

# Infective endocarditis on transcatheter aortic prosthesis: Are there differences with endocarditis on surgically implanted aortic bioprosthesis?

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Transcatheter aortic valve implantation (TAVI) has been a major advance in the treatment of aortic stenosis in elderly patients or those at very high surgical risk, and its indication has been extended to cases of high or even intermediate risk. For this reason, its use has increased notably in the past years [1]. One of the problems associated with TAVI is bioprosthesis infection [2]. The development of infective endocarditis (IE) on TAVI (IETAVI) is a serious complication, with the added problem that in many cases open-heart surgery is necessary to manage it. In patients at high baseline surgical risk, surgery may be contraindicated, or, in any case, the presence of the supporting stent makes the surgical procedure more complex. Some studies have analyzed the incidence of IETAVI, both in Spain [2, 3] and in other countries [4–6]. They all agree on an annual incidence of approximately 1.4–1.6% and high mortality, ranging from 41.8% in the Swedish registry of Bjursten et al. [6] to 47.2% in the Spanish multicenter study by Amat-Santos et al. [3]. They also agree with regard to a high mean age of around 80 years, greater comorbidity (higher incidence of renal failure, previous cancer, higher Charlson index, etc.), and the finding of *enterococci*, *Staphylococcus aureus* and coagulase-negative *staphylococci* as the most frequent microorganisms involved [2–6].

An aspect that has not been well studied yet is the possible difference between IETAVI and IE on surgical aortic valve replacement (IESAVR). Three

multicenter registries carried out in different countries (USA, France and Sweden) [4–6] found a similar incidence of IE in both groups, but there is a lack of studies that had compared clinical features, treatment and mortality between these two types of IE. Only 1 French study, using an administrative database, has compared mortality between IETAVI and IESAVR, but without differentiating between biological and mechanical prostheses [5], finding no differences between them. Therefore, given the scarcity of data on this subject, the objective herein, was to evaluate the incidence and characteristics of IE on TAVI, as well as its comparison with biological IESAVR in our hospital, a center of reference for cardiac surgery and invasive cardiology in Spain. For this purpose, two cohorts of patients were analyzed, including all cases of TAVI (n = 520) and biological SAVR (n = 652) consecutively implanted in our center between 2012 and 2020, and the incidence of IE is compared in both cohorts, their clinical characteristics, treatment and early in-hospital mortality. Non-parametric tests were used for comparisons (the Pearson exact test for dichotomous variables and the Mann-Whitney test for continuous variables). Continuous variables were expressed as median (interquartile range).

The incidence of IE in the TAVI group (n = 9) and in the SAVR group (n = 11) was similar (1.56% in the TAVI group and 1.68% in the surgical group). Age showed a trend to be higher in the IETAVI group: 81 (78–82) vs. 72 (70–79) years (p = 0.18).

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**Table 1.** Characteristics, treatment and early mortality of infective endocarditis in the overall series and in the two cohorts of patients.

	Overall series (n = 20)	IETAVI (n = 9)	IESAVR (n = 11)	P
Age [years]*	78 (72–81)	81 (78–82)	72 (70–79)	0.17
Female gender	6 (30%)	4 (44.4%)	2 (18.2%)	0.33
Early infective endocarditis	10 (55%)	6 (75%)	5 (45.5%)	0.18
Causal microorganism:				0.65
Staphylococcus aureus	1 (5%)	1 (11.1%)	0 (0%)	
Coagulase-negative Staphylococcus	6 (30%)	3 (33.3%)	3 (27.3%)	
Enterococcus	7 (35%)	2 (22.2%)	5 (45.5%)	
Streptococcus viridans	3 (15%)	1 (22.2%)	2 (18.2%)	
Not identified	3 (15%)	2 (22.2%)	1 (9.1%)	
Comorbidity and frailty indexes:				
Charlson index*	4 (2–7)	6 (4–7)	3 (2–5)	0.04
Frail index*	3 (2–4)	3 (3–4)	2 (2–3)	0.28
Complications:				
Any severe complication	19 (95%)	9 (100%)	10 (90.9%)	1
Heart failure	14 (70%)	6 (66.6%)	8 (72.7%)	1
Renal failure	7 (35%)	4 (44.4%)	3 (27.3%)	0.64
Persistent infection	13 (65%)	6 (66.6%)	7 (63.6%)	1
Prosthetic dysfunction	9 (45%)	3 (33.3%)	6 (54.5%)	0.64
Surgical indication:	13 (65%)	5 (55.5%)	8 (72.7%)	0.64
Operated	8 (62.5%)	2 (40%)	6 (75%)	0.23
Not operated	5 (38.5%)	3 (60%)	2 (25%)	
Type of surgery (on operated cases):				0.37
Emergent/urgent	3 (37.5%)	1 (50%)	2 (33.3%)	
Elective	5 (62.5%)	1 (50%)	4 (66.6%)	
In-hospital death	8 (40%)	4 (44.4%)	4 (36.4%)	1

\*Median (interquartile range); IETAVI — infective endocarditis on transaortic valve implantation; IESAVR — infective endocarditis on surgical aortic valve replacement

Frailty, measured by the Frail scale, was similar in both groups: 3 (3–4) vs. 2 (2–3) ( $p = 0.28$ ). Comorbidity, measured by the Charlson index, was significantly higher in the EITAVI group: 6 (4–7) vs. 3 (2–5) ( $p = 0.04$ ). There was a slight predominance of women and of early prosthetic IE in the TAVI group (Table 1). There were no differences between the two groups regarding causal microorganisms (Table 1), being the most frequent coagulase-negative *staphylococci* in IETAVI, 37.8% of the total, and *enterococci* in IESAVR, 45.5% ( $p = 0.65$ ). The incidence of severe complications was very high, although similar in both groups (TAVI 88.9%, SAVR 90.9%), as was the incidence of the different specific complications, as shown in Table 1. Regarding treatment, there was an indication for surgery, in accordance with the clinical practice

guidelines of the European Society of Cardiology, in the same proportion of patients: 62.5% of the IETAVI group and 72.7% of the IESAVR group ( $p = 0.64$ ). However, 5 of the 13 patients (38.5%) with an indication for surgery did not undergo surgery due to contraindications or very high surgical risk, and this proportion of patients who did not undergo surgery was numerically higher in the IETAVI group, 60% vs. 25% of the IESAVRs ( $p = 0.234$ ). In operated cases, the proportion of emergent/urgent and elective indications was similar in both groups (Table 1). Early in-hospital mortality within the active phase of the disease was high (40% in the overall series), but was similar in both groups (44.4% in IETAVI and 36.4% in IESAVR; Table 1). All deaths were related to endocarditis, except 1 of the 4 in the TAVI group, that was due to pneumonia.

From the data in the present series, with the limitation of a small sample size, inherent to the low frequency of this type of IE and the single-center nature of the study, it can be concluded that the incidence of IE on TAVI is infrequent and similar to that of surgical bioprosthetic IE, and that, despite a worse risk profile (older age, comorbidity, earlier prosthetic IE, and less surgery performed in indicated cases), the incidence of serious complications and their mortality are similar. This reinforces using TAVI as an aortic valve substitution therapy in elderly or high-risk patients.

**Conflict of interest:** None declared

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