International Journal of Cardiology 177 (2014) 560–563

Contents lists available at ScienceDirect

International Journal of Cardiology

journal homepage: www.elsevier.com/locate/ijcard

Letter to the Editor

Intravascular recovery of electrode fragments as a possible complication of transvenous removal intervention

Giuseppe Mario Calvagna *, Salvatore Patanè

Cardiologia Ospedale San Vincenzo — Taormina (Me) Azienda Sanitaria Provinciale di Messina, 98039 Taormina, Messina, Italy

ARTICLE INFO

Article history:
Received 17 August 2014
Accepted 18 August 2014
Available online 23 August 2014

Keywords:
Endocarditis
Extraction
Implantable defibrillator
Lead
Pacemaker

The use of implantable cardiac devices has increased in the last 30 years. The evolution of devices in serious cardiac rhythm pathology management has led progressively to the development of devices for the treatment of bradycardia, ventricular arrhythmia, and heart failure and for the prevention of sudden cardiac arrest leading to the delivery of pacemakers, implantable cardioverter defibrillators (ICD) and cardiac resynchronization therapy (CRT) plus ICD (CRT-D) [1–22] and to the recent subcutaneous implantable cardioverter-defibrillator (S-ICD) [23–25]. Infectious complications leading also to endocarditis [1,8,26–33] and non-infectious complications [9,21,23,34–37] often necessitating removal [1,2,8,37–43] affects patients wellbeing also leading to psychological difficulties increase [23,44–50]. In addition, the improved patients' survival with the burden of concomitant diseases [51–71], the progressively younger implanted population and the increase in device and procedure complexity have raised the risk of system component structural failures [51–71]. Lead extraction is being the cornerstone of the modern clinical cardiac electrophysiology as well as efficacious cardiac device implantation and management. Since 2002, our institution [(Cardiologia Ospedale San Vincenzo — Taormina (Me) Azienda Sanitaria Provinciale di Messina, 98039 Taormina (Messina), Italy)] has been a referral center in Sicily for PM and ICD lead extraction, using Bongiorni's multiple entry-site approach [72] and non-powered sheats [40]. We describe a case of a 59 year old male with a dual-chamber pacemaker implanted in 2002 and positioned in the right pre-pectoral region. He was admitted to the hospital with severe septic conditions and with a pocket erosion. He presented evidence of local inflammation with partial lead decubitus and fever. After an exclusion of other septic infection sources, a transesophageal echocardiography showed no vegetations along the entire course of leads. A surgical treatment of the infection was recommended via removal of the entire transvenous cardiac system (can and leads). Previously the patient had been hospitalized three times for sepsis and an attempt to remove the pacing system. In July 2009 and 2010, the patient was hospitalized twice for severe pocket sepsis and a surgical pocket courrettage was performed with only a pacemaker replacement. In January 2011 the patient presented signs of a new pocket sepsis and an intervention of surgical removal of the leads was attempted. One of the leads during the procedure remained abandoned in the venous track between the subclavian vein and the superior cava vein. The proximal fragment of the abandoned lead was fixed to the right pectoral muscle. We proceeded to remove the entire transvenous pacemaker system. First the subcutaneous pocket was opened and the port disconnected, then we treated the necrotic by a courrettage with electrocautery and subsequent washing of the infected area with saline solution. Finally we released the leads from fibrotic and calcific adhesions to the entrance of the right subclavian vein. We used different dilatator heats of sizes ranging between 7.0 and 16 (Byrd) to release and remove the leads from the intravascular fibrotic adhesions. First we removed the abandoned one and then we tried to extract the atrial and ventricular leads but they fractured at distal level. After this failed attempt, the proximal fragment of the two leads was removed and we proceeded to the recovery of the distal fragments by intravascular percutaneous transvenous approach. The distal end of the atrial lead wire of about 3 cm was the first fragment. It was recovered using a loop catheter of 120 cm and a diameter of 6 Fr. with a loop of 12 mm and aperture of 90° (Meditalia). The extraction was difficult due to the limited flexibility, strong rigidity and frayed edges of this lead portion. This fragment was removed via the right femoral vein by surgical incision to avoid possible serious injury by ripping due to severe stiffness. The second fragment migrated into a branch of the left pulmonary artery at the top of the left lung (Fig. 1 panel A). After a cannulation of the left femoral vein through a valved introducer 12 Fr, we reached the second fragment through different guiding catheters (Terumo and Pig Tail) and contrast liquid was used to highlight the vessel lumen. This portion of the lead was removed using a catheter Loop (Meditalia) via the left femoral vein (Fig. 2 panel B). This fragment because of its particular flexibility was removed through the venous valved introducer 12 Fr previously placed in the left femoral vein (Fig. 2 panels C and D). The end of all three distal parts removed was sent to the laboratory and about 72 h

* Corresponding author. Tel.: +39 3474800260.
E-mail address: gicalvagna@tiscali.it (G.M. Calvagna).

http://dx.doi.org/10.1016/j.ijcard.2014.08.115

Fig. 1. Panel A — Pocket erosion, cutaneous septic conditions and leads decubitus. Panel B — A lead fragment removed.

after the removal procedure we proceeded to a new implant of VVIR PM in the opposite side. Clinical practice has always needed for lead extraction, but never more so than now [72,73]. The growing implanted system complexity appears associated with a rapid increase of patients needing implantation and also with a rapid increase of patients needing extraction [72,73]. Despite the progress of science, lead extraction remains a worldwide challenging procedure [72–79].

Conflict of interest

None declared.

Acknowledgments

The authors of this manuscript have certified that they adhere to the statement of ethical publishing as appears in International Journal of Cardiology [79]

Giuseppe Mario Calvagna wrote the manuscript and prepared the references; *Salvatore Patanè* assembled the figures and wrote figure legends.

References

[1] Calvagna GM, Patanè S. Severe staphylococcal sepsis in patient with permanent pacemaker. Int J Cardiol 2014 Apr 1;172(3):e498–501.
[2] Ward C, Henderson S, Metcalfe NH. A short history on pacemakers. Int J Cardiol 2013 Nov 15;169(4):244–8.
[3] Schulman PM, Rozner MA, Sera V, Stecker EC. Patients with pacemaker or implantable cardioverter-defibrillator. Med Clin N Am 2013 Nov;97(6):1051–75 [Review].
[4] Toutouzas K, Synetos A, Tousoulis D, et al. Predictors for permanent pacemaker implantation after core valve implantation in patients without preexisting ECG conduction disturbances: the role of a new echocardiographic index. Int J Cardiol 2014 Apr 1;172(3):601–3.
[5] Giugno V, Messina F, Crosca S. Treatment failure of low molecular weight heparin bridging therapy after implantation of a permanent pacemaker. Int J Cardiol 2014 May 15;173(3):e23–4.
[6] Joung YH. Development of implantable medical devices: from an engineering perspective. Int Neurourol J 2013 Sep;17(3):98–106 [Review].
[7] Aizawa Y, Takatsuki S, Negishi M, et al. Clinical characteristics of atrial fibrillation detected by implanted devices and its association with ICD therapy. Int J Cardiol 2014 Apr 1;172(3):e529–30.
[8] Scarano M, Pezzuoli F, Torrisi G, Calvagna GM, Patanè S. Cardiovascular implantable electronic devices infective endocarditis. Int J Cardiol 2014 May 15;173(3):e38–9.
[9] Ahmed S, Ungprasert P, Srivali N, Ratanapo S, Cheungpasitporn W, Chongnarungsin D. Lead perforation: an uncommon cause of chest pain in a patient with pacemaker. Int J Cardiol 2013 Sep 1;167(5):e113–4.
[10] Van Galen KP, van Dijk J, Regelink JC, Huijgens PC, Minnema MC, Zweegman S. Implantable defibrillators in cardiac amyloidosis. Int J Cardiol 2013 May 10;165(2):371–3.
[11] Fang F, Zhang Q, Chan JY, et al. Early pacing-induced systolic dyssynchrony is a strong predictor of left ventricular adverse remodeling: analysis from the Pacing to Avoid Cardiac Enlargement (PACE) trial. Int J Cardiol 2013 Sep 30;168(2):723–8.
[12] Sairaku A, Yoshida Y, Nakano Y, Kihara Y. Ablation of atrial fibrillation in Brugada syndrome patients with an implantable cardioverter defibrillator to prevent

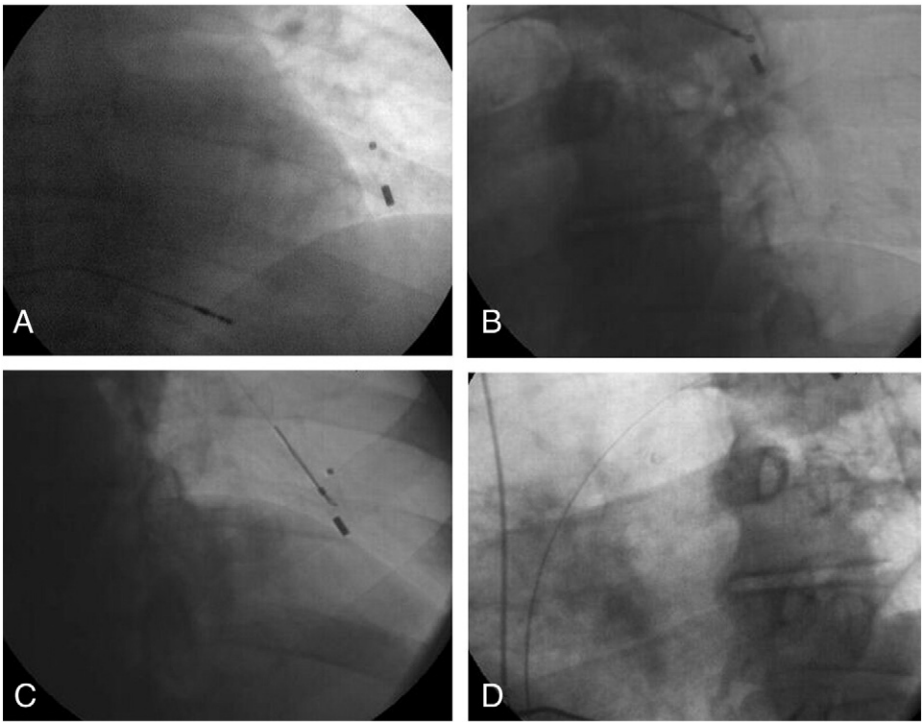

Fig. 2. Panel — A Fragment located in the left pulmonary artery. Panel B — Capture of the fragment by using a loop catheter. Panel C — Guide placement in the left pulmonary artery. Panel D — Removal through the venous valved introducer.