

- Fagman E, Perrotta S, Bech-Hanssen O, Flinck A, Lamm C, Olaison L, et al. ECG-gated computed tomography: a new role for patients with suspected aortic prosthetic valve endocarditis. *Eur Radiol.* 2012;22:2407-14.
- Entrikin DW, Gupta P, Kon ND, Carr JJ. Imaging of infective endocarditis with cardiac CT angiography. *J Cardiovasc Comput Tomogr.* 2012;6:399-405.
- Habib G, Lancellotti P, Antunes MJ, Bongiorno MG, Casalta JP, Del Zotti F, et al. The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology. *Eur Heart J.* 2015. <http://dx.doi.org/10.1093/eurheartj/ehv319>.
- Vahanian A, Alfieri O, Andreotti F, Antunes MJ, Barón-Esquivias G, Baumgartner H, et al. The Joint Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology and the European Association for Cardio-Thoracic Surgery. *Eur Heart J.* 2012;33:2451-96. <http://dx.doi.org/10.1016/j.rec.2015.12.007>

Two-incision Technique for Subcutaneous Cardioverter-defibrillator Implantation: Method of Choice?



Técnica de dos incisiones para implante de desfibrilador subcutáneo: ¿técnica de elección?

To the Editor,

Subcutaneous implantable cardioverter-defibrillators (S-ICD) are becoming established as an effective and safe therapy for a broad spectrum of patients.^{1,2} These devices do not require placement of endovascular leads in or around the heart and allow the sensing and appropriate treatment of malignant ventricular arrhythmias.³ Implantation is relatively simple, and the procedure times and results are very predictable. Nonetheless, physicians require a learning curve of about 13 implants in order to minimize potential complications.⁴ The implantation procedure recommended by the manufacturer involves 3 incisions (Figure A). A pocket incision on the lateral chest wall houses the pulse generator, and 2 parasternal incisions are made to position the defibrillation electrode: an inferior incision close to the xiphoid process and a superior incision to position the distal electrode parasternally at the level of the sternal angle.³ To minimize the risks associated with making 3 incisions, Knops et al⁵ developed a simplified implantation technique that omits the superior parasternal incision (Figure B). This incision is a frequent cause of discomfort, is difficult to suture, and is cosmetically unappealing to patients. In their series, Knops et al reported excellent results with this technique; however, their center has more experience with S-ICD implantation than any other in the world, and there are no other data in the literature. Here, we report our experience at a center with a less established track record with the 2-incision technique, used as first-line treatment in all patients from an early phase in the experience of the center.

Since October 2013, our team has implanted 17 S-ICDs in 17 patients, with follow-up for at least 1 month. For both the 3-incision and the 2-incision techniques, implantation was guided by anatomical landmarks, and fluoroscopy was not used in any procedure. The first 5 implantations were performed with the 3-incision technique. Subsequently, the 2-incision technique was selected as the first-line approach, with the option to revert to the 3-incision technique if difficulties were encountered in achieving a satisfactory implant. For the 2-incision technique, the insertion tool supplied with the S-ICD system was used in combination with an 11 Fr peel-away sheath of the type commonly used for transvenous lead placement.³ After the device-pocket and xyphoid incisions were made, the sheath was mounted over the insertion tool and the combined structure was tunneled parasternally. The insertion tool was then removed, leaving the peel-away sheath in place, and the electrode was introduced into the sheath. Once the electrode tip emerged subcutaneously from the sheath opening, it was held in place manually to prevent downward displacement, and the sheath was peeled away, leaving the distal sensing electrode in the desired position.⁵ The proximal sensing electrode was then secured at the paraxiphoid level, the pulse generator was connected, and both incisions were closed. The 2-incision technique was performed satisfactorily in all 12 patients in whom it was attempted, with no need for reversion to the 3-incision technique. General patient characteristics are shown in the Table. A ventricular fibrillation induction test was performed, and sustained arrhythmia was induced in 11 patients. Of these patients, 10 were adequately defibrillated with a single 65 J shock, and 1 patient required a second 65 J shock with reversed polarity. The mean treatment time for the 11 episodes of induced ventricular fibrillation was 16.6 ± 3.4 s, and the mean effective-shock impedance was $81.5 \pm 13.6 \Omega$. Mean total procedure time (58.25 ± 17.5 min) was notably shorter than for the 5 patients who underwent the 3-incision procedure (107.8 ± 31 min); however, this

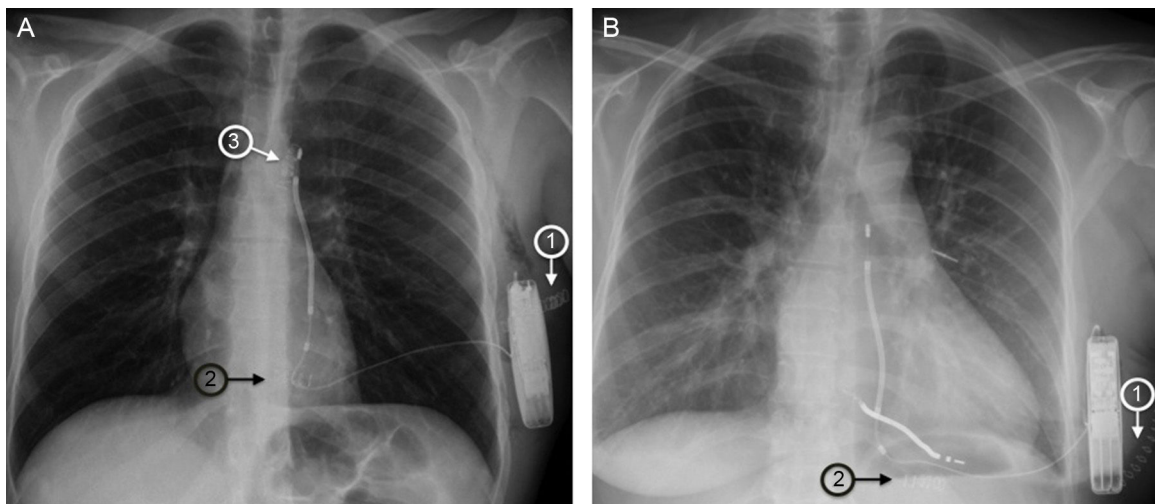


Figure. Chest X-rays showing automatic subcutaneous implantable cardioverter-defibrillators implanted by the 3-incision method (A) and the 2-incision method (B).

Table

Characteristics of Patients

Age, y	48.4 ± 8.8
Weight, kg	75.4 ± 17.8
Height, cm	170.1 ± 8.2
Primary prevention	9 (75)
Clinical disease	
Ischemic heart disease	5 (41.7)
Dilated (nonischemic) cardiomyopathy	1 (8.3)
Channelopathies	1 (8.3)
Idiopathic VF	1 (8.3)
Hypertrophic cardiomyopathy	2 (16.7)
Other	2 (16.7)
LVEF, %	45.7 ± 16.7
Sensing vector	
Primary	6 (50)
Secondary	6 (50)
Alternate	0 (0)
Conditional zone rate, bpm	190.8 ± 11.6
Shock zone rate, bpm	248.3 ± 3.9

LVEF, left ventricular ejection fraction; VF, ventricular fibrillation. Data are expressed as no. (%) or mean ± standard deviation.

difference may reflect not only the relative simplicity of the 2-incision method, but also the accumulated overall experience with the procedure. In all 12 patients, the device was programmed with 2 antitachycardia zones: 1 conditional discrimination zone and 1 shock zone. Patients were discharged the day after the procedure. After a mean follow-up of 6.25 months (range, 1-13 months), there have been no major or minor complications, no cases of lead displacement, and no need for reoperation. During follow-up, there have been no recorded events due to appropriate or inappropriate sensing and no inappropriate or appropriate shocks; these results are identical to those obtained in the patients who underwent implantation using the 3-incision method. Notably, the devices fitted in 6 of the patients who underwent the 2-incision procedure were programmed with the secondary sensing vector (between the distal electrode and the pulse generator), with no effect on the results; this sensing vector involves the distal sensing electrode, potentially the

more vulnerable to problems due to lead dislocation in the 2-incision technique.

The results of our series show that the S-ICD can be appropriately positioned using the 2-incision technique, permitting cardiac signal detection without oversensing or undersensing, providing appropriate defibrillation, and ensuring system stability during follow-up. These results support the adoption of this technique as a first-line approach in S-ICD implantation.

CONFLICTS OF INTEREST

M.A. Arias is a proctor for the S-ICD system and Associate Editor of *Revista Española de Cardiología*.

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Available online 27 February 2016

REFERENCES

- Burke MC, Gold MR, Knight BP, Barr CS, Theuns DA, Boersma LV, et al. Safety and efficacy of the totally subcutaneous implantable defibrillator: 2-year results from a pooled analysis of the IDE Study and EFFORTLESS Registry. *J Am Coll Cardiol*. 2015;65:1605-15.
- Arias MA, Pachón M, Akerström F, Puchol A, Giacomán-Hernández S, Rodríguez-Padial L. Implante de desfibrilador subcutáneo S-ICD™: experiencia inicial en un centro español. *Rev Esp Cardiol*. 2015;68:629-30.
- Akerström F, Arias MA, Pachón M, Puchol A, Jiménez-López J. Subcutaneous implantable defibrillator: State-of-the art 2013. *World J Cardiol*. 2013;5:347-54.
- Knops RE, Brouwer TF, Barr CS, Theuns DA, Boersma L, Weiss R, et al. The learning curve associated with the introduction of the subcutaneous implantable defibrillator. *Europace*. 2015. <http://dx.doi.org/10.1093/europace/euv299>.
- Knops RE, Olde Nordkamp LR, de Groot JR, Wilde AA. Two-incision technique for implantation of the subcutaneous implantable cardioverter-defibrillator. *Heart Rhythm*. 2013;10:1240-3.

<http://dx.doi.org/10.1016/j.rec.2015.12.008>

Usefulness of MitraClip for the Treatment of Mitral Regurgitation Secondary to Failed Surgical Annuloplasty



Utilidad de MitraClip® como tratamiento de la insuficiencia mitral secundaria a anuloplastia quirúrgica fallida

To the Editor,

Valve surgery is the treatment of choice for mitral regurgitation (MR) when the latter is accompanied by ventricular dysfunction or its symptoms. In such cases, valve repair is usually preferred to valve replacement, since the prognosis is generally more favorable. However, despite the implementation of modern valve repair techniques, the rate of MR recurrence can come close to 30%¹ and, in the case of ischemic MR, can reach nearly 50% at 2 years. This leads to a significant number of repeat valve interventions,² which may involve a high degree of risk, especially in elderly patients or those with numerous comorbidities.

The MitraClip device (Abbott Laboratories, Abbott Park, Illinois, United States) has been shown to be a safe and effective therapy that improves the symptoms of patients who are unable to undergo surgery.³ The experience gained in recent years has allowed the indications for this treatment to be extended to other groups of patients with MR. The treatment of patients with a prior failed annuloplasty has been reported previously,⁴ but the information concerning this scenario is still limited. The objective of this study was to present the experience in the treatment of failed annuloplasties with MitraClip in Spain. Between October 2010 and October 2015, 300 MitraClip implantations were performed in the Iberian Peninsula; they include a subseries of 8 procedures (2.6%) performed in 6 patients, which were carried out in annuloplasty rings.

The characteristics of the population, the procedure, and follow-up are shown in the [Table](#). The median time between annuloplasty and MitraClip implantation was 5 years, and the most common cause was recurrence in patients treated surgically for functional MR. In most cases, a central regurgitant jet was