CLINICAL IMAGE

Thyroid goiter: implications for implantation of cardiovascular implantable electronic devices and cannulation of the superior vena cava confluence

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Venous drainages of the left and the right upper limbs are the standard access to the right heart for implantation of cardiovascular implantable electronic devices (CIEDs). Venous stenosis is a frequent complication after the implantation of a CIED.[1] It is much less common in patients without the endocavitary leads.[2] Risk factors for superior vena cava (SVC) confluence constriction include aggressive cancers and the use of a central venous catheter.[3,4]

We present a case of an 80-year-old woman with hypertension, diabetes, disorders of lipid metabolism, and a retrosternal goiter in the euthyroid state. The patient had been scheduled for implantation of permanent cardiac pacing due to repeated episodes of presyncope (almost leading to loss of consciousness) and bradycardia in the course of sick sinus syndrome with noticed pauses in the heart rate over 3 seconds, as well as concomitant symptomatic paroxysmal atrial fibrillation with rapid ventricular rates requiring intensification of antiarrhythmic therapy. Before admission, fine needle aspiration biopsy of the thyroid gland showed the content of solitary thyrocytes, some with features of pleomorphism, as well as proteins and blood. On computed tomography scans of the thyroid goiter, venous compression could be observed (FIGURE 1A and 1B). The patient was scheduled for nodular thyroid nontoxic goiter surgery (unfortunately, she still refuses to give her consent). She was also awaiting hip replacement surgery because of degenerative joint disease of the hip. Left ventricular ejection fraction was preserved and reached 65%. Due to the presence of a significantly enlarged thyroid gland, venous angiography via the left upper limb was performed before the pacemaker implantation procedure (FIGURE 1C). It confirmed significant obstruction of the venous system.

Left subclavian vein puncture for lead introduction was considered too risky. Venography of the venous confluence from the right upper limb was performed and revealed the presence of stenosis, but to a lesser extent (FIGURE 1D). After a percutaneous puncture of the right subclavian vein and its cannulation, a dual-chamber pacemaker was implanted (FIGURE 1E). The further course after implantation and a 3-month outpatient follow-up were not complicated; however, signs of collateral venous circulation could be observed (FIGURE 1F).

Difficulties in central venous system access, either during implantation of CIED or cannulation of SVC confluence, are rare in clinical practice. Previously, it was reported that a thyroid gland goiter implicated central venous obstruction and was a cause of initial failure of pacemaker implantation.[2] Intrinsic or extrinsic obstruction (including enlarged thyroid goiter) of the SVC may cause SVC syndrome and may be revealed by a positive Pemberton sign.[5] The management of patients with central venous stenosis preventing vascular access depends on the planned procedure and underlying disease. However, venous system angioplasty in cases of extrinsic compression, as found in the presence of thyroid goiter, is very likely to be ineffective.[2] Implantation of a stent to relieve symptoms and/or perform implantation of CIED may be a good decision in cases of palliation of malignancy. On the other hand, in clinical situations of possible malignant tumor treatment or in

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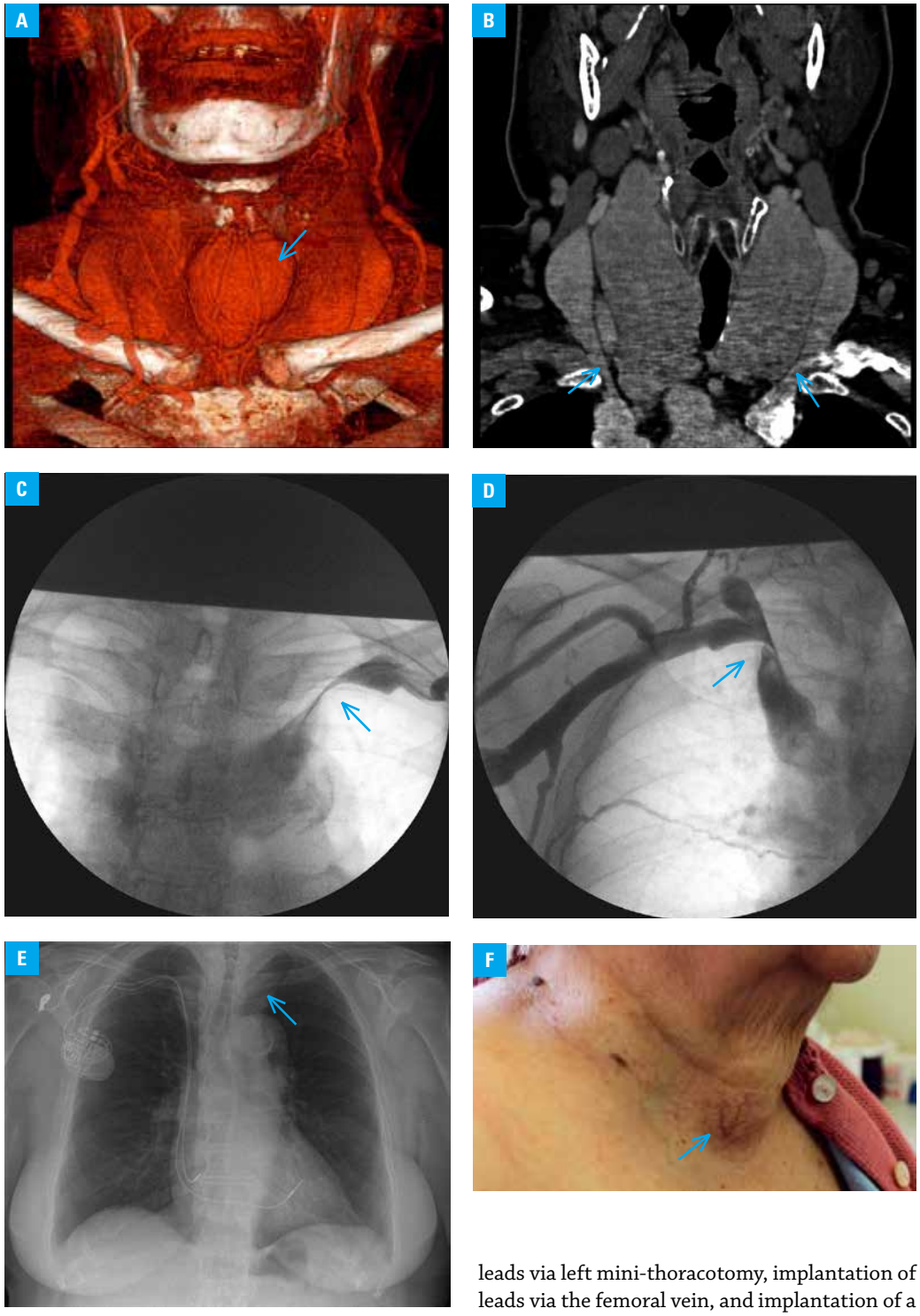

FIGURE 1
A – A computed tomography (CT) scan of a retrosternal thyroid goiter (total volume, ca. 200 ml); the study was performed about 2.5 years before pacemaker implantation; the arrow indicates thyroid isthmus **B** – a CT scan, coronal plane, visible venous compressions (arrows); **C** – a venogram of the left confluence of the superior vana cava; the arrow indicates stenosis; **D** – a venogram of the right confluence of the superior vena cava; the arrow indicates stenosis; **E** – a chest X-ray showing a visible shadow in the upper mediastinum (arrow), caused by the thyroid goiter; the patient after implantation of a dual-chamber pacemaker on the right side; **F** – a photography of the thyroid goiter 3 months after pacemaker implantation; macroscopically visible venous collateral circulation (arrow)

benign causes, resection of the mass seems to be the most reasonable treatment option.[2] Resection of the thyroid goiter in our patient could preserve SVC confluence patency in the case of right subclavian vein stenosis, associated with pacemaker leads. On the other hand, venous flow may not return spontaneously after long-term venous compression and thyroidectomy may affect jugular venous circulation. SVC syndrome belongs to rare but serious complications of permanent cardiac pacing.[6] Taking into account future risk of this complication, lead placement through more stenosed left side is not unreasonable. Other treatment options included implantation of epicardial leads via left mini-thoracotomy, implantation of leads via the femoral vein, and implantation of a leadless cardiac pacemaker.

Stenosis of the venous system should be considered before standard implantation of CIED, and before cannulation of the venous confluence of the SVC from different clinical indications, in the presence of a thyroid goiter.

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