

## The Improvement of the Atrial Flutter Rhythm upon the Removal of the Infected Permanent Pacemaker Lead

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### ABSTRACT

Pacemaker infection has multiple risk factors. Its presentation is most often similar to infected endocarditis and the diagnosis is made through studying blood cultures. Transesophageal echocardiography can confirm the diagnosis. The most common microorganisms are staphylococcus species. As a matter of fact, complete pacemaker removal appears to be the only definite treatment. We presented a case of infected pacemaker lead which was firstly referred with fever and nephritic syndrome. She had intermittent atrial flutter rhythm. Therefore, a total infected pacemaker system was removed under cardiopulmonary bypass support. Yet, the lead was firmly attached to the septal leaflet of tricuspid valve while leaflet repair was needed. As a result, atrial flutter rhythm was converted into sinus rhythm after an incidental interruption of the macroreentrant circuit in the process of the tricuspid leaflet surgery.

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### Introduction

Permanent Pacemaker (PPM) endocarditis is a life-threatening infection. Despite certain improvements made in the PPM design and the administration of antibiotic prophylaxis before pacemaker implantation, PPM infections continue to occur. In this article, we reported a case of infected lead in a woman who was presented with nephritic syndrome and atrial flutter.

### Case

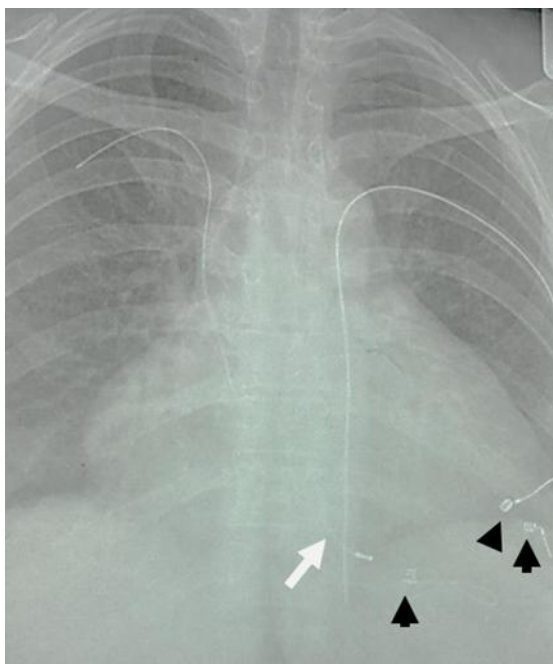
The patient was a 50-year-old woman who was admitted to our hospital because of septicemia caused by infected ventricular PPM lead. She had previously received a DDD (Dual chamber pacing, Dual chamber sensing, dual mode response) PPM in another hospital, which was most probably because of the sick sinus syndrome with intermittent atrioventricular (AV) block after

atrial tachyarrhythmia such as atrial flutter 5 years ago. Two years after the implantation, an unacceptable pacing threshold was detected and thus, the reposition of the lead seemed necessary. In 2012, another epicardial PPM lead was implanted due to the recurring pacemaker malfunction. In this case, the subject had high grade fever (39° C) for the last 6 weeks and had been treated empirically by other physicians. However, she had refused any additions until the nephritic syndrome complicated her condition. Finally, she was referred to our hospital due to an uncontrolled fever. On admission, blood pressure was 115/70 mm/Hg and oral temperature was 38.5 ° C. Complete blood count showed leukocytosis (19,000/uL). Chest X-ray revealed multiple previous lead (Figure 1) and no active lung parenchymal lesions. Blood cultures were

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**Figure 1.** posteroanterior chest X-ray demonstrates multiple previous permanent pacemaker leads (arrow)

positive for staphylococcus species aureus for 3 times. Electrocardiography (ECG) revealed atrial flutter rhythm.

Transesophageal echocardiography (TEE) showed multiple large vegetations attached to the ventricular pacemaker lead. The patient was treated with intravenous antibiotics. Furthermore, a completely infected pacemaker system was removed under cardiopulmonary bypass support but the ventricular pacemaker lead remained firmly attached to the septal leaflet of the tricuspid valve (TV). Consequently, partial removal of the septal leaflet and TV repair was needed (Figure 2). She received postoperative treatment with antibiotics without implanting any pacemakers. She had atrial flutter rhythm before surgery but thereafter she showed a normal sinus rhythm without any cardiac arrhythmia. The monthly follow-up was uneventful and no recurrence of the atrial flutter was seen.

## Discussion

PPM infection has been recognized since 1970s (1). The incidence of the infection of the PPM system is reported between 0.3% to 12.6% (2). Any parts of the pacemaker might be involved in the development of the infection; for instance, the generator pocket or the leads. However, the pocket infections seem to be more prevalent than the others (1). Unfortunately, the rate of cardiac device infections has gradually increased (1).

The most reported patients' risk factors associated with PPM infections include diabetes mellitus, heart failure, renal dysfunction, the



**Figure 2.** Vegetation on the pacemaker lead was seen. Arrow shows part of septal leaflet

presence of more than 2 pacing leads, and long-term corticosteroid use. The procedure characteristics might influence the development of the device infections. Other risk factors are fever within 24 hours before procedure, using temporary pacemaker before the implementation of PPM and early re-intervention. Staphylococcal species are the most prevalent microorganism (3). Device infection can emerge in the form of a variety of syndromes: fever, local inflammatory changes of the generator-pocket site, cutaneous erosion, pain and signs of systemic toxicity and even the involvement of other organs such as the kidney and brain presenting the infection.

At least two samples of blood culture should be obtained before initiating antibiotic therapy. Transesophageal echocardiography (TEE) might be playing an important role in the accurate diagnosis of lead's infection in adults. Thus, the complete removal of all hardware is recommended in the treatment of the patients with device infections. Upon extracting an infected lead in patients with bloodstream infection and valvular involvement, we must complete the period of the antibiotic therapy such as endocarditis (4).

We believe that in our patient, the most important risk factor for device infection was the multiple lead implantations. The presenting symptoms of our patient were uncontrolled fever and nephritic syndrome due to her refusal of any admission or evaluations.

Atrial flutter is an abnormality of the heart rhythm which can be presented alone or as a part of the sick sinus syndrome (SSS). In SSS, a short episode of atrial flutter might be followed by a few seconds of asystole and it can give rise to certain symptoms in the patient. It should be noted that we did not have access to the patient's medical history. However, it seemed that the cause of the pacemaker implantation was SSS with sinus arrest.

Typical atrial flutter is the prototypic macroreentrant atrial rhythm in the right atrium constrained by the tricuspid annulus, the crista terminalis and the eustachian ridge. The

reentrant circuit is likely to be interrupted due to ablation and as a result, the arrhythmia might be terminated (5).

In our patient, after the partial removal of the septal leaflet of TV and TV repair, atrial flutter was stopped and we believe that this surgery acted as ablation.

### Conclusion

Device infections have a variety of presentations and risk factors and multiple lead implantation is one of them. Complete device removal is the treatment of choice in such cases. In our patient, TV repair interrupted atrial flutter rhythm.

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### Conflict of interests

The author has no conflict of interests.

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