

# Surgical valve replacement and transcatheter valve replacement in aortic valve disease: A comprehensive comparison.

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## Introduction

Aortic valve disease, characterized by the dysfunction of the aortic valve, poses a significant burden on patients worldwide. Two primary treatment options for aortic valve disease are surgical valve replacement (SVR) and transcatheter valve replacement (TVR). While SVR has been the gold standard for decades, TVR has emerged as a less invasive alternative in recent years. This article aims to provide a comprehensive comparison of SVR and TVR in the context of aortic valve disease, exploring their indications, procedural aspects, clinical outcomes, and long-term durability.

Surgical valve replacement (SVR) and transcatheter valve replacement (TVR) are two main treatment options for aortic valve disease. SVR involves the removal of the diseased valve and replacement with a mechanical or bioprosthetic valve through open-heart surgery. It has been the conventional approach with established long-term durability. On the other hand, TVR is a less invasive procedure where a prosthetic valve is delivered through a catheter, typically inserted via the femoral artery. TVR is often considered for high-risk or inoperable patients who may not tolerate open-heart surgery well. Both SVR and TVR have shown excellent immediate procedural success rates and significant improvements in symptoms and hemodynamics. While SVR has traditionally been associated with better long-term durability, recent studies suggest that TVR outcomes are comparable, indicating the growing effectiveness of transcatheter approaches. Patient selection and shared decision-making play a crucial role in determining the most suitable treatment modality based on individual patient characteristics, risk profiles, and treatment goals. Continued research and advancements in both techniques aim to further refine and enhance outcomes for patients with aortic valve disease[1].

## Indications and Patient Selection

SVR is generally recommended for patients with severe aortic valve stenosis or regurgitation who are suitable candidates for open-heart surgery. TVR, on the other hand, is often considered for high-risk or inoperable patients, as well as those with anatomical considerations that favor a transcatheter approach. Careful patient selection is crucial in determining the optimal treatment modality for each individual[2].

## Procedural Considerations

SVR involves the excision of the diseased valve followed by the implantation of a mechanical or bioprosthetic valve. It is performed under general anesthesia with a median sternotomy or minimally invasive techniques. In contrast, TVR is a less invasive procedure where a prosthetic valve is deployed through a catheter, typically inserted via the femoral artery (transfemoral approach) or through alternative access sites.

Both SVR and TVR have demonstrated excellent immediate procedural success rates, with significant improvements in symptoms and hemodynamics. SVR has traditionally shown favorable outcomes in terms of long-term durability and freedom from reoperation. However, recent studies have reported comparable outcomes between SVR and TVR, suggesting the evolving effectiveness of transcatheter approaches[3].

The durability of prosthetic valves is a crucial aspect for consideration. Bioprosthetic valves used in both SVR and TVR have shown improved longevity over the years. However, they are associated with the risk of structural degeneration and subsequent valve dysfunction. Mechanical valves, used primarily in SVR, offer excellent durability but necessitate lifelong anticoagulation therapy. Ongoing research aims to enhance the longevity of transcatheter valves, further expanding their applicability[4].

Both SVR and TVR procedures carry potential risks and complications. Surgical interventions are associated with the risks of bleeding, infection, and prolonged hospital stays. In contrast, TVR carries a lower risk of major complications but can present with access-site complications, paravalvular leak, or stroke. Advances in technology and procedural techniques continue to address and mitigate these complications.

## Patient Selection and Shared Decision-Making

The choice between SVR and TVR requires a multidisciplinary approach involving cardiologists, cardiothoracic surgeons, and interventionalists. Shared decision-making, based on patient characteristics, risk profiles, and treatment goals, plays a vital role in selecting the most suitable treatment modality[5].

## Conclusion

Surgical valve replacement and transcatheter valve replacement have revolutionized the management of aortic

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valve disease. While SVR remains the gold standard, TVR has emerged as a viable alternative, particularly for high-risk or inoperable patients. Advances in transcatheter technology and long-term data are gradually expanding the indications for TVR. Ultimately, the choice between SVR and TVR should be tailored to the individual patient, considering their clinical profile, anatomical considerations, and shared decision-making with the medical team. Continuous research and advancements in both modalities aim to further improve patient outcomes and enhance the management of aortic valve disease.

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