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Case Report

"Switching off the light bulb" – venoplasty to relieve SVC obstruction ☆,☆☆

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ABSTRACT

In superior vena cava obstruction, one of the signs on computed tomography is an arterially enhancing pseudolesion in segment IV adjacent to the falciform ligament due to collateral flow via the veins of Sappey, sometimes termed the "lightbulb sign." We describe a case where venoplasty was performed to restore flow in superior vena cava with disappearance of the pseudolesion on subsequent computed tomography, thus "switching off the light-bulb."

Introduction

Superior vena cava (SVC) transports blood from the upper thorax and extremities as well as the head and neck into the right atrium. When the SVC is obstructed, venous return into the right atrium is achieved through collateral circulation [1]. One of these collaterals are the veins of Sappey, small veins around the falciform ligament that drain from the anterior abdominal wall into the liver [2]. This leads to enhancement of Segment IV, most notable during the arterial phase on CT when the intravenous contrast is instilled via the upper limb. Here we describe a patient who had SVC obstruction secondary to multiple previous central line placement and subsequently treated with venoplasty.

Case report

A 64-year-old female patient presented with nonspecific symptoms of fever and rigor. The patient had a complex past medical history of infected abdominal aortic stent graft which was initially inserted because of iatrogenic aortic injury from a Hartmann's procedure performed due to colonic necrosis. As a result, the patient had Hickman line sited for long-term

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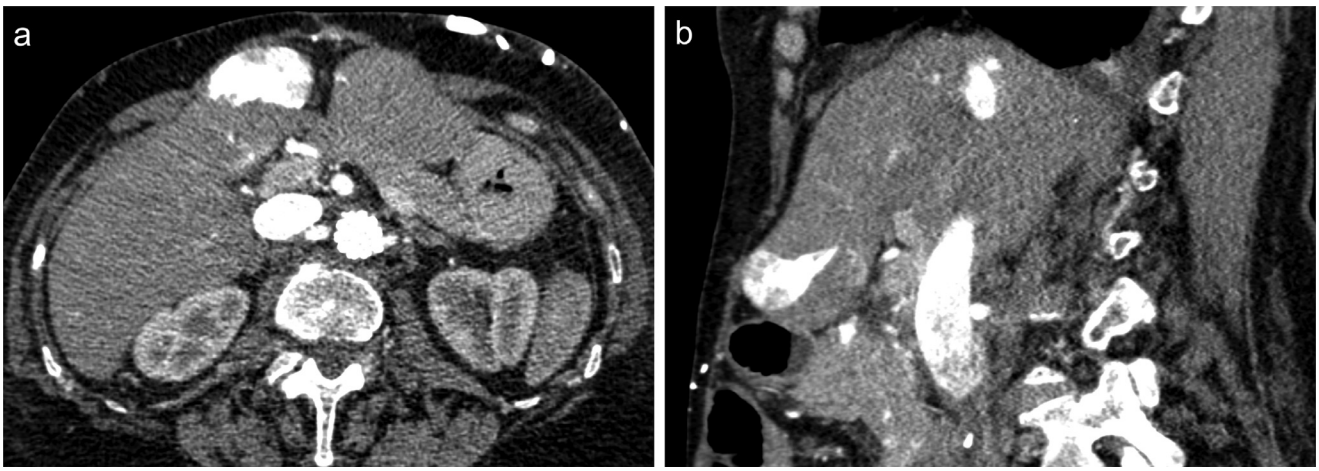

Fig. 1 – Light bulb sign. (a) Axial and (b) sagittal views of CT abdomen in arterial phase demonstrate hyperattenuation of Segment IV in a patient with SVC obstruction secondary to previous placement of long-term central lines. Venous return via collateral channels that drain into the IVC leads to enhancement of the IVC during the arterial phase.

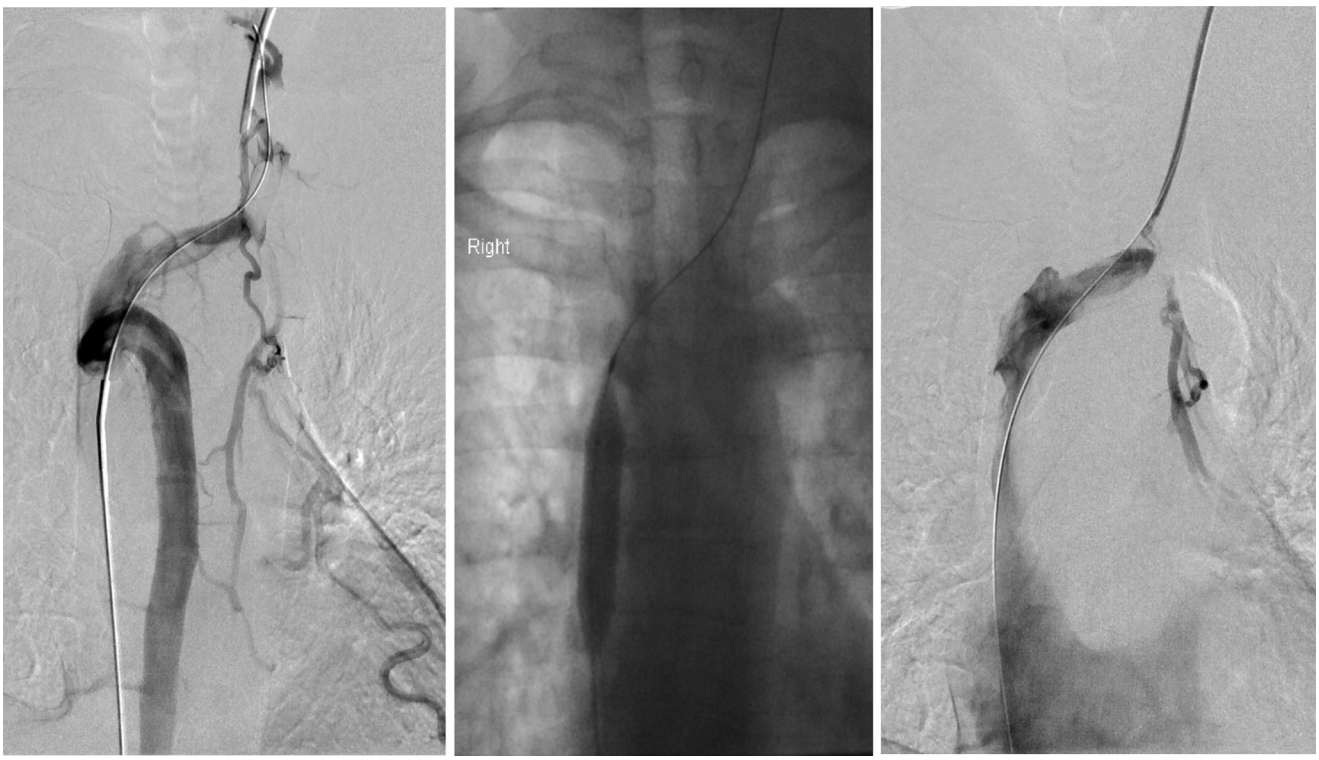

Fig. 2 – Venoplasty of the SVC. Access was gained via the right common femoral vein and left internal jugular vein, followed by snaring of guide wire from the right common femoral vein. (a) Venogram demonstrating SVC obstruction and filling of the azygos vein and pericardiacophrenic vein. (b) Venoplasty was performed using a high pressure 12-mm balloon. (c) Completion venogram demonstrates recanalization of the SVC with no filling of the azygos system.

antibiotics administration, however this had been removed prior to the current presentation.

On investigation of the current episode, biochemistry testing showed raised inflammatory markers. Contrast-enhanced CT thorax, abdomen and pelvis was performed to look for the source of infection and this confirmed aortic stent graft infection. Incidentally on the CT, the SVC was not opacified and there was abnormal enhancement of Segment IV of the liver (Figs. 1a and b).

The patient received broad spectrum antibiotics for recurrent stent infection and underwent venoplasty of the SVC to treat the obstruction. Access to the right common femoral

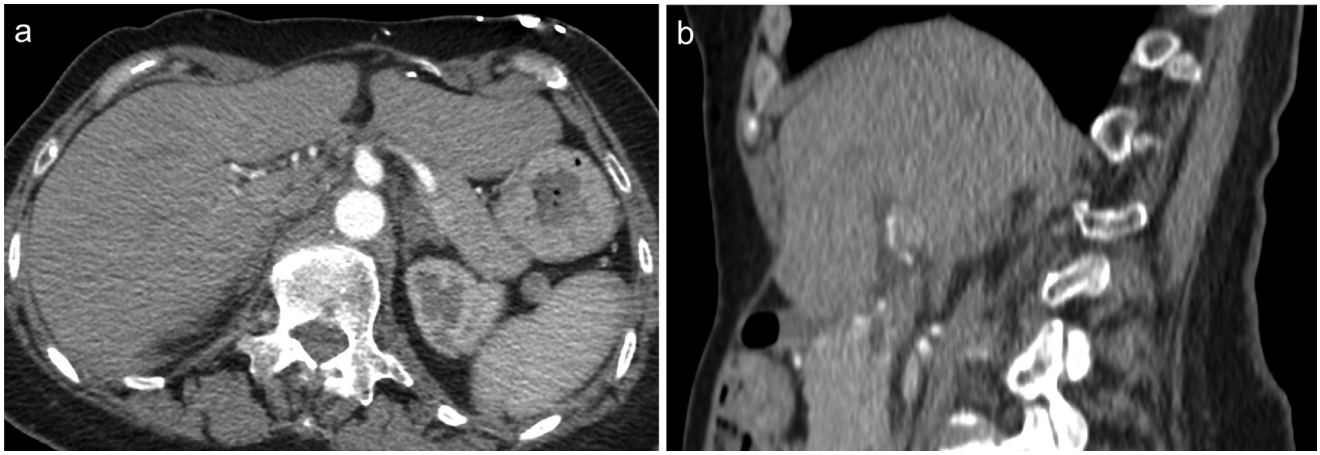

Fig. 3 – "Switching off the light bulb." Arterial phase CT (a) axial and (b) sagittal views demonstrate normal attenuation of the liver 3 months postvenoplasty of the SVC. IVC enhancement during arterial phase is no longer seen.

vein was obtained and a 5-Fr sheath inserted, this was subsequently upsized to an 8-Fr sheath. Inferior vena cava angiography was initially performed which demonstrated normal calibre of the inferior vena cava. The SVC occlusion was traversed with a guide wire. It was not possible to advance a catheter over this, therefore, access from the left internal jugular vein was obtained and the guide wire was snared to establish a through-and-through wire. Venography confirmed SVC occlusion at the level of the azygos confluence with prompt filling of an enlarged azygos vein (Fig. 2a). Balloon dilatation was performed using a high pressure 12-mm balloon (Fig. 2b). Completion venography demonstrated recanalization of the SVC and no filling of the azygos system (Fig. 2c).

Repeat venography was performed three months later and this showed good calibre SVC with no evidence of stenosis. Meanwhile CT was repeated to assess the aortic stent graft infection, and we found that the previously seen Segment IV hyperattenuation has resolved (Figs. 3a and b).

Discussion

Studies of postmortem specimens showed that the superior veins of Sappey and inferior veins of Sappey are normal anatomical structures that drain from the median part of the diaphragm and epigastric veins respectively, these traverse the falciform ligament and drain into the sublobular divisions of the portal veins of the quadrate lobe and the left lobe [2].

Hyperattenuation of Segment IV in patients with SVC obstruction has been described in 5 other case reports [3–7]. These cases described patients presenting with varying degree of SVC syndrome and confirmed the causes of obstruction to be due to anterior/superior mediastinal masses or lymphadenopathy. Here we presented a case of SVC obstruction secondary to previous long-term central venous catheter which is compensated by collateral channels. To the authors' knowledge, this is the first case that illustrates the "light bulb sign" can be "switched off" by performing venoplasty.

It is important to recognize that SVC obstruction could cause hyperattenuation of Segment IV on contrast-enhanced CT, to avoid unnecessary biopsies if these are mistakenly reported as focal liver lesions. It would be more apparent in patients presenting with frank SVC syndrome, however, as in this case, some patients may have subclinical SVC obstruction and the clinical history could be misleading.

Conclusion

We reported a case of SVC obstruction in which Segment IV was initially hyperattenuated but subsequently returned to normal enhancement following SVC recanalisation. We highlighted the importance to recognise this radiological sign, especially in patients who do not present with the classical SVC syndrome.

Author contributions

OW contributed to the writing of the manuscript. CP contributed to the revision of the final manuscript. AP and DY conceived of the presented idea and revised the final manuscript.

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