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## Case Report

# The case of successful catheter ablation using only the approach from the upper part of the subject's body, with meandering aorta and implanted IVC filter

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### KEYWORDS

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catheter ablation

**Summary** A 79-year-old female had paroxysmal supraventricular tachycardia. However, she was implanted with an inferior vena cava filter and her descending aorta had significant meandering. It was thought that the insertion of the catheters would be difficult from the femoral vessels. Therefore we inserted electrode catheters from the right subclavian vein and internal jugular vein. As a result of an electrophysiology study, we diagnosed atrioventricular reciprocating tachycardia with a left lateral concealed accessory pathway (AP). An ablation catheter was introduced retrogradely through the left brachial artery and it was pushed forward under the mitral valve. Furthermore, it was put into the part where the earliest retrograde atrial deflection was recorded under the right ventricular apex pacing, and we succeeded in ablation of the AP. All catheters were inserted only from the upper part of the person's body. As for catheter operability, electric potential, operation time, and fluoroscopy time, there was no change in the case of either approach from the femoral vessels. Because we did not puncture the inguinal region, the patient was able to return to her ward on foot after the operation. In addition, we were able to perform a radical cure without complications.

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## Introduction

Catheter ablation for atrioventricular reciprocating tachycardia (AVRT) with concealed accessory pathway (AP) is now established as a front-line treatment [1]. Electrophysiology (EP) study usually involves inserting many electrode

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catheters and an ablation catheter from the femoral vein and artery.

We report on the case of a subject that had AVRT with left concealed AP. The case had meandering in the descending aorta and had been implanted with an inferior vena cava (IVC) filter. It was thought that it would be difficult to insert electrode catheters from the femoral vein and artery. Electrode catheters and the ablation catheter were inserted from the upper part of the person's body and ablation was performed. A report that some catheters were inserted in the upper part of the person's body at catheter ablation has appeared, but we inserted all the catheters from the upper part of the person's body, and there has not yet been a report that ablation in these circumstances has succeeded.

We report on this, including catheter operability, electric potential, operation time, fluoroscopy time, and complications.

## Case report

A 79-year-old female had received thymus enucleation for myasthenia gravis at the age of 58 years, and she was implanted with an IVC filter for pulmonary embolism at the age of 68 years. There were no especially significant hereditary factors. She had noticed palpitation from about the age of 20 years, and this was diagnosed as paroxysmal supraventricular tachycardia (PSVT). Medication by verapamil, bisoprolol, and hydrochloric acid pilsicainide continued, but two or three times a month she noticed palpitations. She hoped for a radical cure by catheter ablation and had a hospital consultation to that end.

A 12-lead electrocardiogram (ECG) at the time of the tachycardia showed a regular tachycardia of narrow QRS complex in 174bpm. It showed a positive P wave in V1 and a negative P wave in II, III, and aVF after QRS complex (Fig. 1A). The tachycardia was stopped by injection of adenosine triphosphate (10mg). The ECG after the tachycardia stopped did not have a delta wave for sinus rhythm (Fig. 1B) [2]. The above suggested an AVRT by the concealed AP [3]. The left wall was considered to be the location of the concealed AP [4].

The meandering of the aorta was shown by chest X-ray and a contrasting computed tomography (CT) of the aorta was carried out (Fig. 2). The result showed that the descending aorta had significant meandering. It was thought that passage through the descending aorta would be difficult even if we inserted an ablation catheter from the femoral artery, and it was supposed that the catheter ablation operation would be more difficult. In addition, an IVC filter was implanted, and it was thought that a trans-septal approach by the Brockenbrough technique was high-risk, not to mention the insertion of the electrode catheters from the femoral vein. Therefore we decided to insert all electrode catheters and the ablation catheter only from the upper part of the patient's body.

Sheaths were introduced through the right internal jugular vein (5-French) and the subclavian vein (7-French). These punctures were guided by ultrasound [5]. A duo-

decapolar electrode catheter (5-French, distance between electrodes is 2 mm, St. Jude Medical, St Paul, MN, USA) was introduced through the right internal jugular vein and advanced into the coronary sinus. Three quadripolar electrode catheters (2-French, Ensemble, distance between electrodes is 5 mm, Japan Lifeline Co., Ltd., Tokyo, Japan) were introduced from the subclavian vein and positioned in the high right atrium (HRA), right ventricular apex (RVA), and atrioventricular junction. Although operability declined a little when the catheter was compared with normal electrode catheters, we were able to record a good electric potential. Intracardiac signals were filtered at 30–150 Hz.

There was an AA interval of 759 ms, AH interval of 81 ms, and HV interval of 34 ms for sinus rhythm at the time of the start of the EP study (Fig. 3A). We recorded the earliest atrial deflection distal of the CS catheter by RVA pacing. It did not show a conduction delay in response to an increase in the rate in the St-A interval by extra stimulation from RVA. The tachycardia was easily caused by extra stimulation from HRA. The cycle length of the tachycardia was 323 ms and the earliest atrial deflection distal of the CS catheter (Fig. 3B). A ventricular stimulus delivered during the His bundle refractoriness succeeded in advancing the tachycardia [6]. It extended the post-pacing interval and the difference of the cycle length with only 94 ms entrainment by RVA pacing [7].

From the above, we made a diagnosis of AVRT with concealed AP of the left lateral wall. As stated above, the descending aorta had significant meandering, and an IVC filter was implanted. Therefore, a sheath (7-French, 30 cm, TERUMO Corp., Tokyo, Japan) and a 7-French ablation catheter (Ablaze Fantasia MMcurve 4 mm-tipped, Japan Lifeline Co., Ltd.) were introduced through the left brachial artery.

An ablation catheter was introduced using a retrograde transaortic approach and pushed forward under the mitral valve. Furthermore, it was put in the part where the earliest retrograde atrial deflection was recorded under RVA pacing. This was a catheter operation from the brachial artery, but there was no spasm of the artery, and the operability did not change from the femoral artery. It was supposed that the place was AP and radio frequency (RF) energy was delivered at the site with the earliest atrial activation during RVA pacing. RF energy was delivered using a 30-W, 50° setting and a single RF delivery at the site successfully resulted (Fig. 4). PSVT was not caused afterwards.

The operation time was 1.6 h and fluoroscopy time was 23 min, which was not very different to the usual time (average operation time and fluoroscopy time for the concealed AP in the past year in this hospital is 1.3 h and 18.6 min).

After having removed the catheters and sheaths, we applied pressure using tape after having compressed the right subclavian vein, right internal jugular vein, and left brachial artery by hand for 15 min. Because we did not puncture the inguinal region, the patient was able to return to her ward on foot after the operation. All pressure was removed after three hours. The procedure was performed without subsequent complications such as hematoma or median nerve disorder. One year has passed, but there are no symptoms that could suggest AVRT.

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