A rare case of late right ventricular perforation by a passive-fixation permanent pacemaker lead

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The present paper is an interesting and rare complication of implantation of a permanent pacemaker lead. The rarity of the case is based upon that ventricular perforation is usually present during implantation, whereas in our case, it was presented late—1 month after implantation. Furthermore, in our case, the pacemaker lead had migrated through the left hemidiaphragm into the peritoneal cavity.

Case report

An 84-year-old woman with a history of syncopal attacks was referred to our Cardiology Department for complete atrioventricular block. A dual-chamber DDDR permanent pacemaker implantation was performed. A 53 cm passive fixation ventricular lead (St Jude) was inserted via the left subclavian vein approach and positioned at the right ventricular (RV) apex without any complications. One day post-implant, chest X-ray showed the pacemaker lead in place within the RV with appropriate slack (Figure 1A, arrow). Pacemaker parameters were satisfactory, and the patient was discharged well 2 days later.

Five weeks after implantation, the patient presented to the emergency room for exertional fatigue, dyspnoea, and involuntary muscle contractions and twitching pain of the left hemidiaphragm. The ECG revealed complete atrioventricular block with atrial sense but loss of ventricular sense and capture. The patient denied manipulation of or trauma over the pacemaker area. The chest X-ray showed that the ventricular lead had migrated below the lower hemidiaphragm in closer proximity to the stomach and also the development of a small left-sided pleural effusion (Figure 1B, arrow). Echocardiogram showed the lead penetrating through the RV apex myocardium, with no evidence of pericardial effusion. Upon interrogation, complete loss of sense and capture was found at the ventricular lead. Subsequent computed tomography revealed that the electrode had perforated the RV myocardium, the pericardial cavity, and across the diaphragm had reached the abdominal wall, in contact with stomach (Figure 1C, arrow). The patient was operated under general anaesthesia. The lead's tip was easily found and transected through a sternotomy. The proximal part of the lead was then dissected-free and the lead easily explanted (Figure 1D: white arrow, lead; black arrow, temporary epicardial pacemaker wires). Following, a DDD epicardial pacemaker was successfully implanted. Post-operation course was uneventful.

Discussion

According to the literature, lead perforation is a relative rare complication of device implantation varying between 0.3 and 1%, although prevalence may be higher.¹ It typically occurs at the time of implantation or during the first 24 h (acute perforation), which represent the majority of cases.¹ Delayed lead perforations, those diagnosed later than 1 month after implantation, are believed to be very rare.² Most of the cases are associated with the use of active-fixation leads and also perforation of atrial wall is more common than that of ventricular wall.¹

The clinical presentation of delayed lead cardiac perforations varies widely: totally asymptomatic, chest pain, pneumothorax, and haemopneumothorax.²³ In contrast to acute cases, cardiac tamponade or death is scarcely associated with late cardiac perforations.²³ Simple imaging studies such as chest X-ray or echocardiography should confirm the diagnosis, although chest computed tomography is necessary to delineate the path and locate tip position.²³

Clinical predictors of cardiac perforation after pacemaker implantation are use of active fixation ventricular leads, body mass index <20, older age, use of temporary pacemaker, and steroids.² Septal or apical positioning of the pacemaker lead as well as the degree of slack on the ventricular lead may have an effect on the risk of perforation.²

Clinical vigilance by implanting physicians is important for this rare but serious complication.
Conflict of interest: none declared.

References

Figure 1 (A) One day post-implant, chest X-ray showing the pacemaker lead in place within the right ventricle with appropriate slack. (B) Admission chest X-ray showing that the ventricular lead had migrated below the lower hemidiaphragm in closer proximity to the stomach. (C) Computed tomography showing that the electrode had perforated the right ventricular myocardium, the pericardial cavity, and across the diaphragm had reached the abdominal wall, in contact with stomach. (D) Photograph from the sternotomy showing the lead’s tip penetrating the heart wall.