(1.46/100 people/y), 5 episodes of intracranial bleeding (0.29/100 people/y) and 102 deaths (5.85/100 people/y), 34 of which were of cardiovascular origin (1.95/100 people/y). The bleeding rate increased in line with the risk scores (Table 1, Table 2, Table 3 and Table 4 of the supplementary material). All the risk scores showed moderate discriminatory ability (Figure) for both major bleeding—HAS-BLED, 0.62 (95% confidence interval [95%CI], 0.59-0.65); ATRIA, 0.61 (95%CI, 0.58-0.64) and ORBIT, 0.59 (95%CI, 0.56-0.62)—and significant bleeding—HAS-BLED, 0.59 (95%CI, 0.56-0.62); ATRIA, 0.58 (95%CI, 0.55-0.61) and ORBIT, 0.57 (95%CI, 0.54-0.60). The discriminatory ability was somewhat higher for gastrointestinal bleeding—major gastrointestinal bleeding: HAS-BLED, 0.74 (95%CI, 0.71-0.76); ATRIA, 0.71 (95%CI, 0.68-0.74) and ORBIT, 0.69 (95%CI, 0.66-0.72); significant gastrointestinal bleeding: HAS-BLED, 0.69 (95%CI, 0.66-0.72); ATRIA, 0.67 (95%CI, 0.64-0.70) and ORBIT, 0.65 (95%CI, 0.62-0.69). Comparison of the ROC curves of the bleeding risk scoring systems showed no significant differences in any type of event in the general population or after stratification by type of DOAC (all $P > .05$) (Table 5 of the supplementary material).

The results of this study demonstrate that the 3 scoring systems assessed show moderate capacity with no significant differences in discriminating bleeding in patients with nonvalvular AF starting treatment with DOACs. Our results confirm the findings of Riziq-Yousef Abumuaileq et al.[1] and also extend their use to patients with AF being treated with DOACs. Given the increasing use of these anticoagulant agents in routine clinical practice, we consider our findings to be clinically significant. Bleeding risk scoring systems are highly useful for identifying patients with a high risk of bleeding who would probably benefit from closer monitoring. Among the different scoring systems available, the HAS-BLED scoring system has become a benchmark in routine clinical practice, as it has various advantages over other published scoring systems. Because this scoring system has been previously validated in various populations with various antithrombotic regimens, it can be applied to a wide population group. Furthermore, the presence of reversible bleeding risk factors that can be modified by clinicians allows patients' bleeding risk treatment to be considered a nonstatic process, unlike other scoring systems that do not include these potentially modifiable factors. The European Society of Cardiology recently published new clinical practice guidelines for the management of AF.[5] Unlike previous guidelines, these do not recommend using a particular bleeding risk scoring system, but rather focus on using any of them to identify and correct potentially modifiable bleeding risk factors.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found in the online version available at http://dx.doi.org/10.1016/j.rec.2017.01.021.

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Late Coronary Obstruction After Implantation of Self-expandable Valves. Clinical and Angiographic Features of an Unexpected Complication

Obstrucción coronaria tardía tras válvulas autoexpandibles: características clínicas y angiográficas de una complicación inesperada

To the Editor,

Coronary obstruction is reported in 1% of transcatheter aortic valve implantation (TAVI) procedures, making it a dreaded complication.[1] According to a large study, the vast majority of cases (89%) become manifest during the procedure.[2] We report the cases of 2 patients that illustrate how coronary obstruction can occur several hours after implantation of self-expandable valves.

The first patient was an 87-year-old woman in a delicate state of health with bronchial asthma. She was scheduled for transfemoral TAVI (Society of Thoracic Surgeons score, 6%). The echocardiographic study showed a moderately calcified valve with maximum gradient of 81 mmHg, mean gradient of 40 mmHg, and area of 0.9 cm^2. The aortic root was small (annulus diameter, 21 mm; sinus, 24 mm; height of the left ostium, 6 mm). After 18 mm balloon valvuloplasty with simultaneous aortography, a 26 mm CoreValve was implanted. The positioning was high but the functional result was acceptable (Figure 1 and video 1 of the supplementary material). The next day, the patient developed angina with ST depression. Aortography showed preserved coronary artery flow, and therefore it was decided to start medical treatment. Three days later, she had a more intense

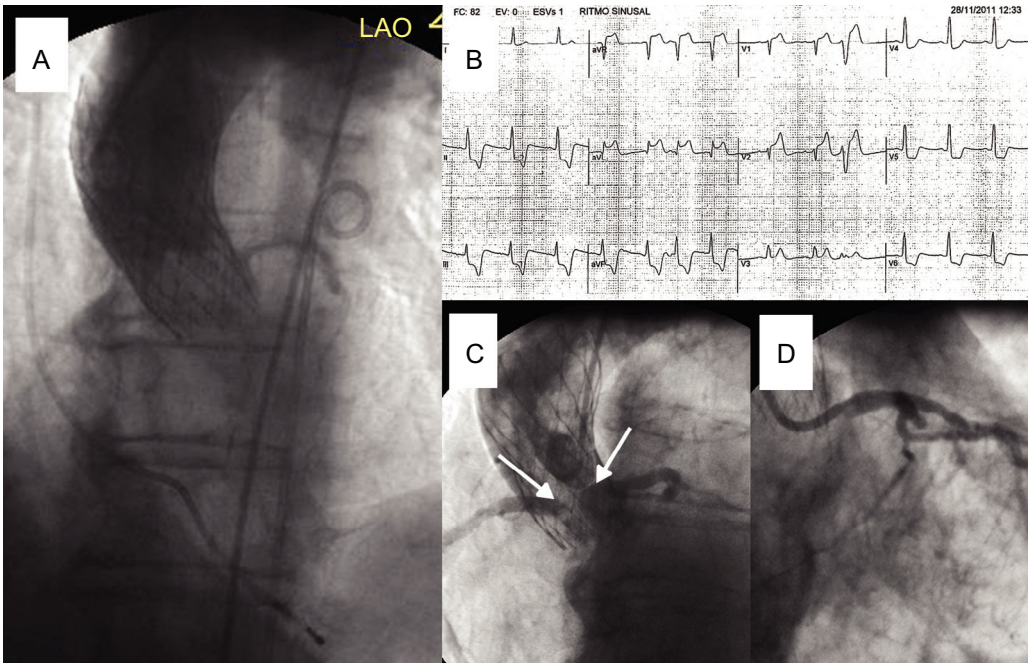

Figure 1. A: Acute outcome. B: Electrocardiogram during chest pain. C: Compromise of both ostia by the skirt of the prosthesis (arrows). D: Coronary artery reperfusion after prosthesis retraction. LAO: Left anterior oblique.

episode with diffuse ST depression. Coronary angiography showed that the skirt of the prosthesis had compromised both ostia (video 2 of the supplementary material). The patient went into cardiorespiratory arrest, which resolved with resuscitation measures, balloon contrapulsation, and retraction with a 20 mm snare catheter (video 3 of the supplementary material). The patency of the coronary arteries was then confirmed (video 4 of the supplementary material) and an improvement was observed in the maximum gradient (49 mmHg). The patient refused any additional procedures and was discharged. She remained free of events for 24 months.

The second patient was an 81-year-old man with limited mobility and a history of myocardial infarction. He presented with myelofibrosis with severe pancytopenia and critical aortic stenosis (maximum gradient, 107 mmHg; mean, 63 mmHg; area, 0.5 cm^2), with severe leaflet calcification (Society of Thoracic Surgeons score, 6%). Computed tomography showed an annulus with a mean diameter of 23 mm, and derived from the perimeter, a left sinus of 29 mm and a left ostium with a height of 9 mm. Transfemoral TAVI was programmed under heparin treatment, single antiplatelet therapy with aspirin, and prior platelet transfusion. After 23 mm balloon valvuloplasty, a 29 mm Evolut R valve was implanted, with postdilation using a 25 balloon (Figure 2 and video 5 of the supplementary material). At 2 hours after arrival in the intensive care unit, the patient experienced repeated episodes of angina with diffuse ST depression. Coronary angiography showed subocclusion of the trunk by a large calcified mass corresponding to the displaced native valve leaflet (video 6 of the supplementary material). Given the appropriate position and acceptable clinical tolerance, retraction was ruled out and the patient underwent percutaneous coronary intervention. After repeat attempts to pass through the obstruction, we decided to perform surgical revascularization. During transfer to surgery, the patient experienced a cardiac arrest.

The main mechanism of coronary obstruction associated with TAVI is displacement of the thickened and calcified native valve over the coronary ostium. Another much less frequent mechanism is direct obstruction by the prosthesis skirt.[3] In addition, other dynamic processes may be present such as tissue hematoma,[4] stasis of the aortic sinus,[5] and gradual expansion after implantation of self-expandable valves,[6] thus explaining the different presentations of the complication.

In a multicenter study of 6688 TAVI procedures, Ribeiro et al.[2] identified height of the left ostium < 12 mm and sinus diameter < 30 mm as the most important predictors of risk of obstruction from the anatomical point of view. In cases of higher risk, certain measures may help avoid the onset of such complications. These include adjusting the size of the valve to the outer annulus (for example, 26 mm instead of 29 mm in the second patient); avoiding implantation in a high position, thereby reducing the remaining space and favoring blood stasis; assessing behavior during valvuloplasty, although the sensitivity of this maneuver may be reduced when small balloons are used; and protecting the coronary artery during implantation with a high-support guidewire, thereby allowing the alignment to be changed and facilitating access if there is obstruction.

The usual treatment is a percutaneous coronary intervention,[2] but sometimes the guidewire cannot be advanced. In these cases, retraction toward the ascending aorta is a reasonable alternative. This maneuver can be performed with a snare catheter or, as an emergency resource, with an oversized balloon at the waist of the prosthesis.[3]

In conclusion, late obstruction of the coronary ostium is a potential complication in the first few hours after implantation of self-expandable valves. Identification of associated factors is essential for the prevention and early diagnosis of this complication.

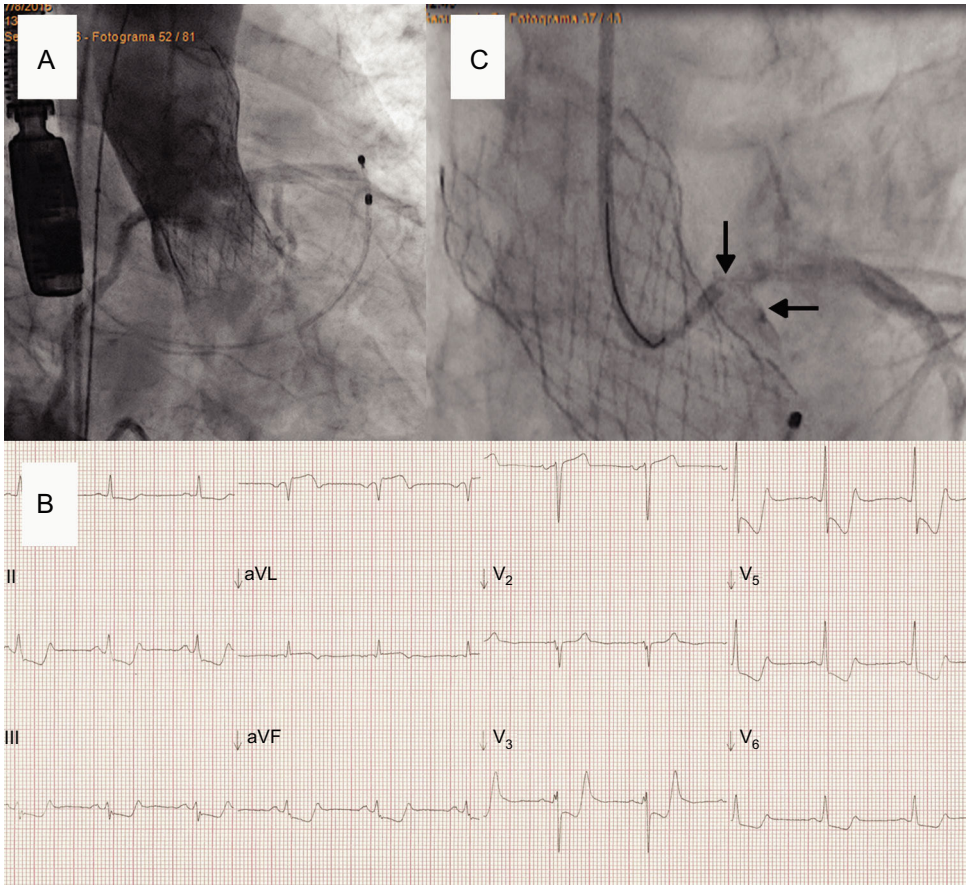

Figure 2. A: Aortography after implantation. B: Electrocardiogram during angina after 7 hours in the intensive care unit. C: Invasion of the aortic sinus by a large calcified mass (arrows), compromising the flow in the common trunk.

CONFLICTS OF INTEREST

C. Morís is a consultant for Medtronic for implantation of CoreValve percutaneous aortic prostheses.

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