CASE REPORT

Cardiac resynchronization therapy: Femoral approach

Luís Brandão, Rita Miranda*, Sofia Almeida, Luciano Ribeiro, Carlos Alvarenga, Isabel João, Hélder Pereira

Department of Cardiology, Hospital Garcia de Orta, Almada, Portugal

Received 4 March 2016; accepted 26 July 2016
Available online 24 March 2017

Abstract  We describe the case of a 62-year-old female patient with bilateral subclavian vein occlusion, in whom a cardiac resynchronization system was implanted via a femoral vein.

© 2017 Sociedade Portuguesa de Cardiologia. Published by Elsevier España, S.L.U. All rights reserved.

Case report

We describe the case of a 62-year-old female patient in whom a cardiac resynchronization (CRT) system was implanted via a femoral vein. She had a history of Hodgkin’s lymphoma in 2001, complicated by superior vena cava syndrome, had undergone chemotherapy and radiotherapy, and was in remission since then. In 2006 she underwent percutaneous coronary intervention with left main coronary artery stenting due to complaints of angina. In 2010, she developed left bundle branch block, and myocardial scintigraphy revealed left ventricular ejection fraction (LVEF) of 40%, without ischemia. In 2014 she developed symptoms of heart failure. An attempt was made to optimize medical therapy on an outpatient basis, but her clinical condition deteriorated and in February 2015 she was admitted to the hospital with severe heart failure (New York Heart Association [NYHA] functional class IV). The echocardiogram showed an LVEF of 25%, moderate to severe mitral regurgitation, preserved right ventricular systolic function and moderate pulmonary hypertension. Levosimendan...
dan perfusion was instituted and drug therapy was titrated (although hypotension precluded achievement of reason-
able doses of angiotensin-converting enzyme inhibitors and
beta-blockers), with progressive improvement to NYHA class
III. Repeat coronary angiography showed no residual coro-
nary disease and implantation of a CRT system was proposed.
An attempt to implant a CRT defibrillator was unsuccessful
due to bilateral subclavian vein occlusion. Surgical implanta-
tion of an epicardial left ventricular lead was not undertaken
due to the patient’s frailty and the strong possibility of
severe mediastinal fibrosis, increasing the risk of procedural
morbidity. We proposed implantation of a CRT system via a
femoral approach, which was accepted by the patient. Con-
siderations of generator size and weight, the low probability
of obtaining an effective defibrillation vector at the level of
the femoral region, and the fact that the patient was hos-
pitalized for advanced heart failure, led to the selection of
a pacemaker system.

Two active fixation leads (85 cm Medtronic CapSureFix
Novus® 5076) were implanted via the right femoral vein
using peel-away introducers and positioned in the right
ventricular septum and right atrial roof. Acute thresholds
were 0.6 V for the right ventricle and 2.0 V for the right
atrium, with impedances of 520 and 600 Ω, respectively.
The R wave was measured at 5.5 mV and the P wave at
2.6 mV. A coronary sinus sheath (57 cm Medtronic Attain
Command® with SureValve 6250VI-EHXL) was introduced
over a deflectable electrophysiology catheter (Bard Dynamic
XT) and advanced to the coronary sinus. Venography was
performed (Figure 1) and a posterolateral vein was selected
for placement of an 88 cm Medtronic Attain Ability® 4196
bipolar lead (Figures 2–4). These leads, as well as the coro-
nary sinus sheaths, were selected because of their longer
length, as the patient’s height was 174 cm. A femoral pocket
was created in the upper leg. The three leads and the gener-
ator were fixed to the muscle under the aponeurosis, using
silk sutures.

Fluoroscopy time was 16 minutes and the entire proce-
dure took less than two hours. Recovery was complicated
by a pocket hematoma related to early administration of
enoxaparin, which required surgical drainage. The

Figure 1 Coronary sinus venography, left anterior oblique
view, demonstrating the target posterolateral branch of the
coronary sinus.

Figure 2 Left anterior oblique view of final lead positions in
the right atrium, right ventricle, and the posterolateral branch
of the coronary sinus.

Figure 3 Right anterior oblique view of final lead positions in
the right atrium, right ventricle, and the posterolateral branch
of the coronary sinus.

patient was kept under permanent oral anticoagulation with
warfarin.

The first follow-up visit took place 40 days after implan-
tation. Her condition had improved markedly, and she
presented in NYHA class II. The pacing system was work-
ing properly. Pacing thresholds were 0.75 V for the right
atrium, 1.0 V for the right ventricle and 0.625 V for the coro-
nary sinus lead. The measured P wave was 4.1 mV and the R
wave in the right ventricular lead was 4.8 mV. Impedances
were 418, 437 and 418 Ω in the right atrium, right ventricle
and coronary sinus, respectively. At the last follow-up visit,
ine months after implantation, the thresholds remained
stable (thresholds, sensing and impedances were 0.75 V/3.9
mV/456 Ω for the right atrium and 0.75 V/3.8m V/475 Ω for
the right ventricle; threshold and impedance for the coro-
nary sinus lead were 0.75 V and 470 Ω), and she is still in
NYHA class II, with no further hospital readmissions.
Discussion

Although there are only a few cases described in the literature, this report shows that implantation of a CRT system through a femoral approach is feasible and sometimes relatively easy, with good stability of the leads at nine-month follow-up. In patients with comorbidities and high surgical risk it can be a good alternative to the epicardial approach.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

Conflicts of interest

The authors have no conflicts of interest to declare.

References