

# World Journal of *Clinical Cases*

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## Successful transcatheter arterial embolization treatment for chest wall haematoma following permanent pacemaker implantation: A case report

Jing Zheng, Xiao-Ming Tu, Zhen-Yan Gao

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**Jing Zheng, Xiao-Ming Tu, Zhen-Yan Gao**, Department of Cardiology, The Quzhou Affiliated Hospital of Wenzhou Medical University, Quzhou People's Hospital, Quzhou 324000, Zhejiang Province, China

**Corresponding author:** Zhen-Yan Gao, MBBS, Chief Physician, Department of Cardiology, The Quzhou Affiliated Hospital of Wenzhou Medical University, Quzhou People's Hospital, No. 100 Minjiang Avenue, Kecheng District, Quzhou 324000, Zhejiang Province, China.  
[gzy1033@126.com](mailto:gzy1033@126.com)

### Abstract

#### BACKGROUND

Haematoma is one of the main complications associated with pacemaker implantation. Pseudoaneurysm is a rare condition that is not easy to identify and is often overlooked.

#### CASE SUMMARY

A female patient diagnosed with high-grade atrioventricular block underwent permanent pacemaker implantation. During the operation, puncturing a small branch of the right subclavian artery developed into a pseudoaneurysm and resulted in further haematoma formation. Conventional treatment of compression haemostasis and haemostatic drugs was not effective. A series of timely transcatheter arterial embolizations avoided serious complications.

#### CONCLUSION

More possible conditions should be taken into consideration as haematoma is discovered, and timely treatment might prevent severe adverse events.

**Key Words:** Permanent pacemaker implantation; Haematoma; Pseudoaneurysm; Transcatheter arterial embolization; Case report

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**Core Tip:** Haematoma is one of the main complications of permanent pacemaker implantation. We report a case of patient with permanent pacemaker implantation that presented with a haematoma without the conventional presentation of a pocket haematoma. After further examination, the subclavian artery pseudoaneurysm caused by puncture was found. The haematoma was successfully relieved after transcatheter arterial embolization. This case is a rare clinical condition, and the haematoma occurring in this situation is often not easily detected in clinical practice and cannot be treated in a timely and effective manner. Clinicians are reminded that when haematoma-related manifestations occur after permanent pacemaker implantation, as more possibilities are considered, timely targeted treatment can avoid serious adverse events.

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## INTRODUCTION

Implantable permanent cardiac pacemakers are the main treatment for bradyarrhythmia[1]. Whereas pacemaker implantation is an invasive operation, strict management is required to ensure its safety and effectiveness. Previous studies have shown that pacemaker postoperative adverse events include pacemaker device-related adverse events and complications such as pocket haematoma, pocket infection, skin ulceration, and diaphragm irritation[2]. Haematoma is one of the main complications associated with pacemaker implantation, mainly refers to pocket haematoma. The WRAP-IT trial analysis concluded that the risk of haematoma from cardiac implantable electronic device was 2.2%, representing a greater than 11-fold risk of infection[3]. There are some relevant studies among Chinese people. Chen *et al*[4] reported the incidence of pacemaker haematoma as 7.2% by a retrospective investigation among 139 patients in Beijing Renaissance Hospital, far higher than foreign data.

We report a case of a pseudoaneurysm and haematoma following permanent pacemaker implantation due to puncturing a small branch of the right subclavian artery during the operation. This is different from the common pacemaker associated pocket haematoma. The clinical symptoms and signs are not typical and are not easily detected. A series of timely treatments in this case was performed to prevent serious complications.

## CASE PRESENTATION

### Chief complaints

A 56-year-old woman suffered tenderness and pain at the right armpit after permanent pacemaker implantation.

### History of present illness

The patient was admitted with repeated chest tightness and dizziness for more than 20 d. Routine laboratory examination on admission showed that routine blood, electrolyte, liver and kidney function and thyroid function were normal. Brain magnetic resonance imaging showed no abnormal appearance. The 24-h dynamic electrocardiogram monitoring results indicated sinus rhythm and grade II type II to high-grade atrioventricular block with a long RR interval of 4150 ms. This patient conformed with the indications of permanent pacemaker implantation. With the exception of contraindication, she underwent permanent pacemaker implantation smoothly. Approximately 3 h after the operation, she felt tenderness and pain at the right armpit.

### History of past illness

She had a history of hypertension for 6 years and took irbesartan 150 mg daily for a long time with good control of blood pressure.

### Physical examination

On physical examination, it was presumed that the tenderness was not obvious swelling with undulating sensation at the pacemaker pocket site but instead a local mass at the right armpit.



### Laboratory examinations

Additionally, haemoglobin decreased to 89 g/L from 113 g/L by routine blood tests.

### Imaging examinations

Ultrasonography showed an 11.0 cm × 5.0 cm haematoma under the right armpit, which was an unidentified source (Figure 1A). Computed tomography angiography (CTA) showed a pseudoaneurysm of a small branch of the right subclavian artery, and there was no obvious abnormality of the right subclavian artery and axillary artery. A mass under the right chest wall had mixed density and was considered a haematoma (Figure 1B and C).

Conservative treatment, including local package compression, haemostatic drugs, and blood transfusions, was unsatisfactory. The next day, subclavian artery angiography in the digital subtraction angiography room showed that the first branch of the right subclavian artery was a trefoil pseudoaneurysm (Figure 2A).

## FINAL DIAGNOSIS

This is a haematoma from complications of pseudoaneurysm due to axillary vein puncture during operation. The clinician considered the possible cause was accidental puncturing of a small branch of the right subclavian artery, which developed into a pseudoaneurysm and resulted in further haematoma formation.

## TREATMENT

Transcatheter arterial embolization by Onyx rubber was performed in the arterial aneurysm and distal vasculature (Figure 2B). Onyx rubber is a non-viscous embolic agent made from a mixture of ethylene-vinyl alcohol copolymer, dimethyl sulphoxide and tantalum powder[5]. It is a novel liquid embolism commonly used in the treatment of cerebrovascular diseases.

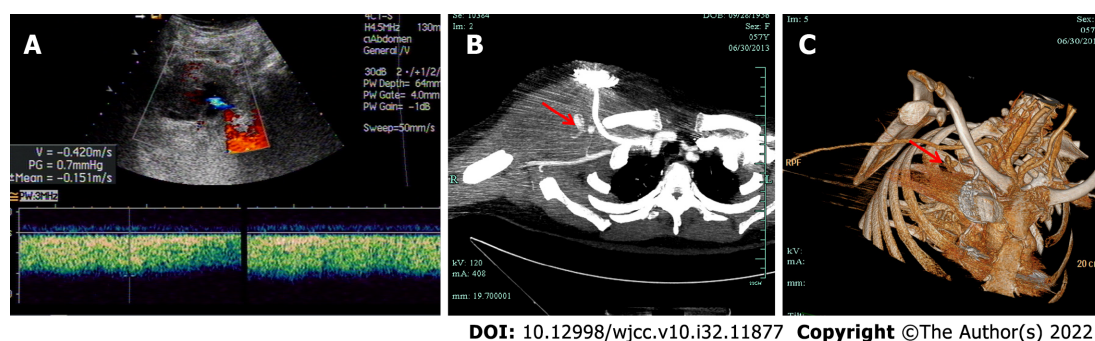
## OUTCOME AND FOLLOW-UP

After the operation, angiography showed no aneurysm in the right subclavian artery (Figure 2C). During the follow-up, ultrasonography showed that the haematoma was absorbed gradually.

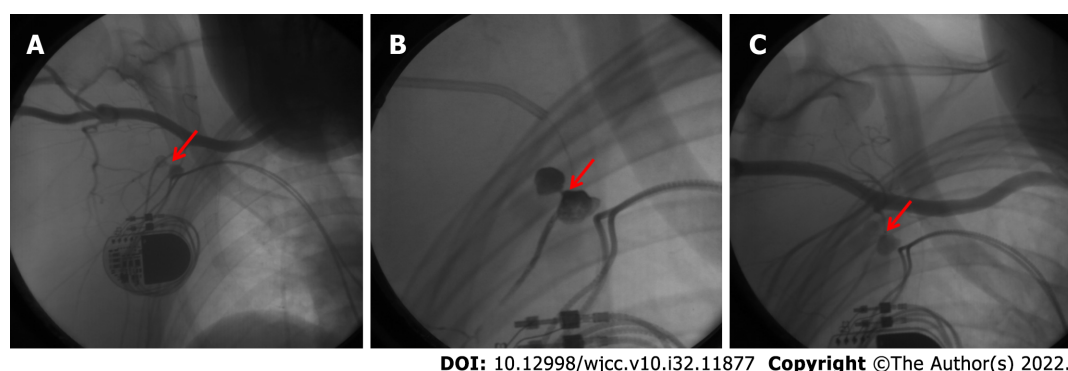
## DISCUSSION

Haematoma is one of the major complications following pacemaker implantation. However, pocket haematoma is mostly represented in previous studies, and other forms of haematoma are relatively rare [6,7]. Haematoma will increase the risk of pacemaker infection, and may affect the pacemaker function, resulting in serious consequences[8]. Previous studies stated that the reasons for haematoma are as follows: (1) Coagulation disorder, long-term prescription of anticoagulant/antiplatelet drugs preoperatively and self-disorder of coagulation may lead to bleeding[9-11]; (2) Individual factors, including old age, marasmus, and underlying diseases, are more likely to produce a “dead cavity” of the pacemaker pocket because of thinner subcutaneous tissue, which increases the risk of bleeding. Guo *et al* [12] reported that a BMI < 23 kg/m<sup>2</sup> was associated with a higher incidence of pocket haematoma; and (3) Intraoperation factors, including accidental injury of arterioles, venules and capillaries, incomplete haemostasis, oversize pocket, effective fixation of lead and insecure suture, may increase the risk of bleeding.

The chest wall haematoma in this case was not a common pocket haematoma. According to the results of ultrasonography and CTA, accidental injury of a small branch from the right subclavian artery is considered to be the reason for pseudoaneurysm. Pseudoaneurysm is a rare iatrogenic injury during pacemaker implantation, and only a few cases have been reported previously[13,14]. Pseudoaneurysms is a ruptured artery surrounded by unstable connective tissue containing a haematoma. The haematoma forms outside the arterial wall, so it is contained by the surrounding tissues, which is one of the complications of cardiovascular intervention. Untreated pseudoaneurysm may generate angiorrhesis, thromboembolism, local compression, tissue necrosis and even severe bleeding[15]. Therefore, it is essential to manage pseudoaneurysms in a timely, accurate and safe manner. More possible factors should be taken into consideration as haematoma is discovered in cases of severe adverse events.



**Figure 1 Imaging findings of the haematoma.** A: Ultrasonography showed a 11 cm × 5 cm haematoma under right armpit which was unidentified sources; B: Computed tomography angiography showed a small branch of right subclavian artery was rupture hemorrhage (showed as red arrow); and C: Three-dimensional computed tomography angiography showed a pseudoaneurysm (showed as red arrow) of the small branch of the right subclavian artery.



**Figure 2 Angiographic images of the pseudoaneurysm embolization operation.** A: A trefoil aneurysm (showed as red arrow) of the first branch from right subclavian artery before embolization; B: Transcatheter embolization by Onyx rubber in arterial aneurysm and distal vascular (showed as red arrow); and C: No residual aneurysm after embolization (red arrow pointed the original position of the aneurysm).

## CONCLUSION

Previous studies have shown that haematoma is one of the main complications following permanent pacemaker implantation, and most of them are pocket haematoma. As a relatively rare clinical condition, pseudoaneurysm is not easy to be detected due to its atypical symptoms and physical signs, which often leads to delayed treatment and serious adverse event. In this case, the haematoma caused by accidental injury to the subclavian artery branch was successfully treated by transcatheter arterial embolization and the prognosis was satisfactory. The aim of this case report is to remind clinicians to consider other rare conditions, including pseudoaneurysm, in addition to pocket haematoma, in the presence of suspected internal bleeding after pacemaker implantation.

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**Country/Territory of origin:** China

**ORCID number:** Jing Zheng 0000-0001-6983-3447; Xiao-Ming Tu 0000-0003-1148-9641; Zhen-Yan Gao 0000-0003-4496-7654.

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