

Superior vena cava syndrome after radiofrequency sinus node modification treated with thrombolysis and stent implantation

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Superior vena cava (SVC) obstruction is a rare complication of pacemaker implantation alone but may occur when pacemaker implantation follows catheter ablation for inappropriate sinus tachycardia (IST). We describe a case of SVC obstruction following ablation for IST and pacemaker implantation, treated with systemic thrombolysis, followed by SVC stenting and the revision of the pacing system.

Case Report

A 30-year-old woman was admitted with symptomatic bradycardia 2 weeks after undergoing a third ablation procedure for inappropriate sinus tachycardia (IST) in another centre. A permanent pacemaker was implanted. She re-presented 3 days later with swelling of both arms, neck, and head consistent with superior vena cava (SVC) syndrome.

Venography showed bilateral brachiocephalic vein thrombosis extending to the SVC. There was no symptomatic improvement with therapeutic anticoagulation for 14 days; repeat venography demonstrated increased thrombus load. Systemic thrombolysis was administered (streptokinase 250 000 U bolus followed by 100 000 U/h over 24 h). Subsequent venography confirmed the resolution of the thrombus but persistent SVC obstruction.

A combined procedure was performed to stent the SVC and to revise the pacing system. The atrial lead was removed and the ventricular lead was withdrawn into the subclavian vein providing access to the left subclavian vein and a channel through the occlusion (*Figure 1A*). A femoral approach was used to cross the SVC obstruction and place 16 × 40 and 16 × 20 mm self-expanding stents in the stenosed segment; the second stent was required as the initial 40 mm stent did not cover the occlusion fully (*Figure 1B*). A new atrial lead and the existing right ventricular (RV) lead were advanced through the SVC stent to the right atrium (RA) and RV septum, respectively. Symptoms resolved within 12 h. The patient did not show any recurrence of symptoms or signs of SVC syndrome and the pacemaker is functioning well at 12 months follow-up.

Discussion

Ablation for IST requires multiple RF lesions at the junction of the SVC and the RA, causing significant swelling. This extends throughout the circumference of the SVC–RA junction, presumably through the spread of interstitial oedema. Intracardiac ultrasound during RF ablation supports the conclusion that RF-induced tissue swelling is responsible for this complication.¹ Cuculich *et al.*² reported the first case of SVC occlusion caused by sinus node modification alone. Leonelli *et al.*³ studied 35 patients after RF sinus node modification for IST with concomitant PPM implantation and reported 3 cases of SVC stenosis.

The incidence of SVC stenosis is difficult to assess as it may remain clinically silent until attempted placement of leads across the narrowing. The associated mechanism of SVC syndrome in patients after IST ablation with concomitant PPM implantation may be related to the combination of both of interventions, with RF ablation leading to SVC stenosis and further pacing leads implantation which may predispose to thrombosis. This further requires much complex treatment.

Superior vena cava stenting of our patient was deemed necessary as venoplasty is limited by immediate elastic recoil and early restenosis. The presence of pacing leads makes stenting more challenging; the leads could become trapped between the stent and the vessel wall. In this case, the leads were temporarily withdrawn, allowing SVC stenting and subsequent lead replacement.

Conflict of interest: none declared.

References

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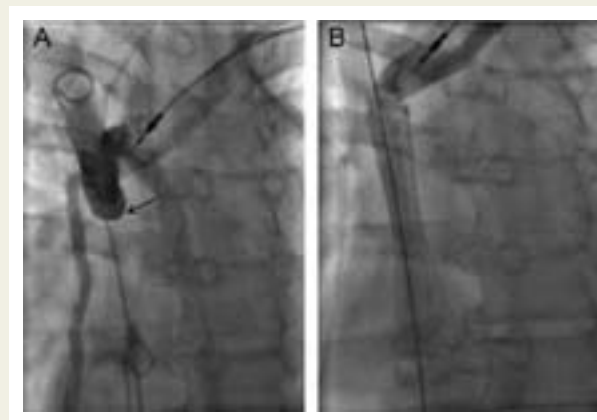


Figure 1 (A) Venogram of the SVC occlusion (arrow) with a pigtail catheter inserted through the stenotic segment; the lower pigtail catheter marks the inferior limit of the occluded segment. (B) Venogram showing venous drainage through newly implanted stents.