

## Percutaneous Repositioning of Dislodged Atrial Pacing Lead

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### Abstract

*The overall rate of atrial pacing lead dislodgement is estimated to be about 3%. These leads are generally repositioned via a second operation through opening the pacemaker pocket.*

*Some operators have introduced percutaneous techniques using snare system or deflectable catheters for this purpose.*

*In this article we present our experience with five cases of percutaneous lead repositioning. Three cases were performed using deflectable ablation catheters and in two cases we used a specially designed urologic basket. The procedural success rate was 100% at the beginning but the long term success rate was 60%.*

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### Introduction

Lead dislodgement requiring reoperation is a complication that raises the costs of pacemaker implantation surgery while adding to patient's discomfort. Migration of a dislodged atrial lead can present with undersensing, loss of atrial capture, loss of atrial kick in patients who need AV synchrony and rarely phrenic nerve stimulation or improper RV stimulation. Once detected, the dislodged lead should be immediately repositioned.<sup>1,2</sup>

In recent years, percutaneous transcatheter repositioning of displaced permanent pacemaker leads has been advocated before consideration of surgical repositioning. The procedure is easy and safe, allowing a reduction in the need for surgical lead revision and the associated morbidity and costs.<sup>3,5</sup> In this article we introduce five cases of dislodged atrial leads. In three cases we tried repositioning with deflectable ablation catheter and in two cases we used a specially designed urologic basket.

### Methods

#### *Cases performed by deflectable ablation catheters*

Three patients, who had atrial lead dislodgment and were diagnosed early in post implantation follow up, were selected for this procedure.

In two cases the atrial lead was dislodged to SVC. In both cases we were able to reposition the lead successfully but in one of them the lead migrated again into SVC.

In the third case, the tip of atrial lead was dislodged to the ventricular side of the anterior leaflet of tricuspid valve. It was repositioned successfully.

In the follow up period (which is 9 months up to now), the leads remain stable in RA.

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## Cases performed by specially designed urologic basket

### Case 1

A 68-year-old man was admitted in January 2006 with dyspnea, mild dizziness and evidence of pacemaker malfunction due to atrial lead dislodgement. He had a history of CABG in 1985 and PCI (implantation of 7 stents in two stenotic SVG grafts) in 2003. In 2004 he experienced an inferior MI, after which he had transient complete heart block accompanied by respiratory arrest and cardiogenic shock, which was treated medically and the block resolved. In the next admission (4 months later) he had first degree AV block and episodes of complete heart block accompanied by dizziness and exacerbation of dyspnea. ECG showed narrow complexes and old inferior MI. In the last echocardiographic study ejection fraction was 40 % and there was no evidence of significant dysynchrony, therefore we decided to implant a dual chamber pacemaker for him.

The implantation was successful and the patient was discharged with good condition in November 2005. During follow up study, pacemaker analysis showed no atrial sensing and pacing. Programming the pacemaker to VVIR mode did not relieve symptoms and the patient was scheduled for repositioning of atrial lead which was performed with this specially designed urologic basket on February 2006.

### More description on specially designed urologic basket (Cardiac pacing lead hook)

This device is specially designed based on the nonmetallic urologic stone basket known as Dormia basket, used for removal of stones that are located in the " lower ureter".

By making certain changes, its functionality is changed so that instead of forming a basket, the operator can construct a hook around the cardiac pacing lead by pulling the steerable inner line of the device. (Figure 1).

In the next step the operator is able to reposition the lead by some traction of the device.

To remove the hook, the operator releases the inner line, this will allow the hook to be reshaped and straightened as it once more enters the delivery system (Mullins sheath).

To perform repositioning of atrial pacing lead, the patient was brought to catheterization laboratory in the post absorptive nonsedated state. Mullins sheath was placed around the atrial lead of pacemaker and by using deflectable ablating catheter, the Mullins sheath was positioned over the loop of the atrial pacing lead (Figure 2).

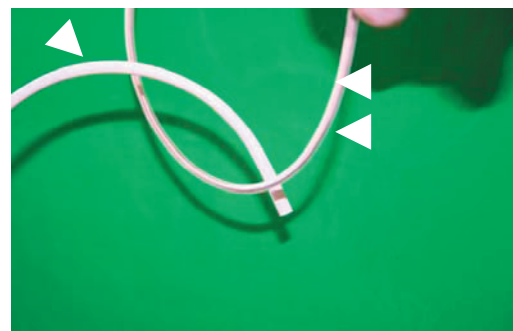


Figure 2. This figure shows how to position the Mullins sheath (single arrow head) over the loop of dislodged atrial lead of pacemaker (double arrow head)

After removing the ablating catheter, the specially designed urologic basket was sent over the loop of j- shaped atrial lead. The deflectable part of this basket was passed through the tip of the Mullins sheath which was positioned over the loop of the dislodged pacemaker lead. By deflecting the tip of basket, we made a hook around the lead (Figure 3, A to C).

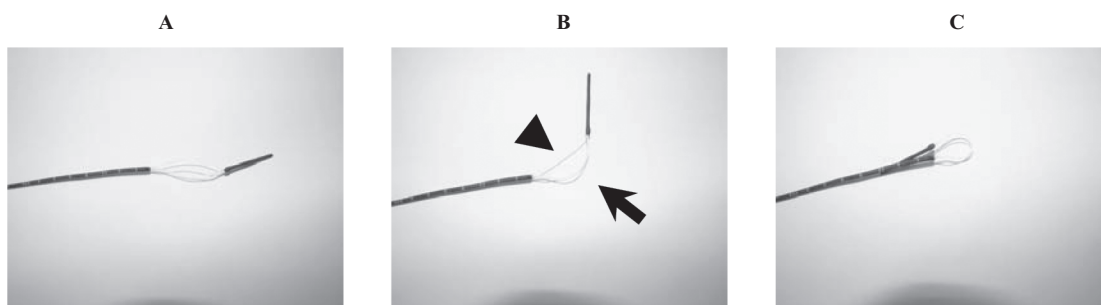


Figure. 1(A. B.C) these figures show the specially designed urologic basket and how it makes a hook. (By Inactivating three Lines of basket (arrow) only one line is active (arrow head). So by dragging the lines, the head bends towards the active line and makes a hook

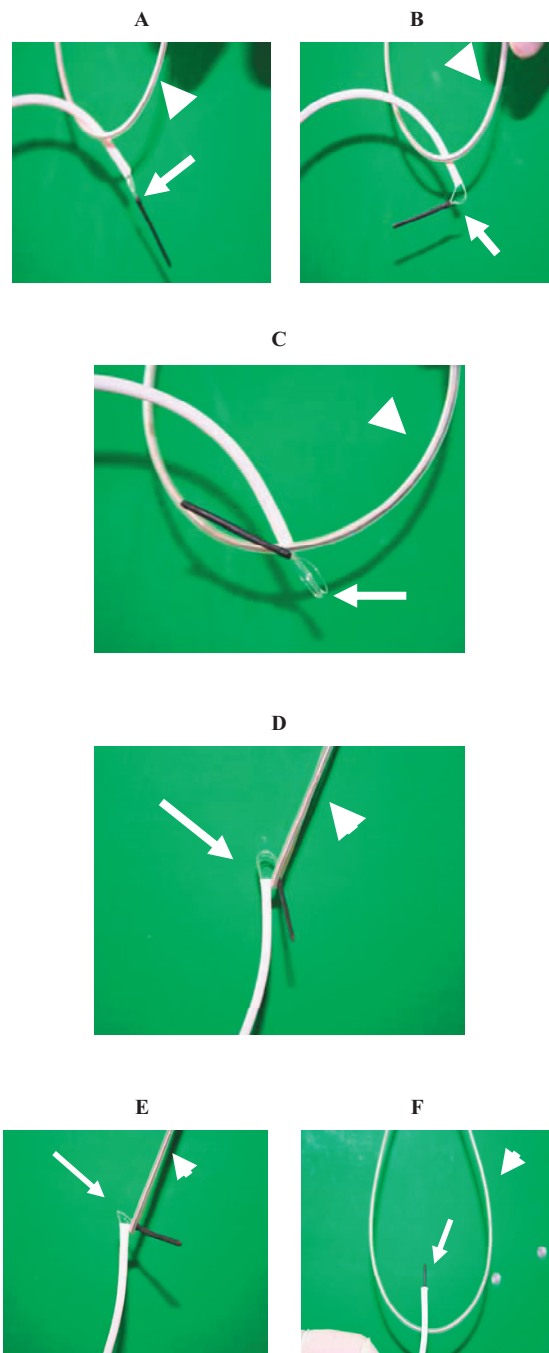


Figure.3 (A to F) These figures show how the basket (arrow) makes a hook around the pacemaker lead (single arrow head) and how it is removed after lead traction

Then by pulling back of the basket, Mullins sheath and some traction (Figure 3, D),

the tip of atrial lead was sent to a new position in the atrium. Pacing analysis was performed immediately, atrial pacing and sensing parameters were acceptable. By pulling the basket catheter back into the Mullins sheath (Figure 3, E & F), all devices were taken out.

## Case 2

A 68-year-old man was admitted in January 2003 with dyspnea and dizzy spells. His ECG showed complete heart block. In echo study, ejection fraction was 40%. In coronary angiography, borderline lesions (about 50%) were found in LAD and circumflex artery. A dual chamber pacemaker was implanted for him and the patient was discharged from the hospital. Four weeks later he came to our pacemaker clinic because of diaphragmatic stimulation. He announced that his diaphragmatic stimulation started after severe sneezing. His chest x ray revealed migration of atrial lead to superior vena cava (SVC). By changing the Pacemaker mode to VVIR, diaphragmatic stimulation was terminated but the patient showed signs of pacemaker syndrome. So we decided to perform repositioning of the dislodged atrial lead with specially designed urologic basket. The dislodged atrial lead was repositioned into the right atrium but one day later this J-shaped passive fixation atrial lead migrated into the SVC once again and the patient preferred reoperation. In the second operation session another atrial lead (an active fixation lead) was inserted into right atrial auricle.

## Results

Percutaneous repositioning of dislodged atrial lead was possible in all 5 cases but in two cases the leads migrated again, therefore our long-term success rate was 60%.

## Discussion

This experience highlights the feasibility of non surgical repositioning of pacemaker atrial leads while introducing a new device. The procedure is possible when a passive fixation J-shaped atrial lead is used. There are some reports about repositioning of dislodged atrial pacing leads by snare systems, or deflectable catheters. We used the deflectable catheter in 3 cases which we diagnosed the lead dislodgment early in post implantation period. The procedure was successful and easily performed but in one case the lead migrated to SVC again.

To reposition the dislodged atrial pacing lead by snare system, the tip of the dislodged atrial pacing lead should move freely in the right atrium or superior vena cava (SVC).

There are some devices such as Needle's Eye® snare, designed to grasp objects without free end but these devices are used for percutaneous retrieval of cardiac leads and to our knowledge, they are not used for lead repositioning.

When the tip of dislodged atrial pacing lead is attached to the wall of atrium, SVC or tricuspid valve, deflectable catheters could be used but if the tip of displaced lead is tightly fixed to atrial wall or SVC it is impossible to detach



the lead.

By using this new device (cardiac pacing lead hook), the operator is able to reposition the lead. Therefore we used our new device in two cases diagnosed with dislodgment later in follow up.

## **Conclusion**

The results of this experience encourage us to try percutaneous repositioning of dislodged atrial leads in more cases and evaluate the results. We prefer to use the deflectable ablation catheters for the dislodged leads which are diagnosed early. For those who are diagnosed later we use our newly invented device, ‘‘The cardiac pacing lead hook’’.

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