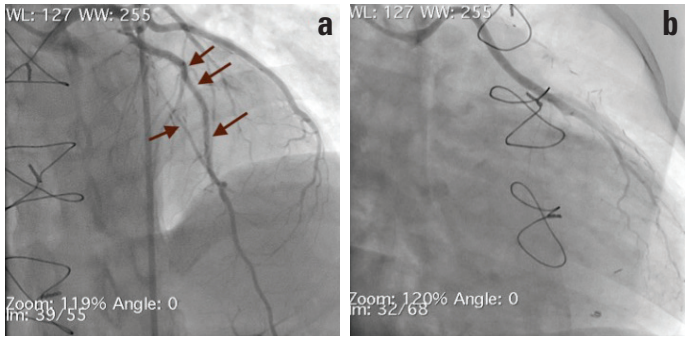

Figure 3. Coronary angiography demonstrating patent prior to stent implantation and healed proximal pre-stent LAD, without residual stenosis with patent LIMA-LAD (arrows, a) and saphenous graft to the diagonal branch (b)

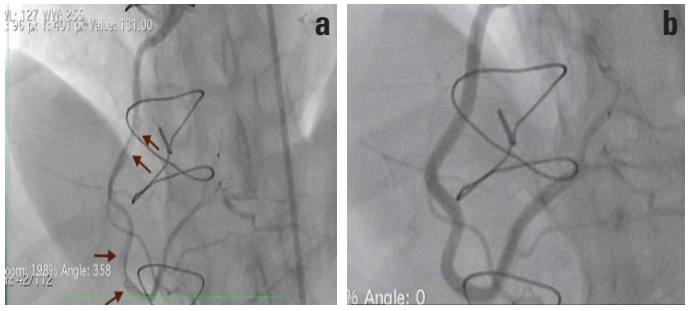

Figure 4. Pre-intervention coronary angiography demonstrating SCAD from proximal to distal RCA (arrows indicate false lumen and intimal flap, a) and final result of two overlapping everolimus-eluting stent implantation to the proximal and mid-part of RCA (b)

No specific guidelines exist to treat SCAD. Emergent angiography appears to play a pivotal role for early recognition of the underlying diagnosis and recovery (5–7). Both primary conventional medical management for acute coronary syndrome and primary stent deployment are associated with early recurrence. Tweet et al. (8) retrospectively evaluated the result of different treatment strategies of 189 patients with first-time SCAD episode, and they recommend conservative medical treatment if the patient had a normal blood flow in an affected coronary artery and revascularization if the blood flow was restricted.

Although revascularization and medical treatment do not prevent a second SCAD episode for our patient, we believe that it is logical to recommend revascularization using cautious PCI if a single medium- to large-sized vessel is involved and if the artery has reduced blood flow. CABG should be preferred in patients who have multivessel dissection, left main dissection, new-onset heart failure, or hemodynamic instability (6). Medical treatment is suitable for a small- to medium-sized vessel if the vessel has good blood flow and the patient is hemodynamically stable.

Conclusion

In patients with SCAD, reoccurrence should be considered as a potential risk and these patients should be successfully managed according to blood flow, vessel size–number included, and hemodynamic stability.

References

1. Vrints CJ. Spontaneous coronary artery dissection. Heart 2010; 96: 801-8. [CrossRef]
2. Mortensen KH, Thuesen L, Kristensen IB, Christiansen EH. Spontaneous coronary artery dissection: a Western Denmark Heart Registry study. Catheter Cardiovasc Interv 2009; 74: 710-7. [CrossRef]
3. Vanzetto G, Berger-Coz E, Barone-Rochette G, Chavanon O, Bouvaist H, Hacini R, et al. Prevalence, therapeutic management and medium-term prognosis of spontaneous coronary artery dissection: results from a database of 11.605 patients. Eur J Cardiothorac Surg 2009; 35: 250-4. [CrossRef]
4. Saw J. Spontaneous coronary artery dissection. Can J Cardiol 2013; 29: 1027-33. [CrossRef]
5. Kansara P, Graham S. Spontaneous coronary artery dissection: case series with extended follow up. J Invasive Cardiol 2011; 23: 76-80.
6. Fontanelli A, Olivari Z, La Vecchia L, Basso C, Pagliani L, Marzocchi A, et al. Spontaneous dissection of coronary arteries and acute coronary syndromes: Rationale and design of the discovery, a multicenter prospective registry with a case-control group. J Cardiovasc Med 2009; 10: 94-9. [CrossRef]
7. Uribe CE, Ramirez-Barrera JD, Rubio C, Gallegos C, Ocampo LA, Saldarriaga C, et al. Spontaneous coronary artery dissection: Case series from two institutions with literature review. Anatol J Cardiol 2015; 5: 409-15. [CrossRef]
8. Tweet MS, Eleid MF, Best PJ, Lennon RJ, Lerman A, Rihal CS, et al. Spontaneous coronary artery dissection: revascularization versus conservative therapy. Circ Cardiovasc Interv 2014; 7: 777-6. [CrossRef]

Address for Correspondence: Dr. Necip Ermiş
İnönü Üniversitesi Turgut Özal Tıbbi Merkezi,
Kardiyoloji Bölümü, 44280 Malatya-*Türkiye*
Phone: +90 422 341 06 60 ext: 4508 E-mail: necipermis@yahoo.com
Accepted Date: 06.11.2015

DOI:10.14744/AnatolJCardiol.2015.6648

Combined implantation of dual-chamber ICD and optimizer through a persistent left superior vena cava

Fabian Fastenrath[1,2], Susanne Röger[1,2], İbrahim Akın[1,2], Martin Borggrefe[1,2], Jürgen Kuschyk[1,2]
[1]Medical Faculty Mannheim of the University of Heidelberg, 1st Department of Medicine (Cardiology, Angiology, Pneumology and Intensive Care), Mannheim-*Germany*
[2]DZHK (German Centre for Cardiovascular Research) partner site Mannheim-*Germany*

Introduction

Cardiac contractility modulation (CCM) is a relatively new treatment for patients with an advanced heart failure having reduced left ventricular ejection fraction (LVEF), which is particularly indicated in patients with a sinus rhythm, narrow QRS complex,

and 25%–35% LVEF (1). Studies have demonstrated improvements in NYHA class, quality of life, and exercise capacity (2–5).

To date, there is a requirement for an atrial lead for P-wave sensing and two ventricular leads for therapy delivery comprising high-energy nonexcitatory impulses during the absolute refractory period of the myocardium (4). According to the current heart failure guidelines, most patients eligible for CCM treatment also have an indication for an implantable cardioverter–defibrillator (ICD) (6, 7), which should be conducted before or at the same time.

Routinely, ICD is placed through the left-sided venous system and the CCM system to the right side (4) without any problems. Nevertheless, in patients with venous anomalies, the implantation process can be challenging. Here we describe the first successful implant of both ICD and a CCM device in a patient with a persistent left superior vena cava (PLSVC).

Case Report

We report a case of a 70-year-old male patient with ischemic cardiomyopathy and dyspnea NYHA class III with major restrictions. His LVEF was 29%. He had already been treated with coronary artery bypass grafting and heart failure therapy comprising ß-blockers, ACE inhibitors, and diuretics. ECG revealed a sinus rhythm (61 beats/min), which was not eligible for cardiac resynchronization therapy. Holter ECG demonstrated intermittent sinus bradycardia and rare sinus-atrial blocks.

Thus, a dual-chamber ICD was indicated for primary prevention of sudden cardiac death and for antibradycardiac pacing. During the ICD implant procedure, intraoperative phlebography revealed that the patient had PLSVC with an absence of the right SVC (Fig. 1a). The dual-chamber ICD was successfully implanted. Optimizer implantation with three leads was performed 6 weeks later through the right subclavian vein and PLSVC. Peri- and post-procedural device interrogation revealed no cross talk.

Follow-up data at 4 years after implantation revealed a mild increase in LVEF (33%) and a significant improvement of dyspnea symptoms (NYHA II). Spiroergometry revealed an improvement in peak oxygen uptake from 10.4 mL/kg/min at baseline to 13.6 mL/kg/min at last follow-up. During follow-ups, the patient felt well without any cardiac decompensation and need for hospitalization because of cardiac issues.

Discussion

CCM therapy has proven to be an effective treatment for patients with an advanced heart failure having left ventricular reduced ejection fraction (2, 3). Nevertheless, in patients with anatomical anomalies, device implantation can be challenging. PLSVC remains one of the most common venous anomalies. Reports in the current literature indicate that PLSVC can be found in up to 0.5% of all patients and up to 4% of all patients with congenital heart disease (8, 9). Because they usually remain asymptomatic, most cases are discovered during invasive diagnostics, such as catheterization (9) or device implantation as in our case. A classification of PLSVC has been suggested by Uemura et al. (10) because of its high variability. PLSVC appear in four different classes (Fig. 1b) and additional subgroups according to the

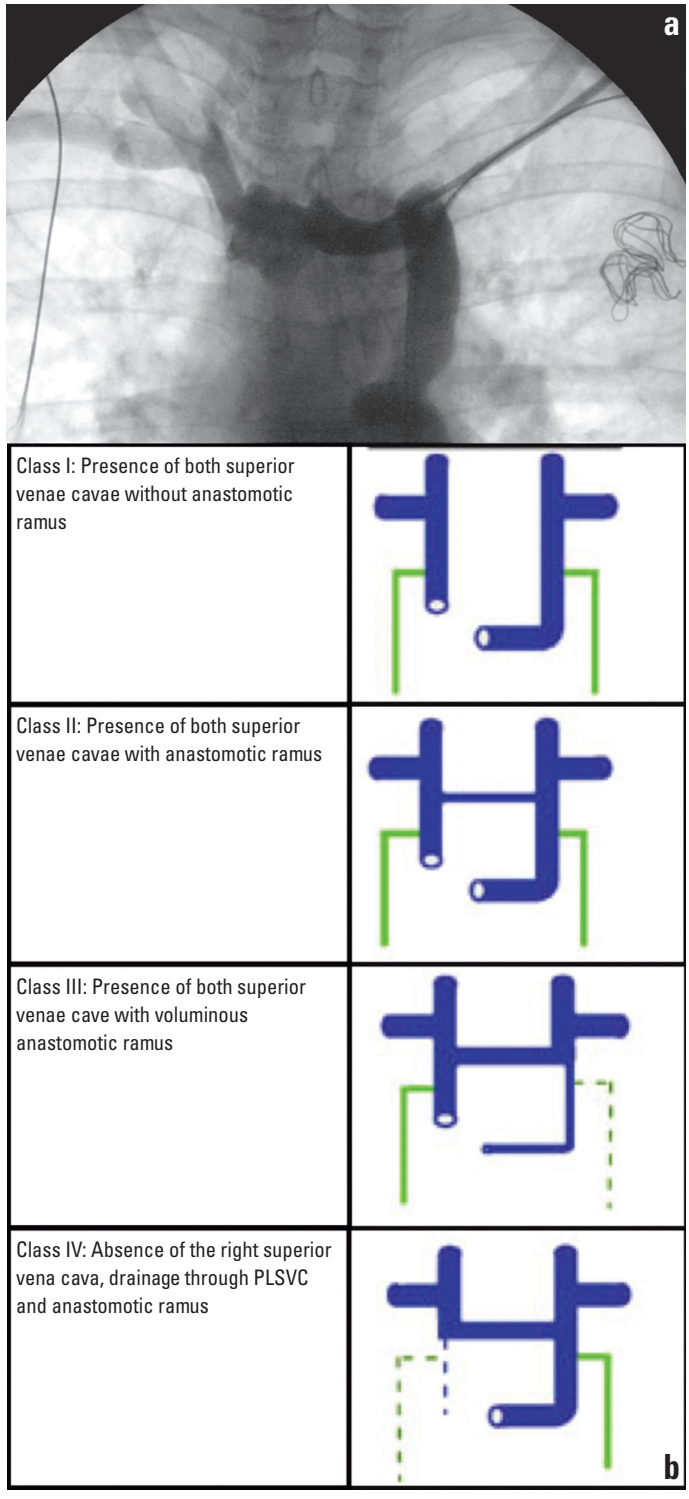

Figure 1. (a) Intraoperative phlebography of the patient. (b) Modified figure according to Ref. 10. Four different classes of PLSVC. In the above reported case, we encountered a class IV, which is the rarest case of PLSVC (Ref. 10)

presence and thickness of the right SVC, an anastomotic ramus between both the brachiocephalic veins and azygos veins (10).

Because PLSVC is usually associated with an enlarged and dilated coronary venous system and ends in the right atrium (8, 9), an implantation can be performed in a standard fashion. However, with an increasing number of leads, the probability of venous occlusion and lead dislodgment increases. We report the feasibility of the first combined implantation of CCM and dual-chamber ICD with a total of five leads through PLSVC (Figs. 2a and b).

Conclusion

In this case, we demonstrated that combined implantation of ICD and CCM through PLSVC is technically feasible, safe, and effective. Therefore, we recommend that this therapy should not be withheld from patients with these anatomical variances.

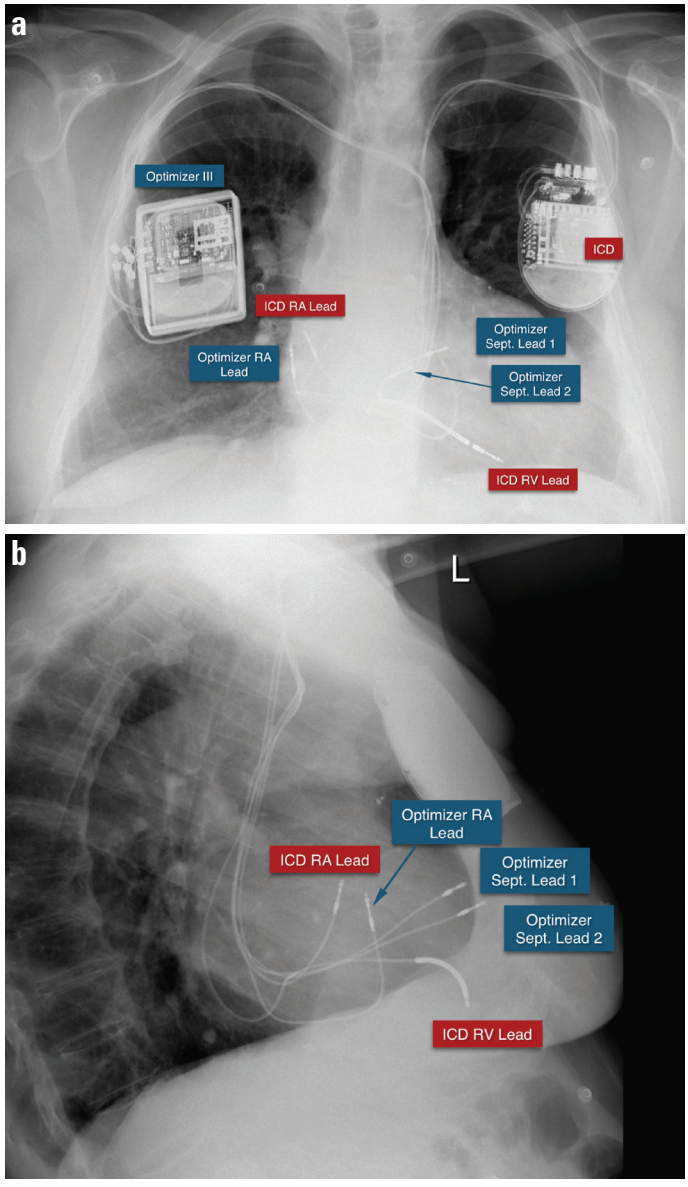

Figure 2. (a) Post-procedural PA chest X-ray revealing both devices. RA, right atrium; RV, right ventricle; sept, septal. (b) Post-procedural lateral chest X-ray

References

1. Kuck KH, Bordachar P, Borggrefe M, Boriani G, Burri H, Leyva F, et al. New devices in heart failure: A European Heart Rhythm Association report: developed by the European Heart Rhythm Association; endorsed by the Heart Failure Association. Europace 2014; 16: 109-28. [CrossRef]
2. Borggrefe MM, Lawo T, Butter C, Schmidinger H, Lunati M, Pieske B, et al. Randomized, double blind study of non-excitatory, cardiac contractility modulation electrical impulses for symptomatic heart failure. Eur Heart J 2008; 29: 1019-28. [CrossRef]
3. Kadish A, Nademanee K, Volosin K, Krueger S, Neelagaru S, Raval N, et al. A randomized controlled trial evaluating the safety and efficacy of cardiac contractility modulation in advanced heart failure. Am Heart J 2011; 161: 329-37 e 1-2
4. Kuschyk J, Roeger S, Schneider R, Streitner F, Stach K, Rudic B, et al. Efficacy and survival in patients with cardiac contractility modulation: long-term single center experience in 81 patients. Int J Cardiol 2015; 183: 76-81. [CrossRef]
5. Giallauria F, Vigorito C, Piepoli MF, Stewart Coats AJ. Effects of cardiac contractility modulation by non-excitatory electrical stimulation on exercise capacity and quality of life: an individual patient's data meta-analysis of randomized controlled trials. Int J Cardiol 2014; 175: 352-7. [CrossRef]
6. Brignole M, Auricchio A, Baron-Esquivias G, Bordachar P, Boriani G, Breithardt OA, et al. 2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy: the Task Force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the European Heart Rhythm Association (EHRA). Eur Heart J 2013; 34: 2281-329. [CrossRef]
7. McMurray JJ, Adamopoulos S, Anker SD, Auricchio A, Bohm M, Dickstein K, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. Eur Heart J 2012; 33: 1787-847. [CrossRef]
8. Campbell M, Deuchar DC. The left-sided superior vena cava. Br Heart J 1954; 16: 423-39. [CrossRef]
9. Demos TC, Posniak HV, Pierce KL, Olson MC, Muscato M. Venous anomalies of the thorax. AJR AM J Roentgenol 2004; 182: 1139-50. [CrossRef]
10. Uemura M, Suwa F, Takemura A, Toda I, Morishita A. Classification of persistent left superior vena cava considering presence and development of both superior venae cavae, the anastomotic ramus between superior venae cavae, and the azygos venous system. Anat Sci Int 2012; 87: 212-22. [CrossRef]

Address for Correspondence: Dr. Med Jürgen Kuschyk
I. Medical Department, Theodor-Kutzer-Ufer 1–3
D-68167 Mannheim-*Germany*
Phone: +49(0)621-383-4231 Fax:+49(0)621-383-3061
E-mail: juergen.kuschyk@umm.de
Accepted Date: 27.10.2015

DOI:10.14744/AnatolJCardiol.2015.6730