2. Kim YJ, Kwon DA, Kim HK, et al. Determinants of surgical outcome in patients with isolated tricuspid regurgitation. *Circulation.* 2009;120:1672–1678.
3. McCarthy PM, Bhudia SK, Rajeswaran J, et al. Tricuspid valve repair: durability and risk factors for failure. *J Thorac Cardiov Surg.* 2004;127:674–685.
4. Campelo-Parada F, Lairez O, Carrié D. Percutaneous Treatment of the Tricuspid Valve Disease: New Hope for the "Forgotten" Valve. *Rev Esp Cardiol.* 2017;70:856–866.
5. Taramasso M, Hahn RT, Alessandrini H, et al. The International Multicenter TriValve Registry: which patients are undergoing transcatheter tricuspid repair? *JACC Cardiovasc Interv.* 2017;10:1982–1990.
6. Navia JL, Kapadia S, Elgharably H, et al. Transcatheter tricuspid valve implantation of NaviGate bioprosthesis in a preclinical model. *JACC Basic Transl Sci.* 2018;3:67–79.

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Percutaneous Tricuspid Valve Replacement Using a Valved Bioprosthesis

Tratamiento percutáneo de la insuficiencia tricuspídea mediante una endoprótesis valvulada

To the Editor:

Severe tricuspid regurgitation (TR) is an uncommon condition associated with a poor prognosis[1,2] and high recurrence, morbidity, and mortality rates with conventional surgical treatment.[3,4] Several alternative therapies involving percutaneous techniques have been recently proposed for TR.[5,6] One such procedure is implantation of a bicaval-anchored valved endoprosthesis, custom-made for the patient's anatomy (Tricento transcatheter prosthesis) (Figure 1) and designed to prevent retrograde flow toward the venae cavae. The valve is inserted through a 24-Fr delivery system via a transfemoral venous access. The device can be repositioned and retrieved up to the time the valve system is deployed.

We report the first clinical case in Spain of successful percutaneous implantation of a Tricento endoprosthesis in the tricuspid position to treat severe TR causing heart failure in New York Heart Association functional class III IV and overt systemic congestion despite optimal medical treatment.

The patient was an 81-year-old woman with hypertension, dyslipidemia, and chronic atrial fibrillation receiving anticoagulant therapy. Transthoracic echocardiography (video 1 of the supplementary data) detected massive functional TR, a moderately dilated right ventricle with mild-moderate dysfunction, and inverted flow toward the venae cavae. She had no other significant valve disease, and the left ventricular ejection fraction was normal.

With the use of computed tomography, the dimensions of the 2 venae cavae were determined, and the outlets of the suprahepatic veins were confirmed to be more than 1 cm from the outlet of the inferior vena cava (IVC) in the right atrium.

The patient's risk of operative mortality estimated with the Euroscore II was 3.1% and the risk of morbidity and mortality by

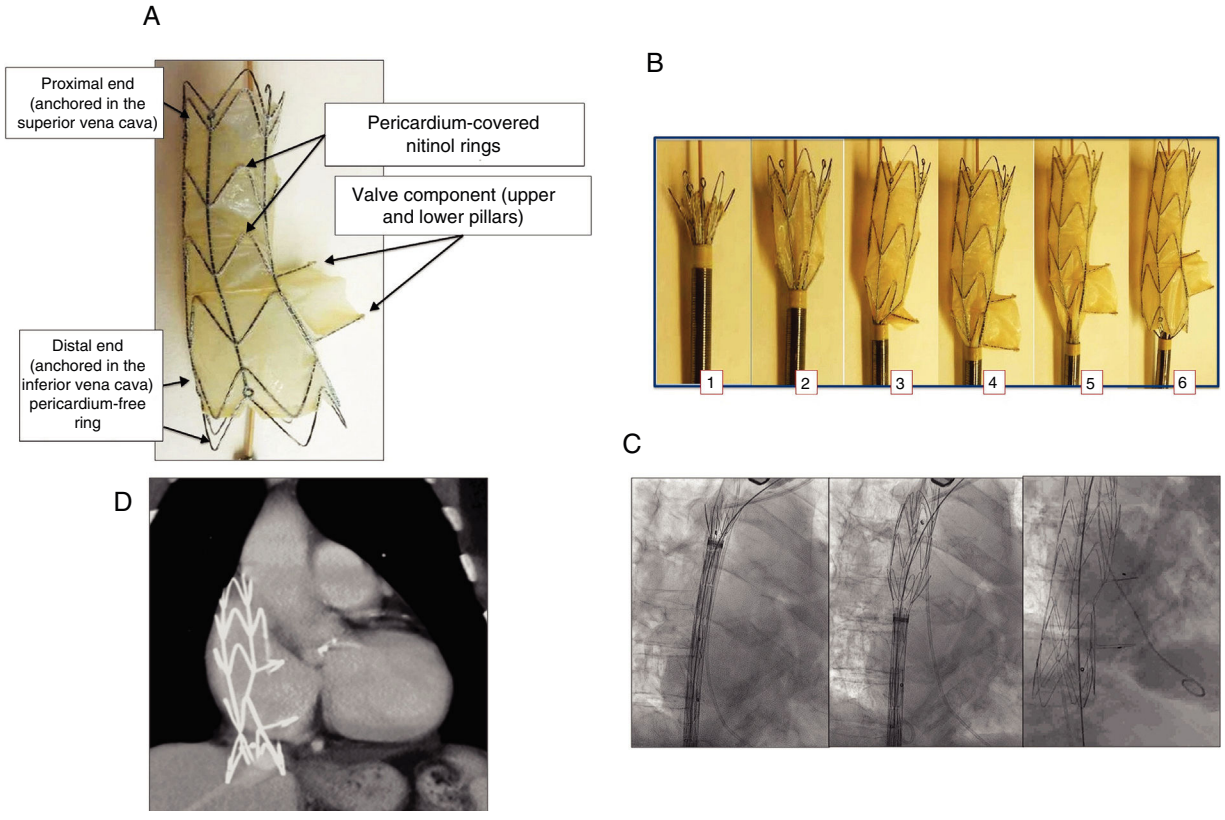

Figure 1. A, expanded Tricento valved prosthesis showing its components. B, gradual release mechanism in various phases up to complete expansion. C, angiography sequence showing implantation and release to complete expansion. D, computed tomography image following implantation, showing correct positioning: the pillars of the valve component are facing the plane of the native tricuspid valve and the right ventricular inflow tract.

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the Society of Thoracic Surgery (STS) scale was 21.1%. The risk of stroke, prolonged ventilation, kidney failure, and repeat surgery was estimated at 1.4%, 13.6%, 3.6%, and 10%, respectively.

Because of the patient's elevated operative morbidity and mortality risk, and her favorable anatomy (venae cavae diameters between 16 and 42 mm, distance between the hepatic vein outlets and IVC outlet in the right atrium at least 1 cm, and absence of pacemaker leads implanted in the right ventricle), percutaneous treatment with the above-described endoprosthesis was indicated. The patient signed an informed consent form and elective implantation was scheduled.

The intervention was performed with the patient under general anesthesia, and monitoring by transesophageal echocardiography and right femoral venotomy. Venotomy was done for safety reasons, to avoid vascular complications and achieve better control of hemostasis and potential damage to the vein wall with the use of a 24-Fr catheter in this first case. After advancing a 0.032-inch vascular guidewire to the right subclavian artery, the endoprosthesis carrier system was inserted and positioned appropriately with its distal end in the superior vena cava. The device was then properly oriented with the radio-opaque markers facing the native tricuspid valve so that venae cavae anterograde flow would be toward the right ventricular inflow tract, and was gradually deployed under monitoring. Final release was carried out following expansion of the upper pillar of the valve component and after ensuring that the lower pillar was positioned at the junction of the IVC outlet and the right ventricle—and therefore, that the valve was in the right ventricle—and the lower anchor of the endoprosthesis was correctly positioned in the IVC without obstructing flow of the suprahepatic veins (Figure 1).

Following completion of the procedure and catheter withdrawal, hemostasis, femoral vascular closure, and extubation of the patient were carried out. The postprocedure clinical course was satisfactory. At the 1- and 3-month follow-up evaluations, the patient was in New York Heart Association functional class II and echocardiography depicted laminar flow through the prosthesis with no regurgitation to the venae cavae or periprosthetic leaks.

The first successful implantation of the Tricento valve prosthesis in Europe was performed by Toggweiler et al.[6] The case reported here is the second referred for publication in Europe. The valve has a simple design for percutaneous implantation and it is tailored to the patient's anatomy. Proper implantation of the device requires the following prerequisites: *a)* no interference with the hepatic veins at the proximal end, *b)* expansion of the nitinol support construct exceeding the dimension of the anchoring points in the venae cavae by 20% for proper fixation in the ideal position, *c)* prevention of periprosthetic leaks and prosthesis migration, and *d)* outlets of the suprahepatic veins at least 1 cm from the IVC outlet in the right atrium.

The limitations of the Tricento are as follows: *a)* made-to-order construction that requires at least 4 weeks, preventing its use in urgent cases; *b)* superior and inferior vena cava diameters must be between 16 and 42 mm; and *c)* uncertainty regarding whether the presence or need for a pacemaker may be a limitation to its use.

Implantation of the Tricento endoprosthesis was effective in the case described, and the patient's short-term clinical and echocardiographic status was satisfactory. A longer follow-up in broader series is needed to evaluate the effectiveness of this device at long-term.

CONFLICTS OF INTEREST

E. Abu-Assi is an Associate Editor of *Revista Española de Cardiología.*

APPENDIX. SUPPLEMENTARY DATA

Supplementary data associated with this article can be found in the online version, at http://dx.doi:10.1016/j.rec.2019.03.004.

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REFERENCES

1. Nath J, Foster E, Heidenreich PA. Impact of tricuspid regurgitation on long term survival. *J Am Coll Cardiol.* 2004;43:405–409.
2. Amat-Santos IJ, Castrodeza J, Nombela-Franco L, et al. Tricuspid but not mitral regurgitation determines mortality after TAVI in patients with nonsevere mitral regurgitation. *Rev Esp Cardiol.* 2018;71:357–364.
3. Killic A, Saha-Chaudhuri P, Rankin JS, Conte JV. Trends and outcomes of tricuspid valve surgery in North America: an analysis of more than 50,000 patients from the Society of Thoracic Surgeons database. *Ann Thorac Surg.* 2013;96:1546–1552.
4. Becerra-Muñoz VM, Rodríguez-Capitán J, Sánchez-Espín G, Such-Martínez M, Gómez-Doblas JJ, De Teresa-Galván E. Resultados del tratamiento quirúrgico de la insuficiencia tricuspídea grave en una serie contemporánea. *Rev Esp Cardiol.* 2019;72:178–180.
5. Campelo-Parada F, Lairez O, Carrié D. Percutaneous treatment of the tricuspid valve disease: new hope for the ''forgotten'' valve. *Rev Esp Cardiol.* 2017;70:856–866.
6. Toggweiler S, De Boeck B, Brinkert M, et al. First-in-man implantation of the Tricento transcatheter heart valve for the treatment of severe tricuspid regurgitation. *EuroIntervention.* 2018;14:758–761.

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Treatment of Hypercholesterolemia With PCSK9 Inhibitors in Heart Transplant Recipients. First Experience in Spain

Tratamiento de la hipercolesterolemia con inhibidores de la PCSK9 en receptores de trasplante cardiaco. Primera experiencia en España

To the Editor,

Hypercholesterolemia continues to be an important comorbidity often seen in heart transplant (HT) recipients and is associated with a higher cardiovascular risk and with the appearance of graft vascular disease (GVD).[1] Statin therapy in this patient group has been shown to significantly reduce the incidence of acute graft rejection and GVD and to increase survival, benefits attributable not only to lower plasma cholesterol concentrations but also to the immunomodulatory effects of statins.[2] Consequently, clinical practice guidelines recommend long-term use in all HT recipients, regardless of low-density lipoprotein cholesterol (LDL-C) levels.[3]

Proprotein convertase subtilisin/kexin type 9 (PCSK9) selectively binds to LDL-C receptors in the hepatocyte membrane, enhancing