

Subclavian Arterial Bleeding during Permanent Pacemaker Implantation: Clinical Case Report and Literature Review

Si Dung Chu^{1,2,3}, Giang Song Tran¹, Minh Thi Tran³, Thu Kim Thi Tran³

¹Vietnam National Heart Institute, Bach Mai Hospital, Hanoi, Vietnam

²Training and Direction of Healthcare Activities Center, Bach Mai Hospital, Hanoi, Vietnam

³Department of Internal Medicine, Vietnam University of Traditional Medicine, Hanoi, Vietnam

Email: sichu.bvbachmai@gmail.com

How to cite this paper: Chu, S.D., Tran, G.S., Tran, M.T. and Tran, T.K.T. (2023) Subclavian Arterial Bleeding during Permanent Pacemaker Implantation: Clinical Case Report and Literature Review. *Open Journal of Emergency Medicine*, 11, 180-185.
<https://doi.org/10.4236/ojem.2023.114018>

Received: September 26, 2023

Accepted: November 14, 2023

Published: November 17, 2023

Copyright © 2023 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Research objective: To study a clinical case that had a complication of subclavian artery bleeding during permanent pacemaker implantation process. **Subject and Method:** Clinical case report and literature review. Study of a patient had an indication for permanent pacemaker implantation who had complication of subclavian artery bleeding during the procedure. **Result:** An 84-year-old female patient was admitted to the hospital because of fainting spells with chest pain, on the background of dangerous complex arrhythmias and ischemic heart disease, and was prescribed a pacemaker for this patient. The patient had complication occurred during the procedure, which left subclavian artery bleeding was detected and treated promptly, a cardiac pacemaker was implanted on the right side of the chest, and the patient had a successful endovascular stent cover in the left subclavian artery. **Conclusion:** Subclavian artery bleeding is a rare complication in the procedure of permanent pacemaker implantation, but it can still occur and requires quick detection and timely treatment, needs to be successful in cardiac pacemaker placement and subclavian artery drug-eluting stent cover placement intervention. Individualized patient risk assessment is needed; appropriate and standardized intervention techniques and experience can reduce the occurrence of this variable.

Keywords

Complication, Subclavian Artery Bleeding, Permanent Pacemaker Implantation

1. Introduction

Subclavian artery bleeding is a serious complication of cardiovascular interven-

tional procedures that can lead to tracheal obstruction, hemothorax, respiratory failure, hemorrhagic shock, and death if not diagnosed early and timely treatment [1] [2]. Left subclavian artery bleeding is a rare complication of cardiac pacemaker implantation, when occurring, often causes life-threatening hemorrhage and must be carefully ruled out by physical examination as well as diagnosed by imaging through contrast dye on a brightening screen right during the intervention [1] [2] [3]. In recent years, with the technical developments and increasing experience of practitioners, treating this complication by endovascular stent placement has become the most convenient and effective treatment method [4].

2. Clinical Case

The female patient, 84 years old, was admitted to the hospital in early 2020 with fatigue and chest pain; The patient has a history of persistent atrial fibrillation, has been treated for thrombosis in the heart chamber, before being admitted to the hospital the patient had fainted, was admitted to an under level hospital and was diagnosed with atrial fibrillation, sustained ventricular tachycardia, and sinus node failure, the patient was assigned to have a screening angiogram with Unfractionated Heparin was used during the procedure. The results showed scattered atherosclerosis of the coronary artery system and dangerous complex arrhythmias, so she was referred to the Vietnam National Heart Institute, Bach Mai Hospital consider placing a pacemaker implantation. Blood test results were within normal limits with blood formula containing Red Blood Cells (RBC): 6.14 T/L, White Blood Cells (WBC): 7.9 G/L, Platelets (PLT): 214 G/L; Biochemical tests with Glucose: 5.4 mmol/L, Creatinine 89.2 μ mol/L, GOT/GPT: 33.2/65.5 U/L, INR: 1.01, Doppler echocardiography showed irregular heart rhythm during the ultrasound, heart function was still preserved EF 51%; The electrocardiogram showed sinus node insufficiency, atrial fibrillation, and sustained ventricular tachycardia (**Figure 1**), and permanent pacemaker implantation was indicated.

During the procedure, the patient was considered to have a puncture of the left subclavian vein. When the left pectoral muscle area was observed to swell rapidly and heavily, it was determined that there were signs of bleeding, so the patient was quickly treated with compression bandage on the left chest area. Therefore, the pacemaker placement was decided to be changed to implantation on the right side of the chest. The procedure to place the pacemaker on the right side of the chest was performed quickly and smoothly; During the intervention, we continued to observe that the left pectoral muscle area continued to swell rapidly. A left subclavian angiogram with contrast agent was performed under a light-enhancing screen and detected an image of contrast agent escaping from the artery. Left subclavian artery, therefore, the patient was determined to have perforation of the left subclavian artery thought to be related to complications of the initial procedure. To solve: The intervention team decided to proceed with

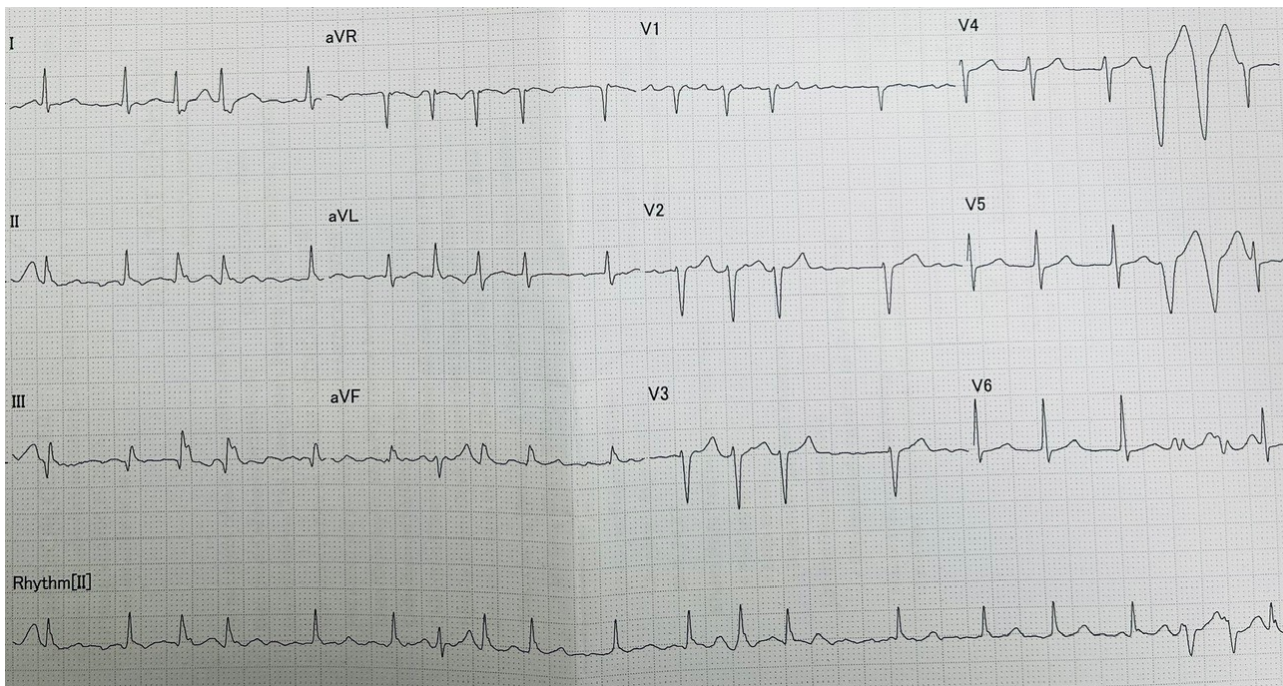


Figure 1. ECG before intervention.

placing a left subclavian artery stent cover to treat this artery perforation. The procedure went smoothly. At the same time, the patient received a red blood cell transfusion, dual antiplatelet medication, and monitoring. After 3 days of intervention, the angiogram showed a very small drug outlet position, and the pectoral muscle hematoma spread to the arm and left rib. In the following days, the patient was monitored for medical treatment, the hematoma area gradually stabilized and after 1 week of further monitoring (**Figure 2**), she was discharged from the hospital.

3. Discussion

Pacemaker implantation is a technique that has been successfully applied to treat patients with arrhythmias over the past few decades. It has been improved over the years to become more effective, safe and less expensive, avoiding cause the most disasters. Complications of puncture of the subclavian artery are also rare. The patient can be stable with normal compression bandages, but puncture of the subclavian artery causing a large level of pectoral hematoma requiring intervention is a rare complication. This patient did not have liver, kidney or coagulation dysfunction but was given unfractionated Heparin for coronary angiography before implantation (**Figure 1**); many times to access the subclavian veins due to difficult access and taking anticoagulants before implantation can be risk factors for this complication. As researched by Phuoc TT (2005) at the Vietnam National Heart Institute, there are 3, 9% of patients had subclavian artery puncture but it was mild and no cases of complications as above were recorded [3]. Research by Ellenbogen KA *et al.* (2002) noted that complications of

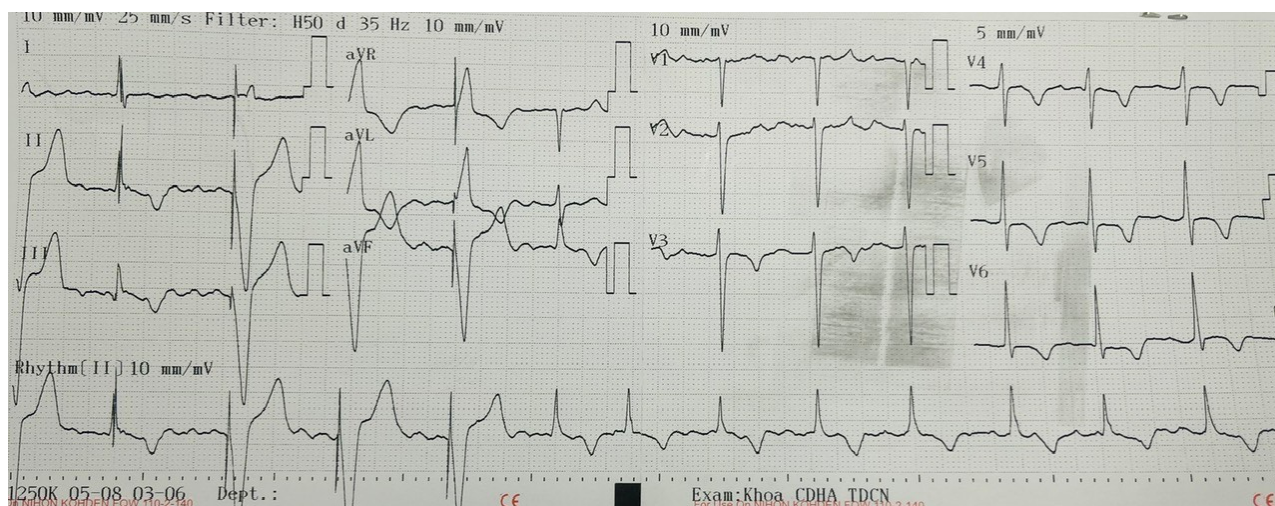


Figure 2. ECG after intervention.

heart perforation occur in less than 2% of cases but have not recorded any cases of complications of subclavian artery perforation. In general, this complication is quite rare [5]. Some other authors such as Kiviniemi MS *et al.* (1999) have shown that hematoma complications of pacemaker implantation are the most common (5%) with risk factors including the use of high doses of molecular weight heparin low, aspirin-clopidogrel combination and operator inexperience [6]. Res J CJ *et al.* (2004) reported iatrogenic pneumothorax after subclavian vein access as a rare complication with an incidence of 1% - 5%, which can be detected during the procedure. quickly and accurately on a contrast-enhanced screen, it is usually an immediate complication and is rarely seen after discharge. It is still routine and accurate to perform a chest X-ray as well as check ECG again after the procedure (Figure 2) [7]. Essoh E *et al.* (2010) said that risk factors for complications of pacemaker implantation procedures include obesity, female gender, elderly patients, mental illness...but no cases have been recorded with subclavian artery bleeding [8]. Studies Del Rio A *et al.* (2003), Klug D *et al.* (2007) also reported some main risk factors for complications after pacemaker implantation such as diabetes, old age, use of corticosteroids, re-intervention, and lack of experience in the patient undergoing the procedure; of course, in this study, there were no cases of subclavian artery perforation complications [9] [10].

In this clinical case study report, the patient was female, elderly, had coronary artery disease, before implantation had recently used heparin, and a few times to access the subclavian vein under difficult access. During the procedure, observe and promptly detect complications that may occur during the procedure. The intervention is very important, the physical examination of the upper limb must focus on skin color, swelling of tissues, temperature, sensation, hand movements as well as radial pulse, etc. Note, contrast agent under the screen Brightening is a quick, it was very important diagnostic test that helps diagnose some complications that may occur during intervention and it also helps support the successful implementation of methods to treat complications under the screen brightening

image. The assessment should identify individual patient risk and intervention procedures should be standardized and appropriate.

4. Conclusion

Subclavian artery bleeding is a life-threatening interventional complication that can occur during permanent pacemaker implantation procedures. During successful pacemaker implantation, quick recognition and timely treatment of complications that occur such as subclavian artery bleeding by placing a drug-eluting stent cover can significantly improve the prognosis for these patients. In addition, the need for individualized risk assessment of the patient and standardized and appropriate intervention procedures, experience can reduce the occurrence of vascular bleeding complications as above.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Assenza, M., Centonze, L., Valesini, L., *et al.* (2012) Traumatic Subclavian Arterial Rupture: A Case Report and Review of Literature. *World Journal of Emergency Surgery*, **7**, Article No. 18. <https://doi.org/10.1186/1749-7922-7-18>
- [2] Gulsin, G.S., Tagi, H., Azeem, T., *et al.* (2021) Subclavian Artery Perforation and Mediastinal Hematoma Following Transradial Percutaneous Coronary Intervention. *JACC: Case Reports*, **3**, 1206-1210. <https://doi.org/10.1016/j.jaccas.2021.05.009>
- [3] Phuoc, T.T. (2005) Research on Techniques and Hemodynamic Effects of Cardiac Pacemaker Implantation Method. Doctor of Medicine Thesis, Vietnam Military Medical University, Hanoi.
- [4] Abdool, M.A., Morrison, S. and Sullivan, H. (2013) Iatrogenic Perforation of Subclavian Artery as a Complication of Coronary Angiography from the Radial Route, Endovascularly Repaired with a Covered Stent-Graft. *BMJ Case Reports*, **76**, 1-2. <https://doi.org/10.1136/bcr-2012-007602>
- [5] Ellenbogen, K.A., Wood, M.A. and Shepard, R.K. (2002) Delayed Complications Following Pacemaker Implantation. *Pacing and Clinical Electrophysiology*, **25**, 1155-1158. <https://doi.org/10.1046/j.1460-9592.2002.01155.x>
- [6] Kiviniemi, M.S., Prines, M.A., Eränen, H.J., *et al.* (1999) Complications Related to Permanent Pacemaker Therapy. *Pacing and Clinical Electrophysiology*, **22**, 711-720. <https://doi.org/10.1111/j.1540-8159.1999.tb00534.x>
- [7] Res, J.C.J., De Priester, J.A., Van Lier, A.A., *et al.* (2004) Pneumothorax Resulting from Subclavian Puncture: A Complication of Permanent Pacemaker Lead Implantation. *Netherlands Heart Journal*, **12**, 101-105.
- [8] Essoh, E., Badot, D., Marcovitch, O., *et al.* (2010) Docteur, j'ai le hoquet à l'épaule! Une cause rare de dysfonctionnement d'un défibrillateur implantable. *Louvain Médical*, **129**, 237-240.
- [9] Del Rio, A., Anguera, I., Miró, J.M., *et al.* (2003) Surgical Treatment of Pacemaker and Defibrillator Leads Endocarditis: The Impact of Electrode Lead Extraction on Outcome. *Chest*, **124**, 1451-1459. <https://doi.org/10.1378/chest.124.4.1451>

- [10] Klug, D., Balde, M., Pavin, D., *et al.* (2007) Risk Factors Related to Infections of Implanted Pacemakers and Cardioverter-Defibrillators: Results of a Large Prospective Study. *Circulation*, **116**, 1349-1355.
<https://doi.org/10.1161/CIRCULATIONAHA.106.678664>