

Guide Wire Entrapment in Mitral Subvalvular Apparatus during Left Lateral Accessory Pathway Ablation: A Case Report

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ABSTRACT

Mitral annular region and valvular apparatus injury during catheter ablation is a rare but serious complication. Although entrapment of a circular-tip mapping catheter in the mitral valve complex has been described as a major etiology of this rare complication, spring-tip guide wire entrapment in mitral valve complex during ablation procedures is unreported. We reported entrapment of a spring-tip guide wire in the mitral subvalvular apparatus during ablation of left lateral accessory pathway using transatrial septal approach. Various techniques were performed to make the guide wire free, which ultimately resulted in fracture of its distal end and subsequently surgical extraction. This unusual complication of catheter ablation would be a critical harm to patients undergoing trans-septal ablation approaches and great consideration should be warranted during the procedures.

► Implication for health policy/practice/research/medical education:

The growing number of transseptal approaches in percutaneous catheter ablation procedures has resulted in increased complications. This case report represents one of these dangerous complications which can in turn cause serious poor clinical outcomes. Therefore, considering such complications would contribute to more necessary precautions before and during the procedure.

1. Introduction

Expansion of catheter ablations involving the mitral annulus and valve apparatus can increase the risk of catheter interaction with the mitral valve complex. Thus, close surveillance of the mitral valve complex is required during ablation procedures and immediate surgical repair is necessary for anatomical salvage while significant injury occurs and percutaneous techniques are unable to retrieve the integrity (1, 2). Such complications have been most reported in atrial fibrillation ablation and are strikingly rare in the ablation of accessory pathways. Entrapment of a circular-tip catheter in the mitral valve complex during ablation of left-sided accessory pathway by the retrograde approach has been described in a few cases reported earlier (1, 3-5). However, guide wire entrapment in mitral subvalvular apparatus during anterograde trans-septal approach has not been reported yet, which is the mainstay

of our presentation.

2. Case Presentation

A 31-year-old woman was hospitalized in our center because of recurrent episodes of palpitation. The standard 12-lead Electrocardiogram (ECG) showed a sinus rhythm with a surface pre-excited QRS complex indicative of a left lateral accessory pathway. Echocardiography showed no structural heart disease. During intracardiac electrophysiological study, a narrow QRS complex tachycardia with cycle length of 350 milliseconds was induced compatible with an Orthodromic Atrioventricular Reentrant Tachycardia (OAVRT) using the left lateral accessory pathway.

While making attempt to map the high lateral atrial aspect of the mitral annulus via an anterograde trans-septal approach using an ablation catheter, a spring-tip guide wire (INOUE-BALLOON®, Toray Industries, Tokyo, Japan) was entrapped in the mitral subvalvular apparatus. Several maneuvers were employed to release the guide wire, including gentle advancement and then mild traction in combination with subsequent bidirectional

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(clockwise and counter-clockwise) rotation, which resulted in separation of the distal end of the guide wire evident on fluoroscopic examination (Figure 1). Retrograde approaches for encircling the fractured distal end of guide wire in order to basket it was also unsuccessful. Transesophageal Echocardiography (TEE) revealed the entangled piece of guide wire within the mitral valve chordae tendineae and anterolateral papillary muscle, tethered middle portion of the anterior mitral valve leaflet (A2 scallop), and mild to moderate mitral valve regurgitation. After confirming successful ablation and in the presence of high possibility of more valvular and subvalvular damage by further trans-vascular interventions, we decided to terminate the procedure.

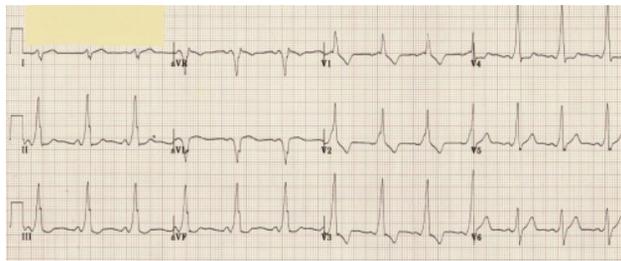


Figure 1. Electrocardiogram of the Patient Demonstrating a Left Lateral Accessory Pathway

The patient was immediately transferred to operating room and the mitral valve was accessed through interatrial septum under cardiopulmonary bypass and venous drainage obtained by bicaval cannulation technique. Ascending aorta was clamped and antegrade cold cardioplegia was used for myocardial protection. Moreover, two limbs of the approximately 10-centimeter fractured distal end of the guide wire had twisted across the mitral valve chordae tendineae and anterolateral papillary muscle, which were carefully unfolded and extracted. Finally, the mitral apparatus was explored for any repairable defects. No commissural tearing or chordal rupture was found, and

intraoperative TEE confirmed no need for mitral valve repair by revealing no residual mitral valve regurgitation.

The patient was fully recovered from open heart surgery. The echocardiogram prior to discharge also showed the same observations. During the follow-up period, a satisfactory course was seen with no episodes of tachycardia or postoperative complications (figure 2 A and B).

3. Discussion

To the best of our knowledge, guide wire entrapment in mitral subvalvular apparatus while performing ablation procedures is unreported. In addition, catheter entrapment in mitral valve complex has been discussed in very few cases mostly by circular-tip Lasso® catheters. In these cases, some catheters were released by percutaneous approaches, such as advancing the sheath over the catheter, rotating it clockwise, and pushing forward rather than pulling back (2, 6). Breakage in the circular portion of the catheter has too been reported in some cases while performing traction on the entrapped catheter (7, 8). There are also reports of catheter extraction using minimally invasive surgical techniques (9).

The incidence of mitral valve damage during ablation of a left-sided accessory pathway has been reported to be nearly 0.04% (10), which seems to be underestimated. One important leading cause of catheter entrapment may be the anatomical complexity of the mitral subvalvular apparatus susceptible to provoke variable mitral valve damage while using maneuvers for releasing the catheter, such as rotating, traction, and forward advancement. Mitral regurgitation has been reported to occur in about 1.1 - 9% of patients (11-13).

Reviewing the literature, catheter entrapment has been reported in five cases while mapping the atrial aspect of mitral annulus during left lateral accessory pathway ablation. One was removed by percutaneous procedures, while attempts to retrieve the catheter were unsuccessful in the four others. Therefore, open heart surgery was

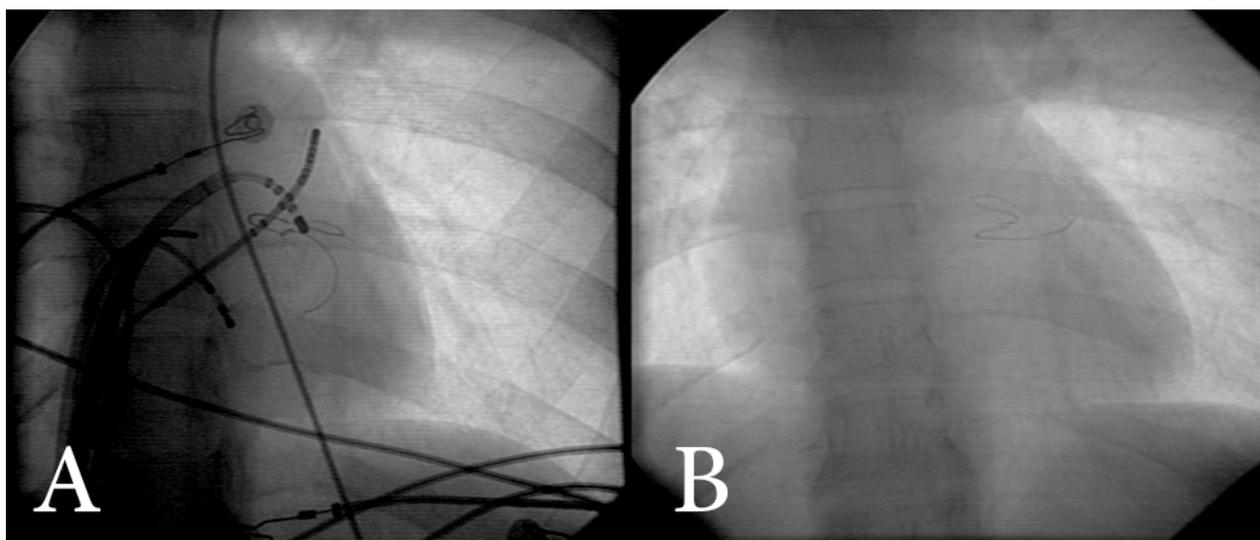


Figure 2. A) Fluoroscopic Visualization of Entrapment of the Fractured Distal Piece of Guiding Catheter in the Mitral Subvalvular Apparatus before Mapping Catheters Removal
B) Fluoroscopic Visualization of Entrapment of the Fractured Distal Piece of Guiding Catheter in the Mitral Subvalvular Apparatus after Mapping Catheters Removal

inevitably performed permitting direct visualization of what had happened followed by successful catheter removal (1, 3-5). Among percutaneous maneuvers suggested for removal of circular-tip catheters in trans-septal ablation approaches, advancement of the catheter with clockwise rotation has been reported to be more effective compared to simple rotation or pulling (2, 6).

In the new era of developing electrophysiology, incidence of such complications may increase considering the growing number of procedures using the left side approach. In addition, the current generation of circular-tip ablation catheters and spring-tip guide wires and their expanded use can increase the chance of device entrapment in the mitral valve complex.

3.1. Conclusion

The present study focused on a rare complication of trans-septal approaches in catheter ablation of arrhythmias, which should be taken into consideration regarding the increasing number of such these procedures and the hazardous nature of the complication itself.

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Authors' Contribution

MV. Jorat, MH. Nikoo: Design and data gathering; M. Tahamtan: Data gathering and writing the manuscript.

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