; IVC, Inferior Vena Cava; MIP, Maximum Intensity Projection; ITV, Internal Thoracic Vein.

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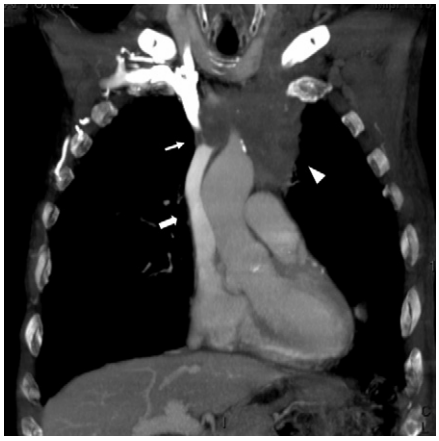

Figure 1. Bronchopulmonary tumour responsible for a superior vena cava syndrome. The CT scan (coronal reconstruction) detects the tumoral mass (tip of arrow) provoking a focal occlusion of the superior vena cava (SVC) (arrow). The underlying SVC (wide arrow) is permeable and opacified by the collateral veins (re-entry by the azygos vein). Stasis of the contrast product in the SVC underlying the obstacle.

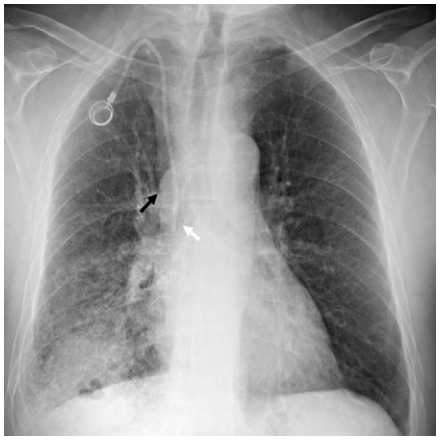

Figure 2. Poorly positioned central catheter responsible for an iatrogenic superior vena cava syndrome. Front chest X-ray showing the overly short distal catheter (white arrow) and the dilation of the arch of the azygos vein (venous shunt) indicating the obstruction of the superior vena cava.

rarely around the wires of a pacemaker [4,5]. This thrombosis is favoured by the overly short positioning of the catheter in the SVC (Figs. 2—4) [4,6—8]. A central catheter is in normal position when the distal end is located at the entrance to the right atrium. An overly short catheter, whose distal end is located opposite venous convergences leading into the arch of the azygos vein at the convergence of the innominate veins (formerly called brachiocephalic veins), may come up against the vein walls and induce endothelial lesions by mechanical friction on the one hand, or may provoke rheological modifications in these zones of flow turbulence on the other hand. The other favouring factors are represented by the hypercoagulability of the cancer patient and the toxicity of the chemotherapy products injected by catheter [4]. The other benign causes of SVCS are rarer. It most often consists

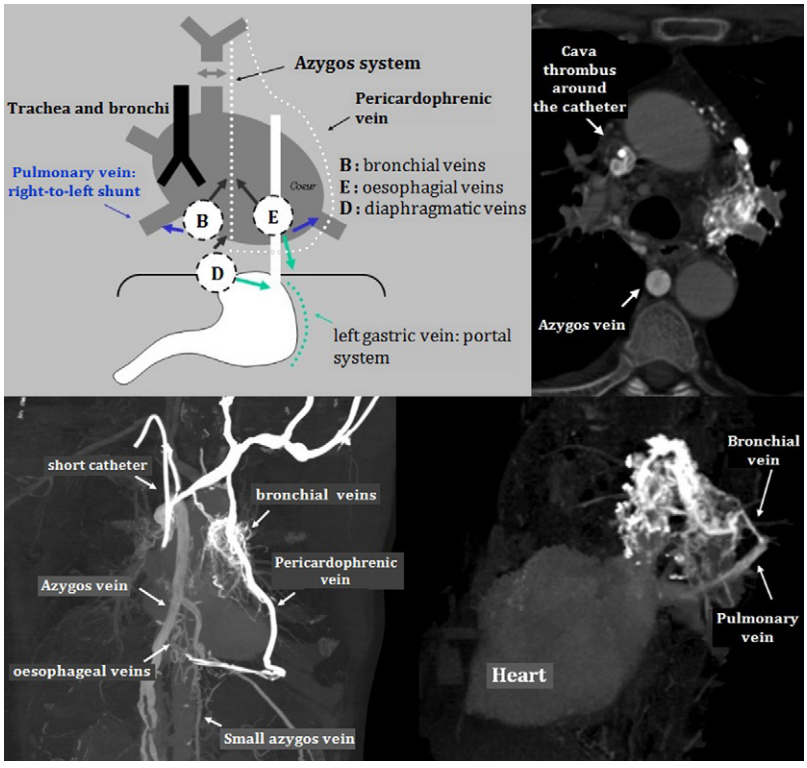

Figure 3. Indirect azygos venous shunts (superior vena cava [SVC]-inferior vena cava [IVC] anastomoses) during a superior vena cava syndrome secondary to a poorly positioned catheter (too short). The diagram and the scan demonstrate the shunting by the pericardo-phrenic vein. The latter drains in the bronchial, oesophageal and diaphragmatic veins that then join the azygos system. There are anastomoses between the bronchial and the pulmonary veins and between the oesophagial/diaphragmatic veins and the portal system.

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