
ELIANA AVERSA, HÉCTOR MAZZETTI, OSVALDO MASCHERONI, M. CRISTINA TENTORI

SUMMARY
Thrombosis of the superior vena cava is not frequent, but its appearance makes difficult the way for the implantation of pacemakers and defibrillators. There are alternatives when endovascular and epicardium vias cannot be used. However, some implantations of catheters of defibrillators via transatrial through minimal thoracotomy with good results at long-term and with an adequate threshold of defibrillation were described. In this presentation the case of a patient with history of Chagasic cardiopathy and dual-chamber pacemaker due to bimodal disease is described. As he is a young patient with difficult accesses, transatrial via through minimal thoracotomy was used preserving the atrial catheter for stimulation and sensing.

CLINICAL CASE
Patient of 43 years with history of chronic Chagasic myocardiopathy and implantation of a DDDR pacemaker due to bimodal disease in 1999.

In August 2002, with the appearance of jugular ingurgitation this patient was diagnosed with occlusion of the left subclavian (way of access of the pacemaker).

In July 2006, due to signs and symptoms compatible with superior vena cava syndrome, an angiography of both upper limbs was performed which evidenced occlusion of the superior vena cava. Oral anticoagulation therapy was started with gradual improvement of the symptoms.

In September 2009, this patient consulted for two syncopal episodes with prodromes, with mild traumatic brain injury and asymptomatic recovery. When analysing the pacemaker no relevant data were obtained as there were no intracavitary electrograms (Pacemaker 2022T).

The echocardiogram showed normal cardiac diameters with preserved systolic function and mild dilatation of the right chambers. During Holter monitor the patient presented sequential stimulation with salvos of ventricular tachycardia 3-beat. The ergometry did not show relevant data.

In the electrophysiological study, with ventricular overstimulation (2 extrastimulus), sustained monomorphic ventricular tachycardia with hemodynamic decomposition (cycle 300 msec) that reverted spontaneously was induced.

Given that it was a patient with syncope, Chagasic cardiopathy and ventricular tachycardia with hemodynamic decomposition inducible in the electrophysiological study, the implantation of a cardioverter-defibrillator was the final decision.

To evaluate the implantation via, a phlebography which reported occlusion of both subclavian and of the superior vena cava was performed (Figure 1).

As there were no possibilities to implant the system via endovascular, transatrial via through minimal thoracotomy was the option, preserving the catheters of the functioning pacemakers for stimulation and sensing.

In the surgical procedure, through extrapleural right anterior thoracotomy, the fourth cartilage was...
removed, the pericardium was released, and a sheath in the lateral side of the right auricle was performed. The sheath was punctured, a peel-away introducer was inserted and a Guidant® 0137 catheter was placed at the tip of the right ventricle. Thresholds were optimum (Figure 2). Then, the catheter was tunneled from the thoracotomy, via sternum, up to the pacemaker pocket where it was connected to the cardioverter-defibrillator together with the anterior auricular catheter. The ventricular catheter of the pacemaker was abandoned. The final position of the system was assessed through radioscopy (Figure 3). Ventricular fibrillation was observed which was reverted with a shock of 20 joules.

**DISCUSSION**

This presentation is the first communication in Argentine of the implantation via transatrial of a cardioverter-defibrillator in a patient with difficult vascular accesses.

Several studies of secondary prevention of sudden death in patients with ischemic cardiopathy have demonstrated that the cardioverter-defibrillator is better than antiarrhythmic drugs, so in recent years the indications have been spread to primary prevention cases and other types of cardiopathies. (1) However, there are no randomized studies that support this technique in Chagasic patients, so its treatment is extrapolated from coronary patients. (2) Endovascular via is the best choice for implantations of pacemakers or cardioverter-defibrillators as they achieve a more physiological stimulation, lower mortality and morbidity and less complications in the epicardial via. However, the occlusions of the superior vena cava or the veins that drain into it are a challenge when choosing the implantation via.

The syndrome of superior vena cava can occur due to several causes, including radiation, thrombophilias, extrinsic compression, implantation of multiple catheters (pacemakers or defibrillators, central via or dialysis). Its incidence is of 1% to 3%. (3) Among these cases, epicardial via is the most used for pacemakers, (4) but the solution is not so simple for defibrillators. Initially, epicardial defibrillation patches through sternotomy were used. Among the multiple complications for this method we find postpericardiectomy syndrome, mediastinitis, constrictive pericarditis and even broken patches. Another drawback was that up to 25% of the patients had a high defibrillation threshold (average, 10 joules more than endovascular via). Most of these patients needed a reoperation to replace the patches because they were ineffective. (5)

As a consequence subcutaneous patches arose, they were inserted in the lateral and/or dorsal side of the thorax and had less complications than epicardial ones. They were used as complements and not as alternative to endovascular catheters in patients with high defibrillation threshold.

Later, another technique to replace subcutaneous patches in patients with high thresholds emerged; the technique involved placing subcutaneous catheters of defibrillation (arrays) in the posterior and left lateral side of the thorax in adults. There are reports of good results and adequate defibrillation thresholds in children with no accesses, both with two subcutaneous catheters and with one subcutaneous catheter, one endovascular catheter implanted via iliofemoral and a carcass in the abdomen. (6) The most important disadvantage in subcutaneous catheters is that the coil defibrillation is exposed to any external traumatism as it is not protected by the ribcage. This leads to the catheter broken or to isolation loss.

Kettering et al. found 6% of complications in patients with subcutaneous array, the most frequent (4%) was the broken of catheters. (7)

On account of these drawbacks other accesses vias which guarantee good thresholds and protection to the catheter were proposed. In 1989, transatrial via emerged, (8) which at the beginning needed sternotomy, but eventually this technique was improved and subxiphoid via and minimal thoracotomy were adopted. There are no follow-ups at long term, only descriptions of cases, but it was highly effective in children with a follow-up to 14 years. (9)

The interesting point of this via is that through
radioscopía the placement of the catheter is similar to the implantation through conventional via. So it is important to make clear the approach via just in case future removals are needed.

The advantages of transatrial via with the current approach techniques is that it is minimally invasive, endocavitary catheters are used, is an alternative for patients of high risk with no adequate vascular accesses, it has good defibrillation threshold and the catheters are protected by the ribcage so the risk of broken is lower. (10)

An important disadvantage is the complexity of removal due to catheter malfunction, as an invasive approach is needed to release the catheter of adhesions and pericardial surface. (10)

CONCLUSIONS
There are many causes that can prevent the endovascular access for the placement of a cardioverter-defibrillator. Transatrial via is one of the alternatives in those cases, with good thresholds of defibrillation and greater durability of the catheters.

As the indications of a cardioverter-defibrillator are becoming known, as it happened in recent years, more patients with difficult accesses will present and it is important to know alternative implantations vias.

RESUMEN
Implante de cardiodesfibrilador por vía transauricular. Descripción de un caso

La trombosis de la vena cava superior es infrecuente, pero su aparición dificulta la vía de acceso para el implante de marcapasos y desfibriladores. Existen alternativas cuando no se puede utilizar la vía endovascular y la vía epicárdica es la de elección. Sin embargo, se describieron implantes de catéteres de desfibrilador por vía transauricular por toracotomía mínima con buenos resultados a largo plazo y con el logro de un umbral de desfibrilación adecuado. En esta presentación se describe el caso de un paciente con antecedentes de cardiopatía chagásica e implante de un marcapasos bicameral por enfermedad binodal que necesita un desfibrilador. Debido a que se trata de un paciente joven con accesos dificultosos se decidió utilizar la vía transauricular por toracotomía mínima conservando el catéter auricular para estimulación y sensado.

Palabras clave > Desfibrilador - Chagas - Transauricular

BIBLIOGRAPHY