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Late pacemaker perforation of the right ventricle. A case report and review of diagnosis and management

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Abstract

***Objectives*: Pacemaker incidence and prevalence are on the rise over the last decade especially in the elderly population. Though complications are rare, most reported literature is about early pacemaker complication. Late complications are also reported, but mostly regarding malfunction or infections. Very few case reports and series report late cardiac perforations which could be catastrophic. We report a case of late cardiac perforation diagnosed and treated in our institution to raise the awareness of this very serious complication.**

***Case summary*: A 65-year-old male who had a single chamber right ventricular pacemaker inserted two months earlier for sick sinus syndrome, presented to the hospital with complaint of shortness of breath. Chest X-ray (CXR) revealed new large left sided pleural effusions. Computed tomography (CT) scan of the chest suggested migration of the pacemaker lead with perforation of the right ventricle associated with hemothorax with no pericardial effusions. A bedside echo confirmed the perforation and showed minimal pericardial effusions with no cardiac tamponade. Clinically patient was hemodynamically stable. He underwent open surgical repair and placement of epicardial pacer leads.**

***Conclusions*: Clinicians should be aware of the early and late complications of pacemaker insertions and how to diagnose and treat them appropriately to avoid unnecessary morbidity or mortality.**

Key words: Cardiac perforation, hemothorax, cardiac tamponade.

Case summary

A 65-year-old male who had a single chamber right ventricular pacemaker inserted two months earlier for sick sinus syndrome, presented to the hospital with complaint of shortness of breath. Chest X-ray (CXR) revealed new large left sided pleural effusions. Computed tomography (CT) scan of the chest suggested migration of the pacemaker lead with perforation of the right ventricle (**Figure 1**) associated with hemothorax with no pericardial effusions. A bedside echo confirmed the perforation and showed minimal pericardial effusions with no cardiac tamponade. Clinically patient was hemodynamically stable. He underwent open surgical repair and placement of epicardial pacer leads (**Figure 2**).

Clinicians should be aware of the early and late complications of pacemaker insertions to avoid unnecessary morbidity or mortality.

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Discussion

Cardiac pacemakers are a proven therapy for cardiac conduction disturbances and many arrhythmias. Despite their lifesaving benefits, they are associated with number of complications that can be fatal. (1) Complications can be subdivided into acute, subacute, chronic, or early (within first months), and late (after first month). (2) **Table 1** summarizes the potential complications of pacemakers.

Pacemaker associated myocardial perforations are rare with reported overall lead perforation rates after pacemaker implantation to be 0.1-0.8%. (3) Majority of those cases occur early within 24 hours after implantation, late cases are even rarer. (4)
Symptoms can include chest pain, shortness of breath, syncope, abdominal pain, hiccups, but sometimes asymptomatic. (5) Hemothorax, pneumothorax, or cardiac tamponade are rare. Pacemaker malfunction can be the only reported indication of perforation. (1,5) Risk factors for perforation are summarized in **Table 2**. (1,5)
CXR, CT scan, or echocardiogram can confirm the diagnosis. CT is considered the gold standard in diagnosis. (1,6)
Management depends mainly on the patient's clinical condition. Guidelines for management were published by the Heart Rhythm Society (HRS) in 2009, and recently updated in 2017. Most experts recommend whole device and lead extraction. Percutaneous extraction, versus open surgical extraction, and repair are valid options. The procedure should occur in a centre specializing in percutaneous lead extraction either direct traction or percutaneous lead extraction in the operating room, in presence of cardiosurgical, anaesthesiological and echocardiographic teams. (7-10)

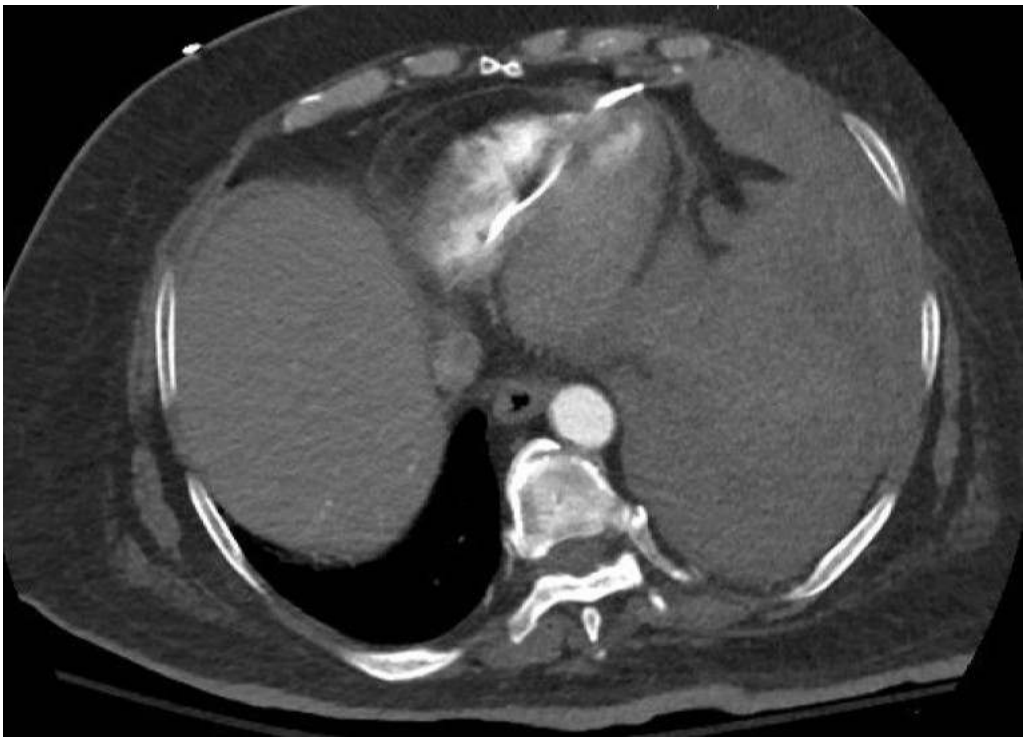
Table 1. Common early and late complications of pacemaker insertion

Early	Late
Pneumothorax	Venous thromboembolism
Hemothorax	Infection
Air embolism	Twiddler syndrome
Cardiac perforation and tamponade	Cardiac perforation and tamponade
Coronary sinus dissection	Pacemaker syndrome
Pocket hematoma	Pacemaker-mediated arrhythmias
Lead dislodgment	Runaway pacemaker
Infection (pocket, sepsis)	Lead failure
Loose set screws	Pacemaker malfunction
Diaphragmatic stimulation	Electromagnetic interference

Table 2. Risk factors for pacemaker perforation

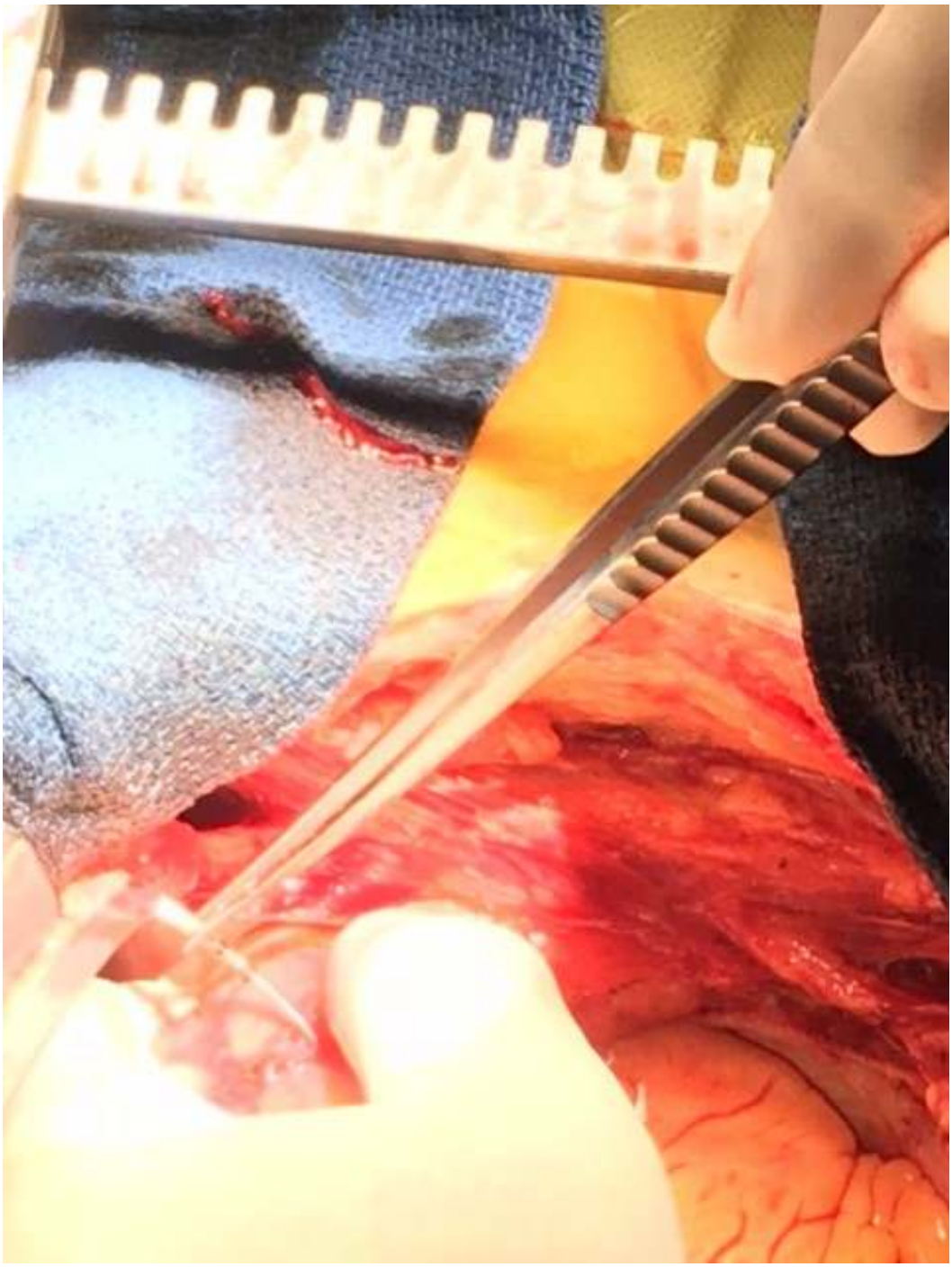
Lead property - Temporary stimulation - Atrial leads - Active fixation
Cardiac muscle - Dilated cardiomyopathy
Patient characteristics - Elderly - Female gender - Low body mass index
Medications - Anticoagulation - Steroids
Chest trauma

Figure 1. CT scan of the chest showing migration of the pacemaker lead out of the right ventricle towards the chest wall associated with large right sided hemothorax



Legend: CT=computed tomography.

Figure 2. Picture of the pacemaker lead perforating the right ventricle apex during surgical extraction and repair



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