Clin Res Cardiol (2015) 104:450–452
DOI 10.1007/s00392-015-0813-8

LETTER TO THE EDITORS

Successful emergency ablation of ventricular tachycardia in the early postoperative period after left ventricular assist device implantation

Nandor Szegedi · Gabor Szeplaki · Bela Merkely · Laszlo Geller

Received: 2 November 2014 / Accepted: 13 January 2015 / Published online: 22 January 2015

Sirs:

A case of a 38-year-old male patient is reported. Left ventricular assist device was implanted because of end stage heart failure. In the early postoperative period, electrical storm with rapid ventricular tachycardia (VTs) occurred that was refractory to medical therapy. Emergency VT ablation was performed successfully. VT frequently occurs after LVAD implantation and radiofrequency ablation can be an effective therapeutic option.

We report a case of a 38-year-old male patient, who suffered an extensive anterior ST-segment elevation myocardial infarction in 2002 treated with thrombolysis. LAD PCI (2005), amiodarone-induced hyperthyreosis (2007) and primary prophylactic ICD implantation (2008) are the most relevant findings in his past medical history. Since then he required several hospitalizations for worsening heart failure symptoms. In May 2013, he was admitted due to rapid VT causing hemodynamic instability requiring two appropriate ICD shocks. Heart transplantation was considered as an option but it was contraindicated because of high pulmonary vascular resistance refractory to vasodilator therapy. Left ventricular assist device (LVAD, HeartMate II) implantation was performed as "destination therapy". In the early postoperative period (5 days after implantation) electrical storm occurred requiring multiple ICD shocks. Shock therapy of ICD was deactivated and multiple external electric cardioversions were needed despite the intravenous administration of high dose antiarrhythmic drugs (amiodarone, procainamide and beta blocker). Due to drug refractory electrical storm radiofrequency ablation of the incessant VT was decided in the early postoperative period. Procedure was performed under uninterrupted anticoagulation, respecting the high thromboembolic risk of the assist device. We decided to use transaortic retrograde approach only. During the electrophysiological study sustained monomorphic VT was inducible (cycle length: 330 ms, superior axis, right bundle branch block morphology). During ongoing arrhythmia, rapid electroanatomic mapping (CARTO3, Biosense Webster) was performed which found that the site of earliest activation is at the inferoseptal region of the left ventricle, in the intrinsic myocardial scar near to the junction of the inflow cannula. The exit point was also identified at the same site with entrainment mapping. Then 5 radiofrequency ablations were applied (total ablation time 790 s, energy 40 W, temperature 43 °C) using 3.5 mm irrigated tip catheter (Thermocool, D curve, Biosense Webster). We would like to highlight that the ablation site was near to the inflow cannula but we kept some distance from the device to avoid damaging of the surgical sutures. The VT stopped immediately and was no longer inducible even with 2 ventricular extrastimuli at 330 ms drive. No complications were observed during or in relation to the ablation procedure (total procedure time: 45 min, fluoroscopy time: 8 min). After the procedure, patient was free of sustained VT episodes during the 12-month follow-up period.

VT is frequently observed in patients after LVAD implantation, but very limited data are available regarding VT ablation in the early postoperative period. Until now publications usually dealt with VTs originating near the cannula, but there are scarce data about VTs arising from the intrinsic scar [1–5]. Managing VT in these difficult

N. Szegedi · G. Szeplaki · B. Merkely · L. Geller (✉)
Heart and Vascular Center, Semmelweis University, Varosmajor street 68, Budapest 1122, Hungary
e-mail: laszlo.geller@gmail.com

situations can be challenging [6–8]. These arrhythmias are usually well tolerated by LVAD patients but they can result in multiple ICD shocks and may cause hemodynamic instability through the impairment of right ventricular function [2, 5]. Radiofrequency ablation even in the early postoperative period can be an appropriate therapeutic option [2]. However, one has to be aware of the higher risk and variety of potential severe complications (damaging the LVAD impeller or the surgical sutures during mapping or due to high energy application). In our specific case, rapid activation mapping and conventional electrophysiology methods such as entrainment were used. Under uninterrupted anticoagulation via transaortic approach, we were able to perform successful ablation using not too

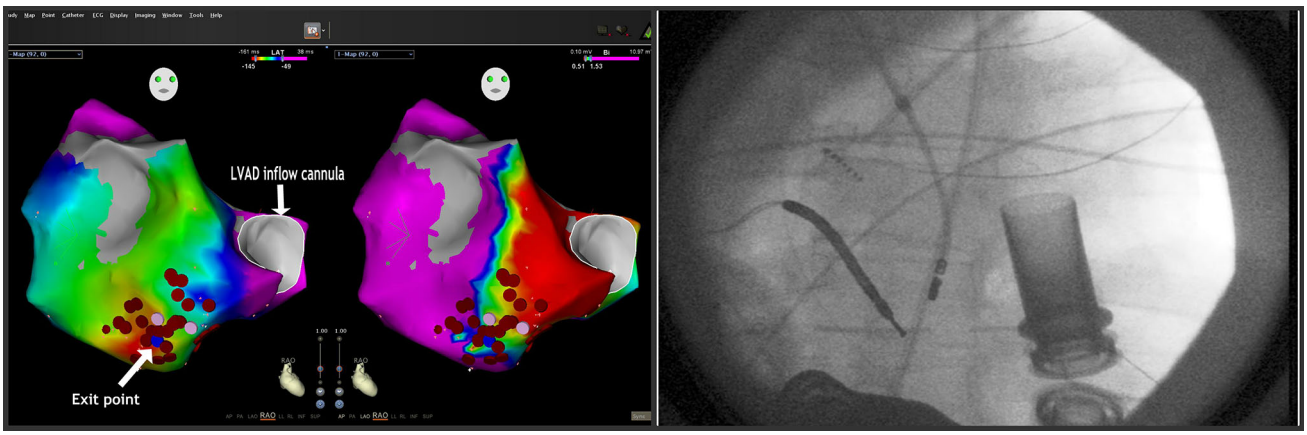

Fig. 1 Activation map (*left*) and voltage map (*middle*) of the *left* ventricle during ongoing VT (*right* anterior oblique projection). The site of earliest activation (*blue dot*) is not far away from the inflow cannula. At this point early, fractionated local electrogram was registered and this is the region where the exit point was also identified with entrainment mapping (see Fig. 2). *Right side*: fluoroscopic view of the successful ablation site (*left* anterior oblique projection)

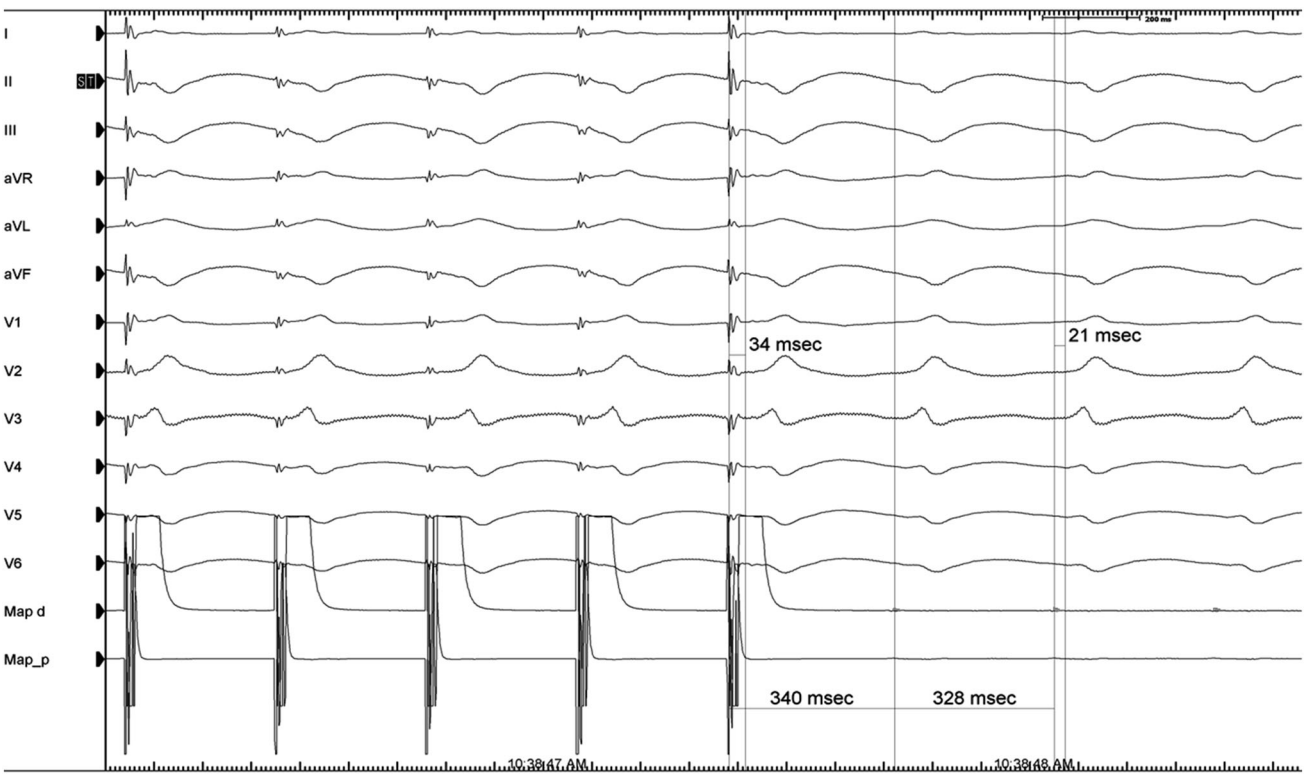

Fig. 2 Entrainment of the VT from the exit site where successful ablation was performed: there is concealed fusion, post-pacing interval is equal with the tachycardia cycle length and stimulus-to-QRS time is near the local activation-to-QRS time

excessive radiofrequency applications, avoiding high risk areas in a relatively short procedure without complications (Figs 1, 2).

Very limited data are available regarding VT ablation in the early postoperative period after LVAD implantation. VTs that occur after LVAD implantation frequently originate near the cannula. VT ablation in these cases seems to be an effective and feasible procedure when performed by an experienced electrophysiology team.

Acknowledgment Dr. Gellér and Dr. Széplaki are Bolyai Janos Research Fellows of the Hungarian Academy of Sciences.

Conflict of interest As to potential conflicts of interest, we wish to declare that Dr. Geller reports receiving lecture fees from St. Jude Medical, Biotronik, Medtronic, Johnson & Johnson and Boston, Dr. Merkely from Johnson & Johnson, Biotronik, Medtronic and St. Jude Medical, Dr. Széplaki from Johnson & Johnson, Biotronik, Medtronic and St. Jude Medical. No other authors receive consulting fees.

References

1. Nakahara S, Chien C, Gelow J, Dalouk K, Henrikson CA, Mudd J, Stecker EC (2013) Ventricular arrhythmias after left ventricular assist device. Circ Arrhythm Electrophysiol 6(3):648–654
2. Pedrotty DM, Rame JE, Margulies KB (2013) Management of ventricular arrhythmias in patients with ventricular assist devices. Curr Opin Cardiol 28(3):360–368
3. Herweg B, Ilercil A, Kristof-Kuteyeva O, Rinde-Hoffman D, Caldeira C, Mangar D, Karlnosky R, Barold SS (2012) Clinical observations and outcome of ventricular tachycardia ablation in patients with left ventricular assist devices. Pacing Clin Electrophysiol 35(11):1377–1383
4. Gorenek B, Blomström Lundqvist C, Brugada Terradellas J, Camm AJ, Hindricks G, Huber K, Kirchhof P, Kuck KH, Kudaiberdieva G, Lin T, Raviele A, Santini M, Tilz RR, Valgimigli M, Vos MA, Vrints C, Zeymer U (2014) Cardiac arrhythmias in acute coronary syndromes: position paper from the joint EHRA, ACCA, and EAPCI task force. Europace 16(11):1655–1673
5. Ferrari M, Kruzliak P, Spiliopoulos K (2014) An insight into short- and long-term mechanical circulatory support systems. Clin Res Cardiol. doi:10.1007/s00392-014-0771-6
6. Reents T, Stilz S, Herold U, Deisenhofer I (2014) Transapical access for catheter ablation of left ventricular tachycardia in a patient with mechanical aortic and mitral valve prosthesis. Clin Res Cardiol 103(12):1025–1027
7. Lee IO, Ukena C, Böhm M, Buob A, Neuberger HR (2013) Underdetection of ventricular tachycardia by an implantable cardioverter-defibrillator due to a locally prolonged arrhythmia cycle length. Clin Res Cardiol 102(12):923–925
8. Scholz EP, Raake P, Thomas D, Vogel B, Katus HA, Blessing E (2014) Rescue renal sympathetic denervation in a patient with ventricular electrical storm refractory to endo- and epicardial catheter ablation. Clin Res Cardiol. doi:10.1007/s00392-014-0749-4