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Infective Endocarditis After Transcatheter Aortic Valve Replacement: The Worst That Can Happen

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Transcatheter aortic valve replacement (TAVR) has become the gold standard treatment for aortic valve stenosis in inoperable or high-risk patients and has been validated as an alternative in intermediate-risk patients.[1] Infective endocarditis (IE) is a recently described complication of TAVR that is difficult to diagnosis and has a dismal prognosis; TAVR-IE deserves prompt diagnosis and treatment.[2–4] However, relatively few data exist concerning TAVR-IE and the best way to manage these patients, particularly concerning the benefit of early surgery.

In this issue of the *Journal of the American Heart Association (JAHA)*, Mangner et al[5] tried to determine the impact of cardiac surgery compared with medical treatment on the prognosis of patients developing IE after TAVR.

Even if their study does not answer all the questions, it gives us the opportunity to summarize our knowledge concerning diagnosis, treatment, and prevention of TAVR-IE.

Diagnosing TAVR Endocarditis

As in surgical prosthetic valve IE, diagnosis is more difficult in TAVR-IE than in native valve IE, with a lower diagnostic value of echocardiography. Usual echocardiographic criteria are not easily applicable in TAVR-IE. A previous series from Mangner et al, for example, included 55 patients with TAVR-IE, among whom transesophageal echocardiography was performed in 47 (85%), vegetation was observed on the prosthesis in only 12 (25%), and imaging was negative in 15/47 (31.9%).[2] That result means we cannot use echocardiography alone to rule out TAVR-IE. Different echocardiographic patterns have recently been reported in TAVR-IE, including an obstructive pattern with leaflet thickening and high transvalvular gradient.[6] Data about echocardiography in TAVR-IE, however, are still scarce and are based on registries or retrospective studies, which explains why the value of the Duke criteria[7] in this population is unknown. The most recent and largest studies on TAVR-IE gave few new information about the value of echocardiography in these patients.[3,4]

Recently, other imaging techniques, such as multislice computed tomography (CT)[8–10] and ^{18}F-FDG (^{18}F-fluorodeoxyglucose) positron emission tomography/CT[10–12] have been shown to be useful particularly in the setting of suspected prosthetic valve IE[11] and have been included in the new European Society of Cardiology (ESC) criteria.[13] ^{18}F-FDG positron emission tomography/CT has been shown to increase the sensitivity of the Duke criteria[7] without significantly decreasing their specificity.[11] However, positron emission tomography/CT has not been specifically studied in suspected TAVR-IE, the value of cardiac CT is unknown in this setting, and the value of the combination of these techniques in a multimodality approach is unknown.[6]

In addition, concerns have been reported concerning the use of positron emission tomography/CT in the early postoperative period in suspected prosthetic valve IE[8] because of the inflammatory process frequently present during this period; whether this limitation also applies to TAVR patients is unknown. In a recent series of 16 patients with suspected TAVR-IE,[6] it was found that the multi-imaging approach (ESC criteria) had higher sensitivity than the Duke criteria (100% versus 50%, respectively) for the diagnosis of TAVR-IE. Nevertheless, it was a single-center study with a relatively small cohort, and the results obtained should be interpreted with caution.[6]

Contrary to their previous paper, in which 31.9% patients with TAVR-IE had negative imaging studies,[2] the authors included in the current study[5] only patients with echocardiographic evidence of IE. Forty-one patients with definite or

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possible TAVR-IE were thus excluded from the study because of the absence of echocardiographic evidence of IE.[5] As recognized by the authors, although they used the ESC guidelines definition of "definite or possible IE,"[13] some patients did not undergo imaging techniques other than echocardiography and may represent false-negative echocardiographic studies but in fact have true IE. These patients could have been erroneously excluded, thus causing significant bias in the study results. Future studies on prognosis of TAVR-IE should include modern imaging techniques.

Treating TAVR Endocarditis

Guidelines[1,13,14] recommend early surgery to be performed in complicated cases of IE, including those with congestive heart failure, perivalvular complications, and high risk of embolism. Unfortunately, these recommendations cannot be applied in all patients with TAVR-IE because contraindications to surgery frequently exist in this high-risk population. In the largest registry, reporting 250 cases,[4] TAVR-IE was associated with an in-hospital mortality rate of 36% and a 2-year mortality rate of 66.7%. Surgery could be performed in only 14.8% of patients (despite 81.2% having at least 1 indication for surgery, according to current guidelines) and was not associated with a reduced risk of in-hospital death. This very low rate of valve surgery is likely secondary to the very high surgical risk of such patients, in addition to the potential technical difficulties of removing a stent frame adherent to the aorta.[4] Similar trends were observed in smaller series.[15,16]

The current article from Mangner et al[5] adds new information on the role of surgery in patients with TAVR-IE. In their series of 64 patients with TAVR-IE, 20 were treated by surgery. They found that the 44 patients treated by antibiotic therapy alone were older (P=0.006), had higher Society of Thoracic Surgeons scores (P=0.029), and more often had severe chronic kidney disease (P=0.037) than the operated patients. One-year mortality was not different between groups, but the complication rate was higher in the surgical group (P=0.024). Interestingly, among the 44 patients treated by antibiotic therapy alone, 31 had a theoretical indication for surgery. The reasons why surgery was denied in these patients should be important to analyze in subsequent studies. The authors should be congratulated for adding new information on the prognosis and role of surgery in patients with TAVR-IE. However, because this study has several limitations (retrospective, observational, nonrandomized study in a small patient population treated at a single center, with an imaging selection bias), the authors are unable to conclude that surgery is or is not better than medical therapy alone in these patients.

In the era of expanding indications for TAVR, all efforts should be made to create multicenter, prospective registries and studies, if possible randomized, to assess the real role of surgery in these patients.

Preventing TAVR Endocarditis

If we cannot cure all TAVR-IE patients with surgery, the best we can do is to try to prevent TAVR-IE. Although guidelines recommend that antibiotic prophylaxis be considered for patients with any prosthetic valve, including a transcatheter valve, in case of dental procedure risk,[13] streptococcal infection is very rare in TAVR-IE, as shown in the current study and in others.[4] Conversely staphylococcal and, more important, enterococcal infections, mostly nosocomial, are the most frequent in this population. This underscores the crucial need to focus on prevention rather than prophylaxis in those patients who have high exposure to healthcare procedures, older age, and foreign material.[4] This work should include aseptic measures during the insertion and manipulation of venous catheters and during any invasive procedures, including TAVR,[13] and use of antibiotics adapted to these microorganisms for prophylaxis during TAVR procedures.[4]

Managing Patients With Suspected and Definite TAVR-IE

Further studies are needed to provide clear information to the clinician about the optimal use of new imaging techniques to diagnose TAVR-IE when it is suspected and the best way to treat it when the diagnosis is definite. Pending the results of future studies, we should recognize that factors other than surgery mainly influence outcome in patients with TAVR-IE, including comorbidity, frailty, heart failure, renal failure,[4] and, in the current paper,[5] disease characteristics (eg, sepsis on admission or a formal indication for cardiac surgery). We do not currently have enough published data to conclude that surgery is or is not better than medical therapy alone in patients with TAVR-IE. For this reason, the decision to operate or not should be individualized for each patient depending on his or her clinical status, operative risk, and comorbidities.

More important, because both diagnosis and treatment choice are particularly difficult for patients with suspected TAVR-IE, these patients should be referred to reference centers and any decision should be taken by the endocarditis team. More and more centers in Europe have an endocarditis team, with the presence of several specialists onsite, including cardiac surgeons, cardiologists, anesthesiologists, infectious diseases specialists, microbiologists, and—when available and needed—specialists in valve diseases, congenital heart disease, pacemaker extraction, echocardiography and other cardiac imaging techniques, and neurology, as well as facilities for neurosurgery and interventional neuroradiology.[13] Although

patients with noncomplicated endocarditis can be initially treated in nonreference centers, patients with complicated IE should be evaluated and managed at an early stage in a reference center.[13] As confirmed by the article by Mangner et al,[5] patients with TAVR-IE represent a very high-risk subgroup and should be managed in these reference centers.

Disclosures

None.

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