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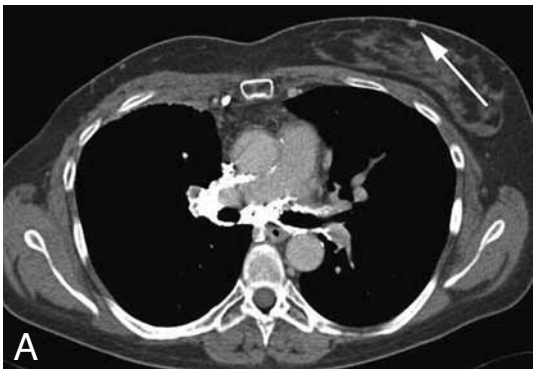
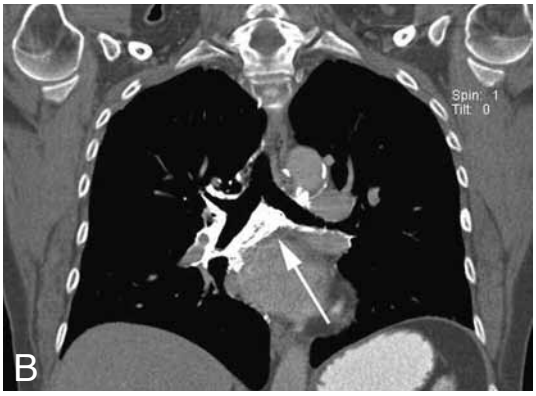
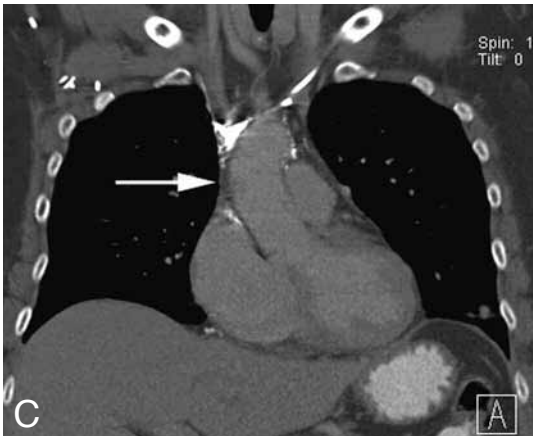
IMAGES IN CLINICAL RADIOLOGY







Collateral systems in superior vena cava occlusion

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A 48-year-old woman presents at the hospital with heavily developed subcutaneous collaterals over the chest. She suffers from slight discomfort, but no pain nor dyspnea. When bending forward, she feels her head swell. The patient has a history of right-sided breast cancer 5 years previously, treated with mastectomy and radiation therapy. Blood results show no increase of tumor markers (CA15-3 19 kU/L (reference < 30 kU/L)).

The patient undergoes a CT of the chest and abdomen. Chest CT reveals subcutaneous collaterals (Fig. A, arrow), but also numerous densely opacified dilated bronchial and mediastinal veins (Fig. B, arrow). There is marked dilatation of the azygos and accessory hemiazygos vein, internal mammary veins and lateral thoracoepigastric veins. The CT images also demonstrate the presence of a long and narrow superior vena cava occlusion adjacent to the ascending aorta, just above the level of the right atrium (Fig. C, arrow).

Comment

Superior vena cava (SVC) occlusion can be either due to benign or malignant causes. Most common benign etiologies include mediastinal or radiation fibrosis, infection or thrombosis. The most frequent culprit is however metastatic pulmonary or mediastinal malignancy. In our case prior history of radiation therapy, the long and narrow SVC occlusion and absence of a mass on chest CT disclose the diagnosis of benign radiation fibrosis.

SVC occlusion is associated with 4 major venous collateral systems: the azygos-hemiazygos pathway, which is the most dominant, the mammary-epigastric system, the lateral thoracic pathway, via the lateral thoracic and superficial circumflex veins and finally the vertebral plexuses. The first three pathways were dilated in our patient. A less frequent collateral route is a systemic-to-pulmonary venous shunt. Anatomically the bronchial veins and pulmonary veins are interconnected through the bronchial venous plexuses, serving as nutritional channels for the bronchi. Bronchial veins predominantly drain into the right atrium and one third of the flow drains via the pulmonary veins into the left atrium. This balance can shift towards the left atrium when systemic pulmonary pressure rises. These collaterals may result in a right-to-left shunt, subsequently causing a higher cardiac output state. The patient may suffer from dyspnea due to this shunt.

The treatment of the SVC occlusion and the subsequent collaterals depends on the etiology. In malignancy, radiation or chemotherapy is used. Anticoagulants and thrombolytics are the treatment of choice for acute thrombosis. In fibrosis, endovascular angioplasty and stent placement may prove successful in 80% of the cases. However in advanced stenosis or complete occlusion, a surgical bypass may be necessary. Because of the supportable clinical status, our patient has not yet been yet treated.

Reference

1. Kapur S., Paik E., Vu D.: Where there is blood, there is a way: unusual collateral vessels in superior and inferior vena cava obstruction. Radiographics, 2010, 30: 67-78.

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