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EDITORIAL

TAVI in Low-Intermediate Surgical Risk Severe Aortic Stenosis in 2025: Clinical Paradigms in a Continuing Evolution

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Transcatheter aortic valve implantation (TAVI) has undergone a remarkable transformation over the past decade, and by 2025 it has expanded firmly beyond the confines of high-risk or inoperable patients. TAVI now stands as an increasingly preferred and compelling therapeutic option in a broad spectrum of patients with severe aortic stenosis (AS), including those with low-intermediate surgical risk. This expansion reflects technological maturation and procedural refinement, together with a growing body of clinical evidence demonstrating that TAVI offers early safety, rapid functional recovery, and high-quality-of-life gains that rival—or surpass—those of surgical aortic valve replacement (SAVR).

Recent systematic reviews and meta-analyses provide a comprehensive synthesis of outcomes in this population. A large 2025 meta-analysis pooling six randomized trials with ≥4 years of follow-up demonstrated no significant difference between TAVI and SAVR in all-cause mortality or disabling stroke in low-intermediate risk patients, although a divergence in mortality favoring SAVR at five years was observed.[1] This finding underscores an emerging dynamic: while early and mid-term outcomes clearly support TAVI, long-term biological valve durability and late-phase event divergence require continued scrutiny, particularly in younger patients with longer life expectancy.

The NOTION-2 trial further refines our understanding by showing that low-risk patients with tricuspid anatomy achieved similar outcomes with TAVI and SAVR at three years, although those with bicuspid valves experienced numerically higher adverse events with TAVI.[2] These results reaffirm that the central role of anatomical assessment—especially in younger and structurally complex patients—remains essential when determining the optimal approach.

Economic analyses published in 2025 add another dimension to this evolving landscape. The United Kingdom and Swedish health-system evaluations concluded that SAPIEN 3 TAVI, despite its higher procedural cost, achieves acceptable cost-effectiveness thresholds in low-risk symptomatic severe AS when gains in quality-adjusted life years and early functional recovery are considered.[3,4] Thus, in carefully selected patients, TAVI represents not only a clinically sound but also an economically rational one.

One of the most important cautionary signals emerges from younger patient populations. Data from the United States Society of Thoracic Surgeons/American College of Cardiology transcatheter valve therapy (TVT) registry indicate that patients youger than 65 years represent a small but steadily growing subgroup undergoing TAVI, yet they carry a disproportionately high comorbidity burden and experience significantly worse 1-year mortality and rehospitalization rates compared with those patients aged 65–80 years.[5] These findings underscore the principle that chronological age alone should never be allowed to serve as the dominant factor in clinical decision-making.

Intermediate- and long-term outcomes from major randomized programs were substantially updated in 2025. The 7-year PARTNER 3 results confirmed no significant difference between TAVI and SAVR in the composite endpoint of death, stroke, or valve-related hospitalization, thereby reaffirming the noninferiority of TAVI in low-risk elderly patients.[6] Echocardiographic analyses at five years demonstrated that TAVI provides superior hemodynamics performance—including a higher stroke volume index and lower valvuloarterial impedance—although it remians associated with a higher prevalence of mild aortic regurgitation.[7] Likewise, the five-year findings of Evolut Low-Risk showed mortality and disabling stroke between the two treatments, accompanied by low reintervention rates in both groups.[8] Ten-year follow-up from the NOTION trial additionally suggests that TAVI durability is at least comparable to SAVR in elderly low-risk patients, even as conduction-system injury and paravalvular leak persist as notable concerns.[9]

Real-world experience continues to provide valuable context. Updated 2025 analyses from the TVT Registry demonstrate that carefully selected low-risk patients achieve excellent early outcomes, with <1% 30-day mortality and <5% 1-year mortality, although event rates

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remain slightly higher than those observed in randomized clinical cohorts.[10] These differences likely reflect unmeasured frailty, variations in comorbidity burden, and heterogeneity in center-level experience.

An particularly paradigm-shifting development is the growing evidence supporting earlier intervention. The 2025 EARLY-TAVR trial showed that in asymptomatic severe AS, early TAVI significantly reduced death, stroke, and cardiovascular hospitalization compared with clinical surveillance, despite most surveilled patients eventually undergoing valve replacement.[11] These findings challenge long-standing "watchful waiting" strategies and may redefine treatment thresholds for a substantial proportion of patients.

Taken together, the evidence accumulated by 2025 demonstrates that TAVI is a safe, effective, and clinically advantageous treatment option for many patients with low-intermediate surgical risk severe AS, offering rapid recovery and excellent peri-procedural safety. Nonetheless, persistent considerations—including late-phase mortality divergence, elevated rates of conduction disturbance and paravalvular regurgitation, and ongoing uncertainties in younger cohorts—underscore that TAVI cannot yet be viewed as the universal default for all low-risk patients.

Based on my clinical experience and interpretation of emerging data, I believe that the trajectory of TAVI is unmistakably progressive. The accelerating pace of technological refinement, including next-generation valve platforms, reduced conduction-system trauma, improved commissural alignment, and device designs that preserve future coronary access, strongly suggests that the role of TAVI in low-intermediate risk patients will expand substantially over the next decade. As durability data continue to mature, and as procedural precision improves with modern imaging and artificial intelligence-assisted navigation, TAVI is likely to evolve from "an alternative" to "a predominant first-line therapy" in this population. Thus, the natural trajectory of innovation points toward increasingly frequent TAVI use among low-intermediate risk patients, provided that careful anatomical and clinical selection remains central to decision-making.

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