Editorial

Infective valve endocarditis after transcatheter aortic valve implantation—a dangerous liaison

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Introduction

Infective endocarditis (IE) is a rare disease in the general population (1), but the annual incidence is markedly increased in patients with previous cardiac valve surgery, which impacts 4,000–6,000 cases per million patients (2). Due to the recent development of transcatheter aortic valve implantation (TAVI), our knowledge about TAVI-IE is still limited, in particular, in comparison to IE developing after surgical aortic valve replacement (SAVR-IE). Initial data on TAVI-IE are concerning, since it is difficult to diagnose and prognosis is dismal. This Editorial will summarize our current knowledge concerning diagnosis, treatment and prevention of TAVI-IE.

Diagnosing TAVI-IE

As in SAVR-IE, diagnosis is more difficult in TAVI-IE than in native valve IE, with a lower diagnostic value of echocardiography (3) except in massive findings as shown in the *Figure 1*. Previous registries have shown negative echocardiographic imaging in about 30% of patients with TAVI-IE (4,5), but those patients, compared to patients with a positive imaging, had a comparably worse prognosis (4). Different echocardiographic patterns have been described in TAVI-IE, including an obstructive pattern with leaflet thickening and high transvalvular gradient as the only abnormality at early stages (6). Other imaging techniques, such as multislice computed tomography (CT) and 18F-FDG (18F-fluorodeoxyglucose) positron emission tomography (PET)/CT are useful in the setting of suspected prosthetic valve IE and have been included in the new European Society of Cardiology (ESC) criteria (1). However, PET/CT and cardiac CT have not been specifically studied in TAVI-IE and the value of the combination of these techniques in a multimodality approach is unknown. This uncertainty explains why the value of the Duke criteria (1) is indefinite in this population and many patients are classified as "possible" IE due to negative imaging. Therefore, prompt diagnosis and treatment is necessary in cases with high clinical suspicion for IE, in particular if continuous bacteremia with the two most common agents *Staphylococcus* and *Enterococcus* is evident (4,5).

Incidence of TAVI-IE

Despite all the diagnostic difficulties, the incidence of TAVI-IE has been reported to be about 1.1% to 1.8% per patient-year (4,5). Two recent cohort studies revealed that there is no significant difference in the incidence of TAVI-IE (1.6–1.7% per patient-year) compared to SAVR-IE (1.2–1.9% per patient-year) up to five years of follow-up (7,8).

Treating TAVI-IE

Early surgery is recommended in complicated cases of IE, including those with high risk of embolism, perivalvular complications and congestive heart failure. Unfortunately, these recommendations cannot be applied in most of the patients currently treated by TAVI that develop IE, as contraindications to surgery frequently exist in this high-risk population. In the largest registry, surgery was performed in only 14.8% of patients with TAVI-IE despite 81.2% having at least 1 indication for surgery, according to current guidelines (5) and cardiac surgery was not associated

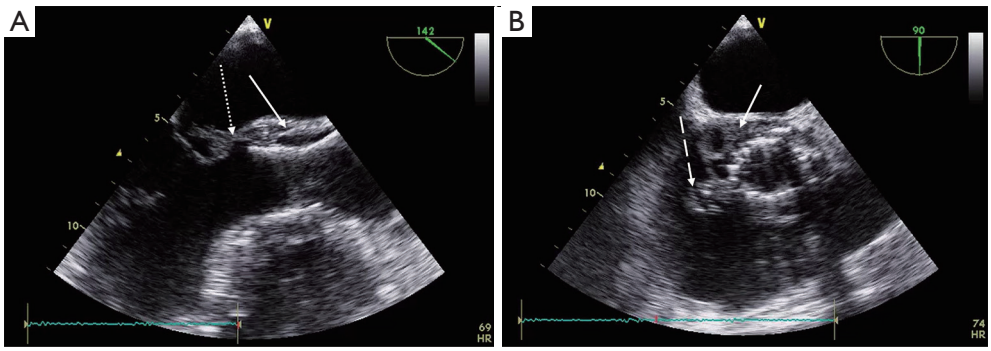

Figure 1 Transoesophageal echocardiography in a long-axis (A) and short-axis view (B) showing massive endocarditis five months after implantation of a CoreValve prosthesis caused by *Enterococcus faecalis*. Not only the perivalvular space (white solid arrow in A and B) is affected but also perforation and vegetation at the anterior mitral valve leaflet (white dotted arrow in A) and vegetation at the septal tricuspid valve leaflet (white dashed arrow in B) are evident.

with a reduced risk of in-hospital death. This very low rate of valve surgery is likely due to the high surgical risk of such patients, in addition to the potential technical difficulties like removing a stent frame adherent to the aorta. Against this background, it is not surprising that TAVI-IE is associated with a devastating in-hospital and mid-term mortality ranging from 34–63.6% and 66.7–74.5%, respectively (4,5).

In a recent analysis, we tried to gain more information on the role of cardiac surgery in patients with TAVI-IE (9). In a series of 64 patients with TAVI-IE, 20 were treated by surgery. The 44 patients treated by antibiotic therapy only 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). One-year mortality was not different between groups, but the complication rate was higher in the surgical group (P=0.024). The results were not significantly different after manual matching comparing 20 patients treated by antibiotics only *vs.* 20 patients treated by cardiac surgery (and antibiotics). Due to several limitations (retrospective, observational, nonrandomized study in a small patient population treated at a single centre, potential imaging selection bias), we are unable to conclude whether surgery is better when compared to medical therapy alone in these patients. However, this is also true for any prosthetic valve IE treatment since our guideline recommendations are based on registries (10) without having data derived from randomized controlled trials. In the era of expanding indications for TAVI, 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 TAVI-IE

If treatment of TAVI-IE is so difficult, the best approach is to prevent it. Although guidelines recommend antibiotic prophylaxis for patients with any prosthetic valve in case of dental procedures with increased risk for bacteremia (1), *Streptococcal* infection is very rare in TAVI-IE. Conversely, *Staphylococcal* and, probably more important, *Enterococcal* infections are most frequent in this population (4,5). 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 (4,5), including aseptic measures during any invasive procedure and use of antibiotics potentially adapted to these microorganisms for prophylaxis during TAVI procedures (5).

Conclusions

Further studies are needed to provide clear information to the clinician about the optimal use of new imaging techniques to diagnose TAVI-IE and the best way to treat it when diagnosis is definite. We should recognize that factors other than surgery mainly influence outcome in patients with TAVI-IE, including comorbidity, frailty, heart failure, renal failure (5) and disease characteristics (9). We do not currently have enough published data on the role of cardiac surgery in prosthetic valve IE and particularly TAVI-IE. For this reason, the treatment decision needs to be individualized depending on the clinical status, operative

risk and comorbidities. More importantly, because both diagnosis and treatment are particularly difficult for patients with suspected TAVI-IE, these patients should be referred to reference centers and the "endocarditis team" should make any decision as outlined in current guidelines (1).

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Footnote

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