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Contents

Thrice Monthly Volume 11 Number 30 October 26, 2023

MINIREVIEWS

- 7261 Lower limb amputation rehabilitation status in India: A review
Swarnakar R, Yadav SL, Surendran D
- 7268 Magnetic resonance imaging for acute pancreatitis in type 2 diabetes patients
Ni YH, Song LJ, Xiao B

ORIGINAL ARTICLE

Retrospective Study

- 7277 Efficacy of lidocaine wet compress combined with red-light irradiation for chronic wounds
Bao MZ, Zhou LB, Zhao L, Zhang H, Li Y, Yang L, Tai AT
- 7284 Clinical implications of forkhead box M1, cyclooxygenase-2, and glucose-regulated protein 78 in breast invasive ductal carcinoma
Bai J, Li Y, Cai L
- 7294 Six-year analysis of key monitoring for bacterial strain distribution and antibiotic sensitivity in a hospital
Li ZY, Yang D, Hao CH
- 7302 Clinical pharmacists' involvement in carbapenem antibiotics management at Wenzhou Integrated Hospital
Xu XM, Pan CY, Zeng DL

Observational Study

- 7309 High risk for obstructive sleep apnea and risk of hypertension in military personnel: The CHIEF sleep study
Liu WN, Lin KH, Tsai KZ, Chu CC, Chang YC, Kwon Y, Lin GM

EVIDENCE-BASED MEDICINE

- 7318 Causal relationship association of cheese intake with gestational hypertension and diabetes result from a Mendelian randomization study
Zhong T, Huang YQ, Wang GM

META-ANALYSIS

- 7329 Left lateral decubitus sleeping position is associated with improved gastroesophageal reflux disease symptoms: A systematic review and meta-analysis
Simadibrata DM, Lesmana E, Amangku BR, Wardoyo MP, Simadibrata M
- 7337 Efficacy and safety of anti-vascular endothelial growth factor agents on corneal neovascularization: A meta-analysis
Lai SC, Loh EW, Chiou DI, Hong CT

- 7350** Efficacy and safety of different anti-osteoporotic drugs for the spinal fusion surgery: A network meta-analysis

He XY, Chen HX, Zhao ZR

SCIENTOMETRICS

- 7363** Construction of clinical research nurse training program based on position competence

Sun J, Shan WC, Liu JM, Zhang QQ, Ye Y, Huang ST, Zhong K

CASE REPORT

- 7372** Fatal hemophagocytic lymphohistiocytosis-induced multiorgan dysfunction secondary to *Burkholderia pseudomallei* sepsis: A case report

Sui MZ, Wan KC, Chen YL, Li HL, Wang SS, Chen ZF

- 7380** Interpeduncular cistern intrathecal targeted drug delivery for intractable postherpetic neuralgia: A case report

Fu F, Jiang XF, Wang JJ, Gong L, Yun C, Sun HT, Tang FW

- 7386** Using shape-memory alloy staples to treat comminuted manubrium sterni fractures: A case report

Zhang M, Jiang W, Wang ZX, Zhou ZM

- 7393** Lead helix winding tricuspid chordae tendineae: A case report

Liu TF, Ding CH

- 7398** Fournier gangrene in an infant, complicated with severe sepsis and liver dysfunction: A case report

Bakalli I, Heta S, Kola E, Celaj E

- 7403** Prenatal ultrasound diagnosis of congenital infantile fibrosarcoma and congenital hemangioma: Three case reports

Liang RN, Jiang J, Zhang J, Liu X, Ma MY, Liu QL, Ma L, Zhou L, Wang Y, Wang J, Zhou Q, Yu SS

- 7413** Iatrogenic bladder neck rupture due to traumatic urethral catheterization: A case report

Ekici O, Keskin E, Kocoglu F, Bozkurt AS

- 7418** Near obstructing painful anorectal mass and facial rash in a man with monkeypox: A case report

Akpoigbe K, Yannick J, Culpepper-Morgan J

- 7424** Traditional Chinese medicine for foot pain in a patient with complex regional pain syndrome: A case report

Shin WC, Kim H, Chung WS

- 7432** Diffuse large B-cell lymphoma successfully treated with amplified natural killer therapy alone: A case report

Nagai K, Nagai S, Okubo Y, Teshigawara K

- 7440** Pharmacogenomics-based individualized treatment of hypertension in preterm infants: A case report and review of the literature

Tang LF, Xu A, Liu K

- 7450** Warthin-like papillary renal cell carcinoma: A case report
Li XF, Wang ZJ, Zhang HM, Yang MQ
- 7457** Bladder stone due to late clip migration after prostatic urethral lift procedure: A case report
Bozkurt AS, Ekici O, Keskin E, Kocoglu F
- 7463** Acute-on-chronic liver failure induced by antiviral therapy for chronic hepatitis C: A case report
Zhong JL, Zhao LW, Chen YH, Luo YW
- 7469** Hemodynamic instability following intravenous dexmedetomidine infusion for sedation under brachial plexus block: Two case reports
Kim YS, Lee C, Oh J, Nam S, Doo AR
- 7475** Neonatal methicillin-resistant *Staphylococcus aureus* pneumonia-related recurrent fatal pyopneumothorax: A case report and review of literature
Li XC, Sun L, Li T
- 7485** Infrequent organ involvement in immunoglobulin G4-related prostate disease: A case report
Yu Y, Wang QQ, Jian L, Yang DC
- 7492** Gouty tenosynovitis with compartment syndrome in the hand: A case report
Lee DY, Eo S, Lim S, Yoon JS
- 7497** Acute myocardial infarction after initially diagnosed with unprovoked venous thromboembolism: A case report
Seo J, Lee J, Shin YH, Jang AY, Suh SY
- 7502** Distal clavicle fractures treated by anteroinferior plating with a single screw: Two case reports
Zhao XL, Liu YQ, Wang JG, Liu YC, Zhou JX, Wang BY, Zhang YJ

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The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

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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.

CASE SUMMARY

A 64-year-old man was admitted with a 24-h history of chest distress and shortness of breath, which continued unabated. The patient had no symptoms of chest pain, dizziness, syncope, nausea nor vomiting. There were no abnormalities found in routine examinations after admission. Twelve-lead electrocardiogram presented a result of 2:1 atrioventricular block. Coronary angiography was performed the next day and no abnormality was found. Finally, the patient agreed to received LBBP and signed the informed consent. During the process of withdrawing the Medtronic Model 3830 lead into sheath, we found the lead helix was wrapped around the chordae tendineae of the septal valve of tricuspid. Attempts to rotate the 3830 lead failed to release the lead helix from the chordae tendineae, and ultimately 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 resolve lead winding chordae.

Key Words: Pacemaker, Left bundle branch pacing; Lead; Tricuspid; Chordae tendineae; Radiofrequency ablation; Case report

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Core Tip: Radiofrequency ablation can be used to separate the lead helix from a wrapped chordae tendineae. This method helped our patient avoid a surgical procedure. The innovation of this novel technique is its use of a high concentration of saline (10% NaCl) to reduce impedance.

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INTRODUCTION

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].

In our experience with lead implantation of the Medtronic Model 3830 (Minneapolis, MN, United States), we encountered a problem. The pacing position was not ideal, and the intracardiac electrocardiogram (ECG) indicated Q waves in the inferior wall leads (II III AVF). Our aim was to adjust the lead position to get a good parameter. During the process of withdrawing the 3830 lead to sheath, however, we found the lead helix was wrapped around the chordae tendineae of the septal valve of tricuspid. We performed a right ventricular angiography immediately (Figure 1). We rotated the lead clockwise as well as counterclockwise, and in the meantime sent the 3830 lead forward as well as backward while adjusting the sheath tube forward for sending or withdrawal at different angles. After nearly 2 h of attempts, 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 the ablation catheter to the end of the 3830 lead (cathode ring). In this manner, the ablation catheter, the 3830 lead with the winding chordae tendineae, and the back electrode plate of the patient linked with the radiofrequency generator formed a closed current loop (Figure 2). Radiofrequency energy successfully transmitted to the tip of the 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 ohms to 300 ohms. But it failed to discharge, again because of the high impedance. Finally, a high concentration of saline (10% NaCl) was injected into the sheath of the electrode (Supplementary Figure 1) and the impedance was reduced from 300 ohms to 125 ohms. During the 3-s abatement, the lead helix successfully separated from the chordae tendineae.

We changed to a new Model 3830 electrode and successfully implanted it into the left bundle branch area, with good capture threshold and pacing pattern (Figure 3). After that, we performed a reexamination by ECG and discovered a mild regurgitation signal of tricuspid and pericardial effusion. The patient had no complaint of discomfort.

The pacemaker was programmed before the patient was discharged, and the pacing threshold, sense, and impedance were good. The patient was regularly followed up in the clinic and the pacemaker worked normally.

CASE PRESENTATION

Chief complaints

A 64-year-old man was admitted with a 24-h history of chest distress and shortness of breath. The patient had no symptoms of chest pain, dizziness, syncope, nausea nor vomiting.

History of present illness

Symptoms started 24 h before, with no reason. The patient was consequently sent to the Emergency Room of Aerospace Center Hospital, Peking University Aerospace School of Clinical Medicine.

History of past illness

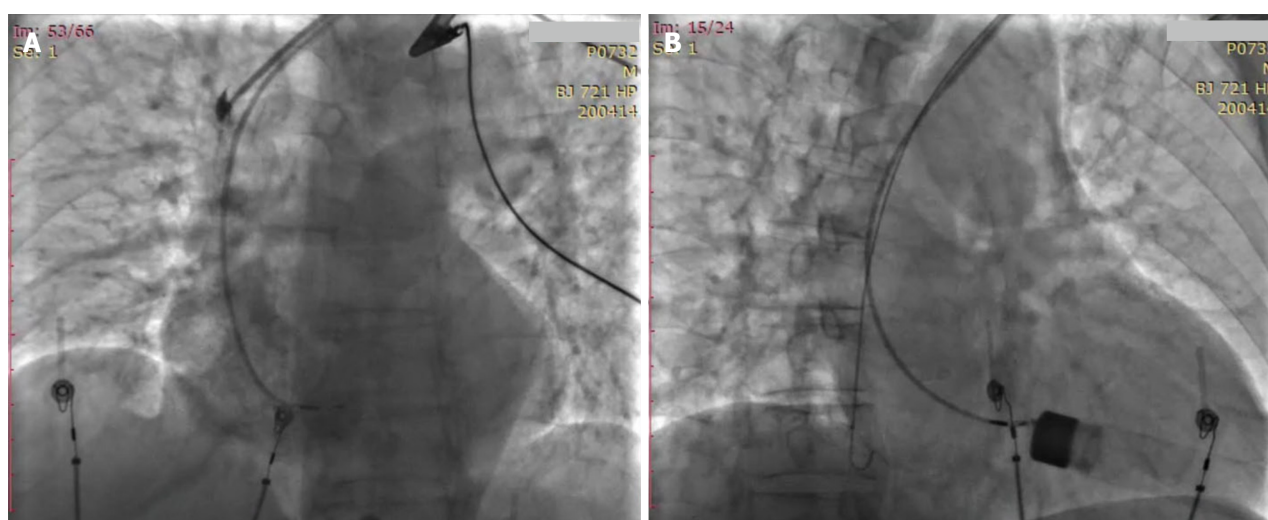
The patient had a 14-year history of hypertension. The highest blood pressure recorded was 150/90 mmHg. Valsartan was taken regularly and controlled the blood pressure well.

Personal and family history

The patient denied any family history of disease.

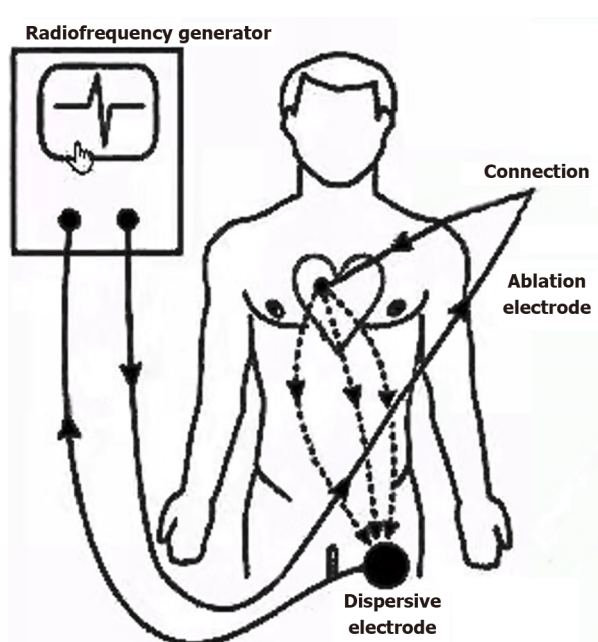
Physical examination

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



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Figure 1 Right ventricular angiography showed the lead helix wound with the chordae tendineae. A: LAO 30°; B: RAO 30°.



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Figure 2 Loop schematic diagram of the chordae tendineae was ablated by radiofrequency electricity through the tip of the Model 3830 lead (radiofrequency generator-ablation catheter-3830 lead tip-chordae tendineae-blood-heart-back electrode plate-radiofrequency generator).

Laboratory examinations

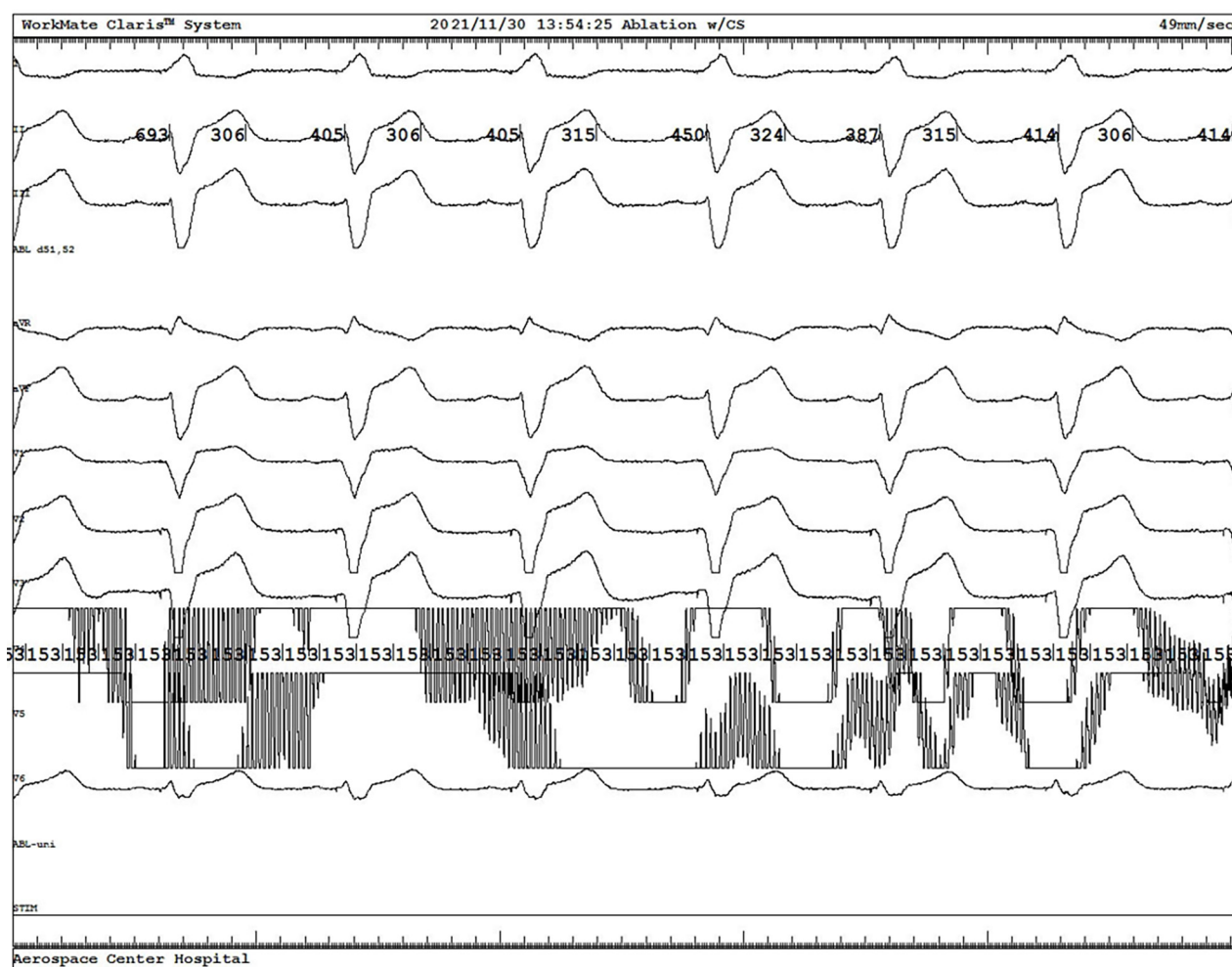
There was no abnormality in routine laboratory examinations made after admission.

Imaging examinations

Twelve-lead ECG presented a result of 2:1 atrioventricular block (AVB) (Supplementary Figure 2). Coronary angiography was performed the next day and no abnormality was found (Supplementary Figure 3).

FINAL DIAGNOSIS

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



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Figure 3 Intracardiac electrocardiogram of left bundle branch pacing.

TREATMENT

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

OUTCOME AND FOLLOW-UP

The patient was regularly followed up at the clinic. The patient had no symptoms of discomfort and an ECG was added (Supplementary Figure 4). The echocardiography showed mild tricuspid regurgitation (Supplementary Figure 5).

DISCUSSION

The present case involved a rare occurrence of a 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 solved this problem using a high concentration of saline (10% NaCl) to reduce the impedance according to Ohm's law[2] and the principles of radiofrequency ablation[3,4]. When the radiofrequency energy was sent to 3830 lead helixes, heat was generated to dehydrate and denature the wrapped chordae tendineae.

Since intracardiac echocardiography was unavailable in the catheter lab which may have shown the wrapping situation of the electrode tip and chordae tendineae, this could have helped to guide us and allow for visualization of a way to rotate the lead.

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

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

CONCLUSION

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

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FOOTNOTES

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