



## 27. THE SIGNIFICANT IMPACT OF ARTIFICIAL INTELLIGENCE IN TAVI

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**Introduction.** Currently, TAVI represents a benchmark in the treatment of patients with severe aortic stenosis, becoming a durable and preferred option compared to the traditional SAVR method. The success of TAVI significantly relies on the careful evaluation of the patient before, during, and after the procedure. A new paradigm in the assessment of patients for TAVI has emerged with the introduction of AI, providing more flexible, adaptable, and potentially more accurate approaches for risk estimation and patient selection in the context of the TAVI procedure.

**Aim of study.** Through the analysis of existing studies and literature, we aim to highlight the ways in which AI can enhance various aspects of the TAVI procedure, from diagnosis and planning to image analysis and complication management. Understanding how AI can contribute to the planning and execution of the TAVI procedure can optimize the patient selection process, reduce complications, and improve post-procedural outcomes for patients.

**Methods and materials.** This is a synthesis of newest medical articles and national protocols published during the years 2021-2024, found by the search engines Google Scholar, HINARI, and NCBI.

**Results.** Decision algorithms contribute to establishing a personalized patient profile, determining the relative benefits of TAVI compared to other treatment options. A study cohort of 151 patients shows that simulation algorithms can provide a virtual preview of the procedure with 100% sensitivity, allowing the medical team to prepare efficiently for the intervention. This contributes to optimizing the size and positioning of the valve or blood vessels course, based on imagistic analysis, and assessing relevant anatomical details, automatically with 100% precision in 2 min compared to the 10 min required for manual measuring. This visualizing opportunity can lead to a decrease in post-procedural complications, such as paravalvular regurgitation, with a 76% positive prediction and 100% negative prediction. Already knowing the probability of readmission, with a high probability, predicted by AI in the study of a 917 patient cohort, and the patient's postoperative mortality, validated in a study of 10,000 patients, where the accuracy reached 80% of cases, physicians can more easily guide the clinical future of the patient in the right direction. The AI feedback can contribute to the continuous improvement of the procedure and treatment, based on accumulated clinical experience.

**Conclusion.** Integrating this technology into TAVI practice, brings significant benefits in improving efficiency, accuracy, and clinical outcomes. A current worrisome trend is data privacy of patients because of the need for large and high-quality datasets and the development of precise, reliable, and interpretable artificial intelligence algorithms.

**Keywords.** Artificial Intelligence (AI), TAVI, TAVR, Machine Learning.