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Lead helix winding tricuspid chordae tendineae: A case report

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Abstract

BACKGROUND

As left bundle branch pacing (LBBP) is more like physiological pacing, LBBP has emerged as a novel pacing strategy that uses the native conduction system to improve ventricular synchronization with stable pacing parameters. LBBP has been revealed associated with a significantly reduced risk of new-onset atrial fibrillation and heart failure compared with conventional permanent pacemaker implantation^[1].

CASE SUMMARY

A 64-year-old man was admitted with a 24 hours history of chest distress and shortness of breath. The patient had no symptoms of chest pain, dizziness, syncope, nausea and vomiting. Symptom continued unabated. There was no abnormality in routine examination after admission. Twelve-lead electrocardiogram (ECG) presented a result of 2:1 atrioventricular block (AVB) (**Supplemental Figure 1**). Coronary angiography (CAG) was performed the next day and no abnormality was found (**Supplemental Figure 2**). Finally, the patient agreed to received LBBP and signed the informed consent. During the process of withdrawing the Medtronic Model 3830 Lead to sheath, we found the lead helix was wrapped around the chordae tendineae of the septal valve of tricuspid. After attempting for rotating the 3830 Lead, it failed to release the lead helix

from the chordae tendineae. Finally, we used radiofrequency ablation to ablate the wrapped chordae tendineae.

CONCLUSION

Radiofrequency ablation effectively solved this problem without complications. It is an effective and reliable method to solve the problem of lead winding chordae.

INTRODUCTION

During the Model 3830 Lead implantation, we encountered a problem. The pacing position was not ideal, and the intracardiac electrocardiogram indicated that inferior wall leads (II III AVF) were Q waves. So, we wanted to adjust the lead position to get a good parameter. During the process of withdrawing the 3830 Lead to sheath, we found the lead helix was wrapped around the chordae tendineae of the septal valve of tricuspid. we performed the right ventricular angiography immediately (Figure 1). We rotated the lead clockwise or counterclockwise, and in the meantime sent the 3830 Lead forward or backward while adjusting the sheath tube forward sending or withdrawal in different angles. After attempting for nearly 2 h, we failed to release the lead helix from the chordae tendineae.

Finally, we used radiofrequency ablation to ablate the wrapped chordae tendineae. We connected the tip of ablation catheter to the end of the 3830 Lead (cathode ring). So, the ablation catheter, 3830 lead with the winding chordae tendineae, the back electrode plate of patient with the radiofrequency generator formed a closed current loop (Figure 2). In this way, radiofrequency energy could transmit to the tip of 3830 Lead. Unfortunately, the radiofrequency generator failed to work as the impedance was over the maximum (350 ohms) allowed.

We then tried to add another back electrode to reduce the impedance from 350 to 300 ohms. But it failed to discharge because of the high impedance again. Finally, high concentration of saline (10% NaCl) was injected into the sheath of

electrode (Supplemental Figure 3) and the impedance reduced from 300 to 125 ohms. While abating only for 3 s, the lead helix successfully separated from chordae tendineae. We changed a new Model 3830 electrode and successfully implanted in the left bundle branch area, with good capture threshold and pacing pattern (Figure 3). After that, we reexamined echocardiography which showed mild regurgitation signal of tricuspid and pericardial effusion. The patient had no complain of discomfort. The pacemaker was programmed before the patient discharged, and the pacing threshold, sense and impedance were good. The patient was regularly followed up in the clinic and the pacemaker worked normally.

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CASE PRESENTATION

Chief complaints

A 64-year-old man was admitted with a 24 hours history of chest distress and shortness of breath. The patient had no symptoms of chest pain, dizziness, syncope, nausea and vomiting.

History of present illness

Symptoms started 24 h without reason. So, the patient was sent to the Emergency Room of Aerospace Center Hospital, Peking University Aerospace School of Clinical Medicine.

History of past illness

The patient had a 14-year history of hypertension. The highest blood pressure was 150/90 mmHg. Valsartan was taken regularly and controlled blood pressure well.

Personal and family history

The patient denied any family history of disease.

Physical examination

Body temperature, 36.5°C blood pressure, 108/65mmHg; heart rate, 38 beats per min; respiratory rate, 18 breaths per min.

Laboratory examinations

There was no abnormality in routine examination after admission.

Imaging examinations

Twelve-lead electrocardiogram (ECG) presented a result of 2:1 atrioventricular block (AVB) (**Supplemental Figure 1**). Coronary angiography (CAG) was performed the next day and no abnormality was found (**Supplemental Figure 2**).

FINAL DIAGNOSIS

Combined with the patient's medical history and the examinations, the final diagnosis was 2:1 AVB and hypertension.

TREATMENT

Permanent pacemaker with LBBP was implanted for the patient. During the process of withdrawing the 3830 Lead to sheath, we found the lead helix was wrapped around the chordae tendineae of the septal valve of tricuspid. Finally, we used radiofrequency ablation from 3830 Lead helix to ablate the wrapped chordae tendineae.

OUTCOME AND FOLLOW-UP

The patient followed up at clinic regularly. The patient had no symptoms of discomfort and ECG was add as **Supplemental Figure 4**. Echocardiography showed mild tricuspid regurgitation. (**Supplemental Figure 5**).

DISCUSSION

The present case described a rare occurrence of pacemaker lead wrapped around the chordae tendineae. This is the first case to describe how to resolve this problem by

radiofrequency ablation with high impedance. We successfully solve this problem using high concentration of saline (10% NaCl) to reduce the impedance according to Ohm's law^[2] and the principles of radiofrequency ablation^[3]. When the radiofrequency energy sent to 3830 Lead helix, heat was generated to dehydrate and denature the wrapped chordae tendineae.

As intracardiac echocardiography (ICE) was unavailable in the catheter lab which may show the wrapping situation of electrode tip and chordae tendineae and guide us to rotate the lead.

The patient was satisfied with the result of the treatment, for avoiding mental, financial, physical damage by iatrogenic injuries.

This case demonstrates how to resolve Model 3830 Lead wrapped around the chordae tendineae.

CONCLUSION

Radiofrequency ablation with injection of high concentration of saline in the sheath effectively solves the problem of Medtronic 3830 Lead wrapped around chordae tendineae without complications.

ACKNOWLEDGEMENTS

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SIMILARITY INDEX

PRIMARY SOURCES

1

Shalaimaiti Shali, Weiyun Wu, Jin Bai, Wei Wang et al. "Current of injury is an indicator of lead depth and performance during left bundle branch pacing lead implantation", Heart Rhythm, 2022

22 words — 2%

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