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Case Report

Permanent pacemaker lead placement via the femoral vein in an elderly patient with a large thoracic aortic aneurysm

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ABSTRACT

An 87-year-old woman with complete atrioventricular block was admitted for permanent pacemaker implantation. The patient had a large thoracic aortic aneurysm that had been conservatively treated. Lead placement was not possible via the superior vena cava or the epicardial route because of the aneurysm. Therefore, we implanted a VVI pacemaker via the femoral approach. A unit was placed in a pouch on the right lower abdominal wall, and a lead was introduced into the right ventricle via the right femoral vein. The femoral vein approach is rarely used; however, it should be recognized as an effective alternative when the usual approach is difficult or impossible to be performed.

1. Introduction

The conventional method of pacemaker implantation via the subclavian vein is sometimes unfeasible in cases of occlusion and tortuosity of the vein accompanied by superior vena cava (SVC) obstruction. SVC obstructions are generally caused by malignancies (80–90%) and various benign conditions (20%). The most common benign causes of the SVC obstruction are central venous catheters or pacemaker/defibrillator leads, while a rare cause is thoracic aortic aneurysm [1]. Herein, we report a rare case in which VVI pacemaker implantation was achieved via the less invasive femoral vein approach in an elderly patient with a thoracic aortic aneurysm.

2. Case report

An 87-year-old woman had unexplained frequent loss of consciousness since 2008. On August 30, 2010, she experienced repeated episodes of syncope and was brought to our hospital. Her heart rate was 25 beats per minute, and the electrocardiogram (EKG) showed complete atrioventricular block; therefore, an external pacemaker was implanted.

The patient also had hypertension, an abdominal aortic aneurysm (diameter, 71 mm), and a thoracic aortic aneurysm (diameter, 64 mm; Fig. 1). These aortic aneurysms had been treated conservatively. She was not taking any medicine capable of causing atrioventricular block, and her serum electrolyte levels were normal. Given these findings, she was considered eligible for placement of a permanent pacemaker.

First, we attempted VVI pacemaker implantation through the left subclavian vein approach. Contrast angiography, however, revealed left brachiocephalic vein occlusion, and a wire and pacemaker lead could not be advanced

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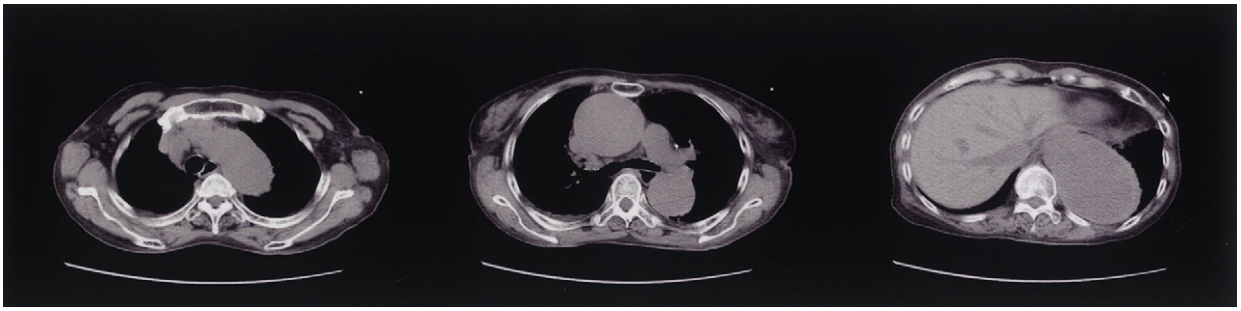

Fig. 1. The patient had an abdominal aortic aneurysm (size: 71 mm) and a thoracic aortic aneurysm (size: 64 mm). Superior vena cava, right subclavian vein, and left brachiocephalic vein were shifted by the thoracic aortic aneurysm.

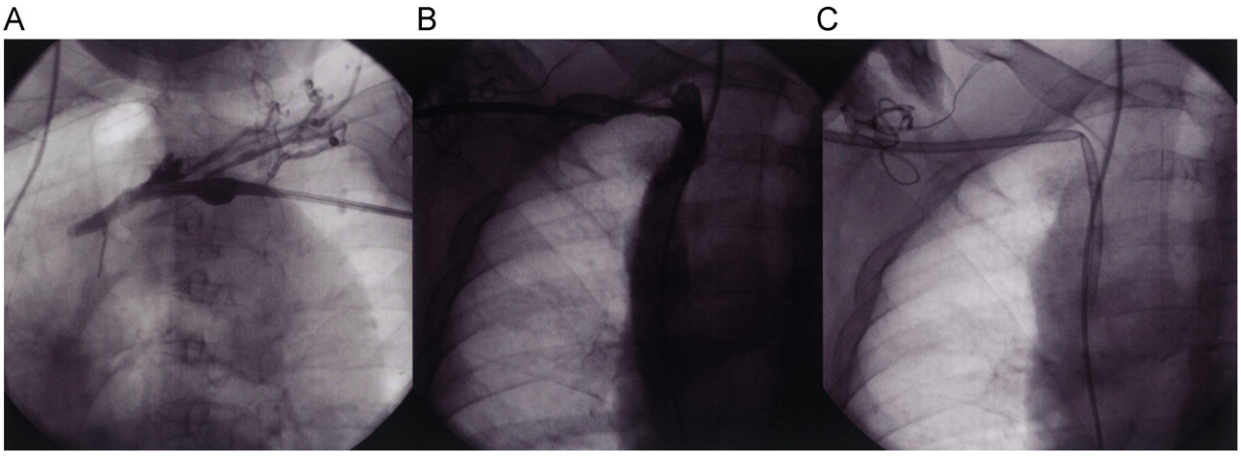

Fig. 2. A left brachiocephalic vein occlusion was found, and a wire and a pacemaker lead could not proceed to the heart (A). The right subclavian vein was very tortuous and narrowed (B), resulting in the kinking of the 7-Fr and 9-Fr sheaths (C).

into the heart (Fig. 2A). We then attempted to implant the pacemaker via the right subclavian vein. However, a 7-Fr sheath became kinked because the origin of the right subclavian vein was very tortuous and narrow (Fig. 2B and C). A sheath-in-sheath system, which included a 7-Fr sheath inside a 9-Fr sheath, also failed to maintain the patency of the sheath.

We thought that the cutdown technique would also be difficult because the tortuous vein was stiff, and the lumen was so narrow that the inserted lead could not pass through the region of tortuosity. In addition, even if it could pass the tortuous region, there would still be a risk of the lead fracturing at the tortuous point. We therefore discontinued the surgery by the subclavian approach and adopted the femoral approach instead.

The procedure was as follows. Under local anesthesia, we incised the skin above the inguinal ligament around the femoral vein (Fig. 3), detached the intimal tissue, and stripped the ligament. After puncturing the lower portion of the ligament to enter the femoral vein, we inserted a 7-Fr split-sheath system for introducing a pacemaker lead and guided the lead into the right ventricle. In order to advance the lead to the right ventricle, we inserted the stylet curved to 180° in a long ventricular lead (CapsureFix Novus, 5076/85 cm, Medtronic). After the lead was advanced into the right atrium, we pulled the stylet off and bent it again such that its tip was oriented toward the patient's back; we then inserted it again and screwed the lead in at the lower portion of the right ventricular septum (Fig. 3). We sutured the inguinal ligament to fix the lead and prevent hemorrhage. To hold the unit in place, a pouch was fashioned cranial to the incision and superficial to the fascia of the external oblique abdominal muscle. A tunnel from the ligament point to the pouch was made by clipping. After the tip of the lead was inserted into the pouch and connected to a pulse generator (Adapta, Medtronic), they were advanced into the pouch, and the wound was sutured. The entire procedure lasted 89 min, with minimal intraoperative hemorrhage.

The patient's clinical course after implantation was uneventful and without complications, and the patient was discharged on the 15th postoperative day. She survived for 4 months without any pacemaker-related complications until she died of a ruptured aortic aneurysm.

3. Discussion

This case clearly demonstrates the usefulness of permanent pacemaker lead implantation via the femoral vein.

Occasionally, conventional access sites for pacemaker implantation are not available, and another approach must be selected according to the patient's clinical condition,