treatment, and a class IIa indication in some cases of persistent symptomatic AF failing treatment.

Although the technique is quite safe, it is not free from complications. The mortality rate is estimated at less than 2 deaths per 1000 procedures.[3] In Spain, 2953 procedures were indicated in 2016, with an acceptable technique-associated complication rate (3.9%) and no reported deaths.[4] Complications, although infrequent, are potentially fatal, including cardiac tamponade, stroke, and atrial-esophageal fistula, among others. An experienced team, together with adequate patient selection, significantly reduces the incidence of these complications.[5] In addition, a recent study has related the CHA_2DS_2-VASc score with the risk of periprocedure complications.[4]

Atrioesophageal fistula is an uncommon complication (< 1 per 1000 patients)[2] that can develop between 3 days and 5 weeks following ablation. It should be promptly suspected when there is onset of fever, chest pain, dysphagia, gastrointestinal tract bleeding neurological symptoms, or sepsis. Associated mortality is around 100% when untreated and 32% when prompt surgery is performed.[6]

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Utility of the Hybrid Operating Room for Lead Extraction: Initial Experience in a Single Center

Utilidad del quirófano híbrido en la extracción de dispositivos implantables: experiencia inicial de un centro

To the Editor,

Although the extraction of implanted pacing devices is now a standard activity in electrophysiology laboratories, these procedures are considered to carry a high risk of potentially serious complications.[1]

Most extractions can be performed percutaneously using the appropriate tools. However, a small percentage ultimately requires a surgical approach. Additionally, other intermediate situations require both a percutaneous and surgical approach. The availability of a hybrid operating room can enable and facilitate the completion of such mixed interventions in a single surgical procedure. In addition to all of the benefits of a conventional operating room, hybrid operating rooms include an integrated fluoroscopy system that permits procedures based on percutaneous access (Figure 1A).[2] Here, by discussing 3 procedures performed between January and November 2017, we present the experience of our group with the use of a hybrid operating room for lead extraction.

The first case involves a 32-year-old woman with single-ventricle physiology and a dual-chamber transvenous pacemaker implanted in 2013 due to atrioventricular block (AVB). After the implantation, the patient developed recurrent strokes, despite adequate oral anticoagulation. Because the embolic strokes were suspected to be originating at the pacemaker leads, we decided to replace the endocavitary leads with epicardial ones. The procedure was performed in the hybrid operating room; first, the epicardial leads were implanted via thoracoscopy (Figure 1B); then, both transvenous leads were percutaneously removed by means of separate locking stylets (LLD, Spectranetics) and a mechanical extraction sheath (TightRail 9 Fr, Spectranetics), and complete extraction was achieved (Figure 1C).

The second case concerns a 58-year-old man with a DDD pacemaker introduced through the left subclavian in 2007 due to AVB. In 2015, a dual-chamber implantable cardioverter-defibrillator was implanted on the right side in a second hospital center due to ventricular arrhythmias. The right side was used due to occlusion of the left subclavian vein, and the left side leads were left in place. The patient was referred to our center due to endocarditis of the pacemaker/implantable cardioverter-defibrillator lead with positive blood cultures and positive positron emission tomography-computed tomography (Figure 1D). Given that the patient was dependent on the pacemaker and had potentially infected bilateral leads, we decided to implant epicardial leads and percutaneously extract all of the endocardial leads in the same procedure. An epicardial pacing lead was implanted in the left ventricle with a defibrillation coil through a left minithoracotomy. Another epicardial lead was implanted in the right atrium via a right minithoracotomy. The leads on the right side were then percutaneously extracted using separate locking stylets (LLD, Spectranetics) and a mechanical extraction sheath (TightRail 11 Fr, Spectranetics). Finally, both leads on the left side were removed with an LLD locking stylet and a 9 Fr mechanical sheath (Figure 1E and F).

The final case involves a 14-year-old boy with a perimembranous ventricular septal defect, treated in 2003, and a right-sided VVI pacemaker implanted due to postoperative AVB.

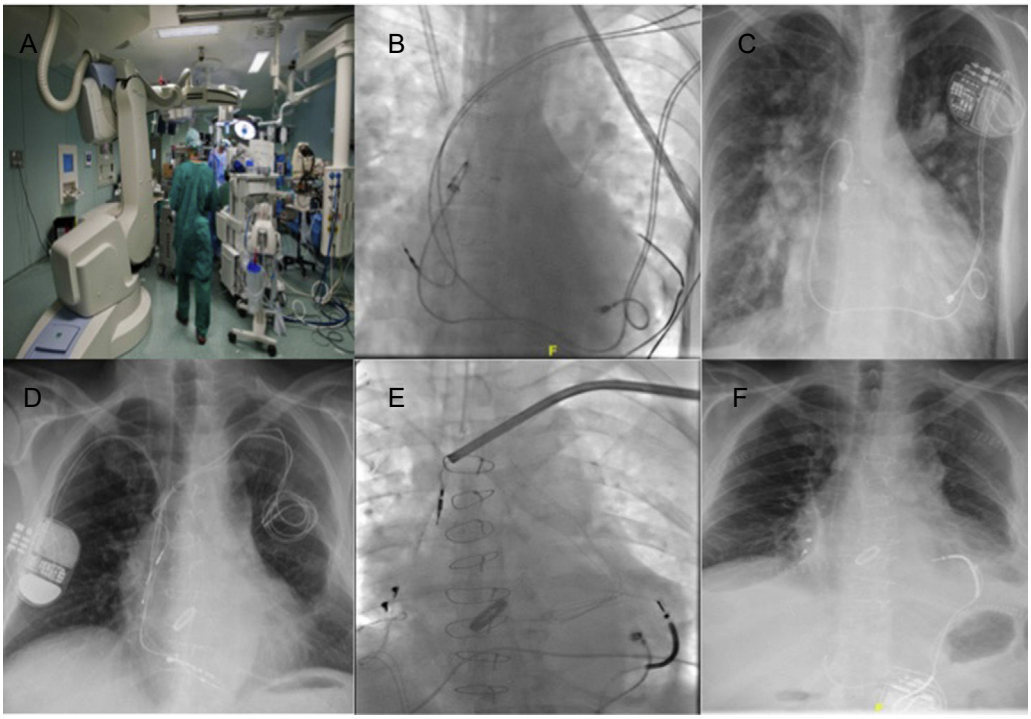

Figure 1. A: the hybrid operating room in our center. B and C: a patient with single-ventricle physiology and a dual-chamber pacemaker. D and E: a patient with a dual-chamber pacemaker implanted on the left side and a dual-chamber implantable cardioverter-defibrillator implanted on the right side.

Ventricular lead fracture was documented in June 2017 and a new ventricular pacing lead and an atrial lead were implanted to restore atrioventricular synchrony. During this implantation, an abortive attempt was made to remove the previous lead; however, the lead had been implanted through the right jugular vein and it was not possible to align the extraction tools with the axis of the lead (Figure 2A). The patient subsequently developed an uncomplicated pouch infection, and complete percutaneous removal of the device was scheduled in the hybrid operating room, after surgical facilitation of access to the ventricular pacing lead implanted in

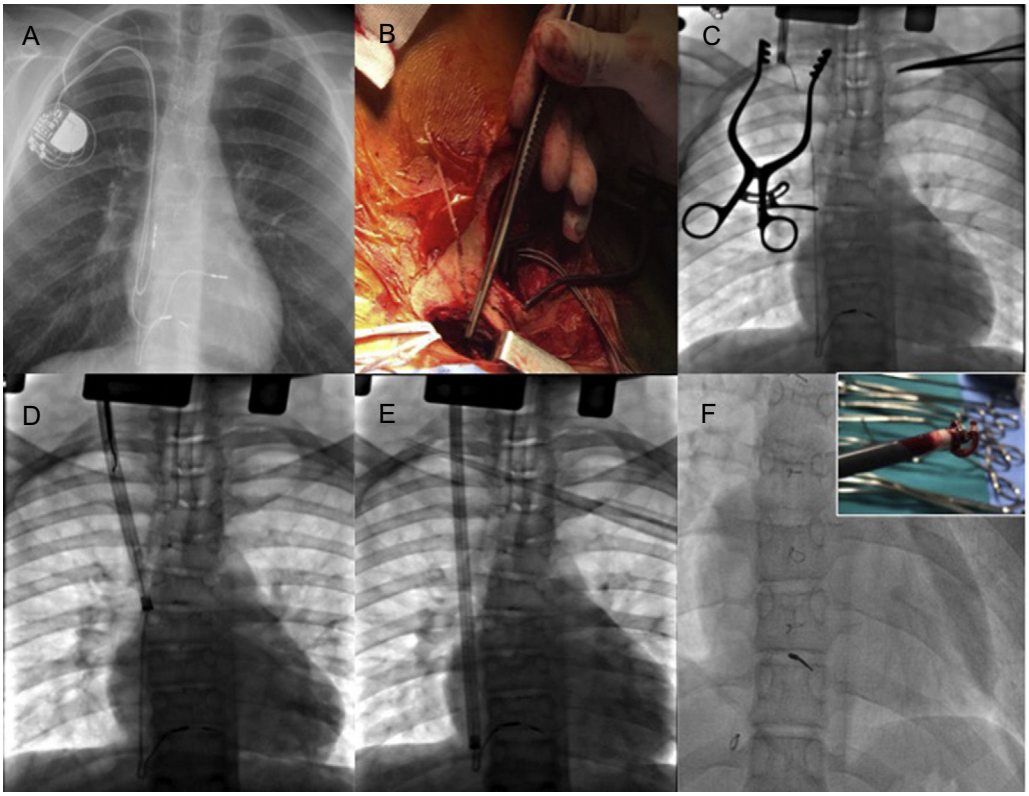

Figure 2. Extraction of a lead implanted via the jugular vein.

2003. First, the pacemaker pouch was opened and the recently implanted right atrial and right ventricular leads were extracted by simple traction. Then, through a second supraclavicular incision, the origin of the fractured ventricular lead in the right jugular vein was reached and its proximal end was extracted from the generator pouch to the supraclavicular incision (Figure 2B). Once exposed, a lead extender (Bulldog, Cook Medical) was used and a mechanical sheath (Shortie, Cook Medical) was introduced to release the proximal adhesions (Figure 2C and D); this sheath was subsequently replaced with a longer sheath (Evolution 13 Fr, Cook Medical) (Figure 2E). Finally, the lead was successfully extracted; although a small fragment (length < 2 cm) remained in the ventricle, it was considered a complete extraction due to its distal location (Figure 2F).

Because interventional procedures can be performed in a hybrid operating room, although usually with portable fluoroscopy systems of lower image quality, this type of room has clear advantages over a conventional operating room for these procedures. In contrast, electrophysiology laboratories are usually not prepared to house all of the equipment necessary to perform cardiac by-pass surgery under optimal conditions.

The patients presented here are 3 clear examples of the possible indications for lead extraction in a hybrid operating room: *a)* when epicardial lead implantation is required and it can be performed in the same procedure, and *b)* when an alternative nonstandard access is required for lead extraction. The advantages of this multidisciplinary approach are undoubted because it allows the implantation of epicardial leads at any stage of the procedure, surgical removal if there is failure of the percutaneous route, and, ultimately, the performance of complex procedures in a safe environment for the patient.

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Postural Orthostatic Tachycardia Syndrome and Vasospastic Angina: Therapeutic Approach to a Previously Unreported Association

Síndrome de taquicardia postural ortostática y angina vasoespástica, una combinación de difícil abordaje terapéutico

To the Editor,

We present the case of a patient with vasospastic angina and postural orthostatic tachycardia syndrome (POTS), an association that has not been previously described.

A 49-year-old woman was admitted for typical angina, without toxic habits, and with a history of high blood pressure and dyslipidemia, for which she was receiving treatment. An echocardiogram ruled out structural heart disease. Myocardial perfusion scintigraphy showed mild ischemia in the anterior wall, and medical treatment was initiated.

A few months later, the patient was admitted for progressive angina with transient ST-elevation in the anterior wall. Coronary catheterization showed no coronary lesions. Acetylcholine administration showed severe vasospasm of the left coronary tree, which was clinically and electrically positive and underwent remission with intracoronary nitrates. Consequently, a provisional diagnosis of vasospastic angina was made based on standardized international diagnostic criteria.[1]

During the following years, the patient was often readmitted for refractory angina. Given the severity of the symptoms and the electrical changes, she underwent several coronary catheterisation procedures, without evidence of coronary disease. For this reason, vasodilator treatment was sequentially increased using nitrates and nondihydropyridine calcium antagonists.

Subsequently, the patient began to develop syncope when standing, which gradually became more frequent and hindered basic activities, such as using the restroom. A 24-hour Holter showed a sinus tachycardia episode at 140 bpm during mild effort. The tilt table test was positive, showing syncopal tachycardia without hypotension, compatible with POTS (Figure 1), although the vasodilator medication almost certainly enhanced the tachycardia response. We attempted to suspend the nitrates to reduce the tachycardia, but this attempt was unsuccessful due to the worsening of the angina.

Catecholamines were determined by a 24-hour urine test and in plasma in decubitus. Values were within the normal range. However, plasma values after 5 minutes of standing (with presyncope and tachycardia at 180 bpm) were very high: noradrenaline, 1797 ng/L (normal range, 165-460 ng/L) and adrenaline, 357 ng/L (normal range, 30-90 ng/L). Detailed physical examination ruled out signs of disorders that may occur with orthostatic intolerance, such as Ehlers-Danlos syndrome. That patient had no family history of POTS.

The patient developed frequent syncopes, always while standing, which compelled her to use a wheelchair. Simultaneously, she had New York Heart Association (NYHA) functional class III effort dyspnea and orthopnea, without associated structural heart disease. Catheter-induced coronary vasospasm did not lead to mitral regurgitation or increased pulmonary pressures. However, cardiopulmonary ergometry showed tachycardia and desaturation at 30 seconds with hyperlactatemia.

These results were considered secondary to POTS. Thus, clonidine and venlafaxine treatment were started but discontinued due to intolerance and ineffectiveness, respectively. Finally, we decided to increase the blocker drugs, and an improvement was achieved by using a combination of diltiazem 60 mg/12 h and ivabradine 7.5 mg/12 h. Due to the recurrence of angina, transder-