Case Report

LEAD INDUCED RIGHT VENTRICULAR PERFORATION – A RARE CASE REPORT

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ABSTRACT

Cardiac perforation is a known complication of device implantation. It is an under-recognized complication with significant morbidity and mortality, particularly if not recognized early. We report a case of subacute right ventricular perforation caused by passive-fixation lead 12 days after implantation which was successfully managed by pulling back and repositioning the same lead under local anaesthesia ,without transvenous lead extraction or surgery. Early recognition of this complication is important as the indications for and numbers of patients who receive cardiac implantable electronic devices continue to increase.

Keywords: pacemaker lead, perforation, right ventricle

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INTRODUCTION

Perforation of the right ventricle (RV) is a rare but serious complication of permanent pacemaker and implantable cardioverter-defibrillator implantation, with a prevalence rate of 0.1–6% [1].The prevalence is probably underestimated in many studies as some patients with this complication may be completely asymptomatic. CT evaluation of patients has shown a prevalence of 6% and is the modality of choice [2].

CASE REPORT:

A 73 year old hypertensive Asian man presented to the emergency room with one episode of pre-syncope lasting for a few seconds and stable vital signs. His baseline ECG showed left ventricular strain pattern. Biochemical labs and cardiac biomarkers were in the normal range. Carotid Doppler showed normal bilateral carotid velocities with no evidence of atheroma. Transthoracic echocardiogram revealed good biventricular systolic function with mild concentric LVH.

He was admitted to the cardiology ward and his 24-hour Holter monitoring was done which showed normal sinus rhythm with occasional supraventricular and ventricular beat. Significant pauses were noted, the longest being 4.760 seconds. The minimum heart rate recorded was 16bpm. No ventricular tachycardia or ventricular fibrillation was noted. His coronary angiogram showed ectatic vessels with no evidence of coronary obstructive disease.

He was implanted with single chamber Medtronic SENSIA SESR01 permanent pacemaker with R wave amplitude 5.0 mv, Pacing threshold 1.0v @ 0.50ms, Impedance 533 ohms@ 5.0v. His clinical course remained uneventful post implantation (Figure1) and he was discharged home.

He was re admitted 5 days later with the complaints of epigastric fullness and early satiety. He was vitally stable. His follow up echo showed large pericardial effusion all around the heart, maximum 2.73 cm. His ECG showed normal paced rhythm with heart rate of 60bpm. Pacemaker interrogation showed complete loss of sense and capture at the ventricular lead. He was immediately taken to the cath lab for fluoroscopy which led to a suspicion about his lead position. Multi-slice Chest CT showed free floating RV lead end in the pericardial space (Figure 2). Pericardial tap was done and 500 ml of hemorrhagic fluid was withdrawn with an additional 700 ml drained over 2 days.

After discussion with a team of cardiologists and cardiac surgeon, it was decided to reposition the lead and monitor progress. With cardiac surgery back up, the ventricular lead was pulled back and readjusted at another place near RVOT with optimal pacing parameters including normal lead impedance. Post-procedure echocardiogram confirmed only a thin rim of pericardial effusion. Following that the clinical course was uneventful. The patient was discharged home after 48h.

DISCUSSION:

Pacemaker lead ventricular perforation is a potentially life-threatening complication. It happens when the leads are inserted into the myocardial wall and is most common with the use of active fixation leads [3] due to thickness and over rotation. [4] The incidence of perforation is decreased when the lead is placed on the septal wall or in the RV outflow tract where the wall is thicker as opposed to the right ventricular wall or the apex where the myocardium is thinner.[5]

Myocardial perforations are divided into acute, subacute and delayed.[6] Acute perforations occur within 24h of lead placement [6]. Subacute perforations occur within 5–29 days [6] and delayed perforations occur more than 30days after placement. [7] The common complications are ecchymosis, haematoma at the incision site and chest discomfort, but these are usually short-lived. Cardiac tamponade, hemopericardium, pneumothorax or

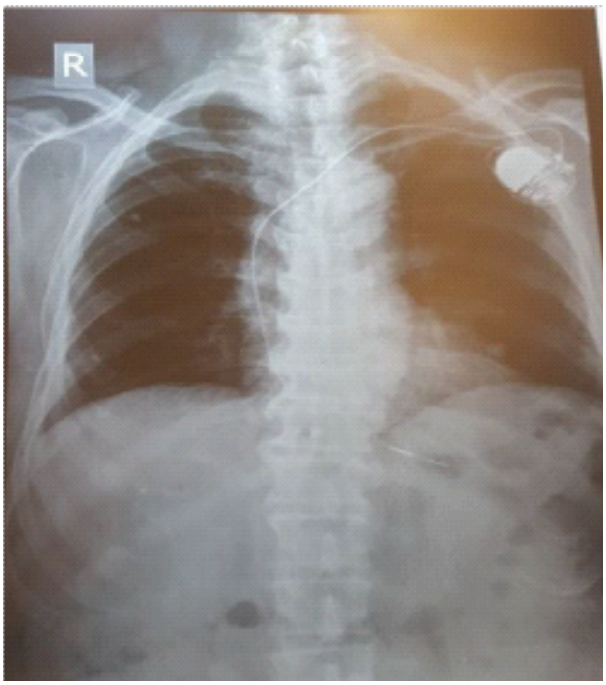

Figure 1 Chest X ray PA view post pacemaker implantation.

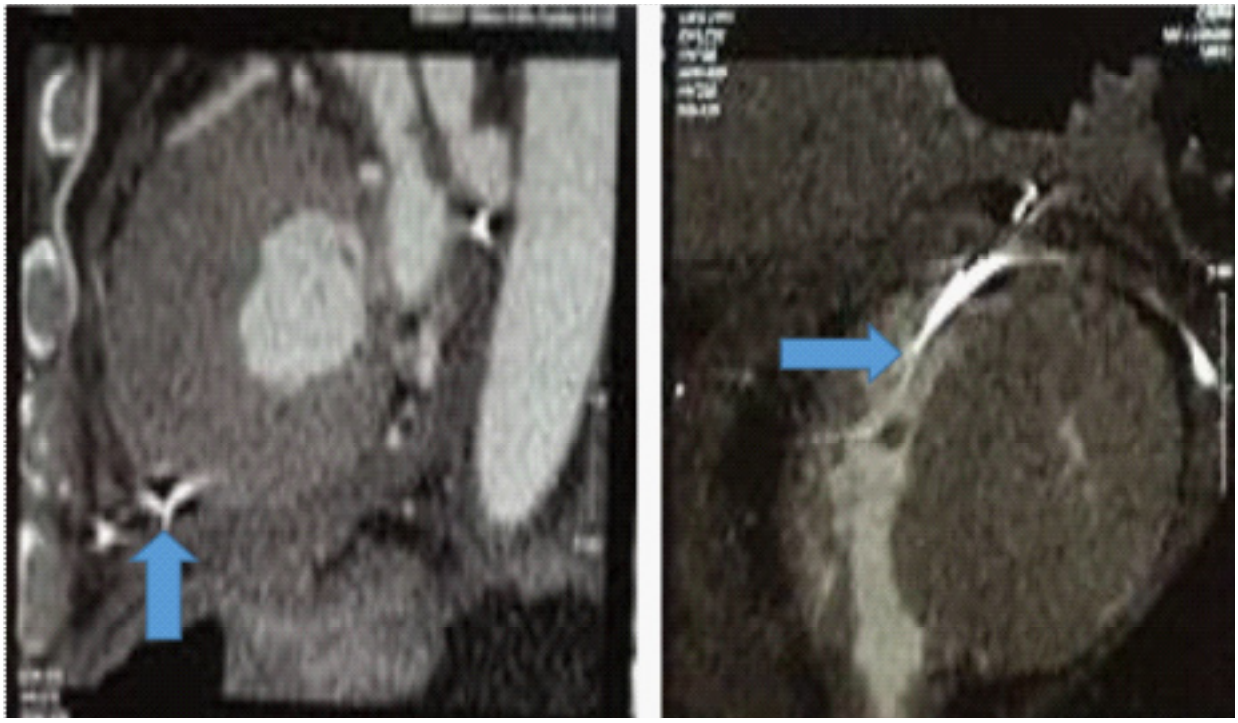

Figure-2: Multi slice chest CT showing the displaced lead in the pericardial space

hemothorax, or diaphragmatic or pectoral stimulation are more serious complications [8]. Pacemaker interrogation, ECG, Chest X-ray, echocardiography and non contrast chest CT can confirm the perforation[1] by indirect evidence of the presence of pericardial or pleural effusion or by revealing the lead position beyond the cardiac silhouette [9]. Perforation is not excluded by normal impedance and pacing parameters.[7,8] The clinical predictors of late cardiac perforation after pacemaker implantation include concomitant transvenous pacing, steroids within 7days, older age, active fixation leads, (BMI) <20, anticoagulation therapy and female gender[9]. Right ventricular pressure of > 35mmHg is associated with a lower incidence of perforation due to RV hypertrophy[10] Subacute and delayed perforations are thought to be increasing due to the increased flexibility of leads which cause increased force per unit of area on the wall of the ventricle[5] and this in addition to the patient's old age seems to be the likely cause in our case.

Repositioning of the lead has been done in some of the cases reported in literature.[8] American guidelines recommend surgical removal of the lead.[11,12] The duration of time elapsed since implant increases the challenges of repositioning a previously implanted lead due to fibrotic adhesions.[8] In acute ventricular perforations, the lead can be repositioned and followed with serial echocardiograms to monitor resolution of perforation and to detect deterioration that would require immediate intervention.[7]

In the subacute and delayed perforations, if there is no bleeding in the mediastinum, the lead can be left in place and another lead is placed in for use. If there is evidence of bleeding within or outside of the mediastinum, the lead must be extracted.[13] While tamponade following extraction of a perforated lead has been reported, it is relatively uncommon and is associated with raised international normalized ratio.[2] This has led to a hypothesis on the 'self sealing' properties of the myocardium, whereby bleeding onto the pericardium is prevented even when the defect is exposed.[2] The active fixation leads can be removed transvenously under visualization. The passive fixation leads can cause damage with transvenous extraction due to bulky tips. The recommended method of removal involves cardiothoracic surgery, cutting the tip and the lead body being removed transvenously.[14]

This case is a good example of a patient with passive fixation lead perforation 12 days post implantation managed by lead readjustment under local anaesthesia, without hemodynamic compromise of the patient. A potentially serious complication can be appropriately managed by

clinical vigilance of the cardiologist.

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