Transforming heart valve treatment: The rise of transcatheter heart valve therapies.

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Introduction

Transcatheter Heart Valve Therapies (THVT) have emerged as a groundbreaking approach to treating heart valve diseases, particularly in patients who are not candidates for traditional open-heart surgery. These minimally invasive procedures are transforming the management of conditions like aortic stenosis and mitral regurgitation, offering patients quicker recovery times, less discomfort, and improved outcomes. In this article, we explore the evolution, techniques, and future prospects of THVT. Heart valve diseases, particularly aortic stenosis (narrowing of the aortic valve) and mitral regurgitation (leakage of the mitral valve), are common in elderly populations. As people age, heart valves can become stiff, calcified, or otherwise dysfunctional, impairing blood flow and leading to severe complications such as heart failure, stroke, and even death. Traditionally, heart valve replacement required open-heart surgery, which posed risks, particularly for elderly or frail patients. For many patients, especially those with multiple comorbidities, surgery was often not a viable option. This led to the development of trans catheter heart valve therapies minimally invasive procedures that use catheters inserted through blood vessels to repair or replace heart valves. [1,2].

TAVR has revolutionized the treatment of severe aortic stenosis. In this procedure, a replacement valve is delivered via a catheter, usually inserted through the femoral artery (or sometimes via the subclavian or transapical approach), and positioned inside the diseased valve. The new valve is expanded, restoring normal blood flow without the need for open-heart surgery. Since its introduction, TAVR has become the standard of care for patients with symptomatic severe aortic stenosis who are at high or intermediate risk for traditional surgery. Clinical trials have demonstrated that TAVR not only improves survival rates but also enhances the quality of life for patients, making it a preferred choice for older populations.For patients with mitral regurgitation, where the mitral valve doesn't close properly and allows blood to flow backward into the left atrium, TMVR provides a less invasive option for valve repair. One of the most commonly performed procedures is the MitraClip, where a device is inserted via a catheter to clip together the leaflets of the mitral valve, improving its function. [3,4].

This procedure is particularly beneficial for patients with symptomatic, severe mitral regurgitation who are not candidates for open surgery. TMVR has shown to significantly reduce symptoms and improve heart function, although it is still being refined for broader indications. TPVI is used to treat patients with congenital heart defects, specifically those who have undergone surgery for conditions such as Tetralogy of Fallot or other forms of pulmonary valve dysfunction. A catheter is used to deliver a new valve to the pulmonary artery, bypassing the need for open-heart surgery. TPVI provides long-term relief for patients, particularly those with right-sided heart defects, improving cardiac output and preventing complications. [5,6].

The major advantages of THVT over traditional surgery. The procedure is performed through small incisions, reducing trauma and recovery time. Patients typically experience shorter hospital stays and quicker returns to daily activities. For elderly patients and those with comorbidities, THVT offers a safer alternative with fewer complications compared to open-heart surgery. By restoring normal heart valve function, THVT can improve heart output and reduce symptoms of heart failure, such as shortness of breath and fatigue.While THVT has made significant strides in treating heart valve diseases, there are challenges that remain. One of the major hurdles is ensuring long-term valve durability. Although TAVR and TMVR devices have been proven to work well in the short and medium term, their long-term performance is still being studied. Researchers are working to develop more durable materials and techniques to increase the lifespan of these valves. [7,8].

Moreover, expanding the indications for these therapies is a key focus. Currently, TAVR is approved for aortic stenosis and TMVR for mitral regurgitation, but other valve disorders, such as tricuspid regurgitation, are being investigated for potential treatment via catheter-based techniques. The future of THVT looks promising, with ongoing advancements in technology, device design, and clinical techniques. Robotic-assisted procedures, 3D imaging, and the use of artificial intelligence to guide procedures are all contributing to more accurate and personalized treatments. Additionally, the expansion of indications to include more complex valve diseases, as well as the development of less invasive approaches to valve replacement and repair, will continue to drive the growth of this field. As a result, THVT may become the go-to treatment option for a broader range of patients, including those who were once deemed inoperable. [9,10].

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Conclusion

Transcatheter heart valve therapies represent a major breakthrough in the field of cardiology, offering less invasive, highly effective treatments for patients with severe heart valve disease. As the technology continues to evolve, these therapies are expected to become even more accessible and beneficial to a wider range of patients, offering a lifeline to those in need of heart valve intervention. The future of THVT holds great promise, and ongoing research will only enhance its potential to transform the landscape of cardiovascular care.

References

1. Franklin RC.Nomenclature for congenital and paediatric cardiac disease: historical perspectives and The International Pediatric and Congenital Cardiac Code. Cardiol Young. 2008;18 Suppl 2:70-80.
2. Van der Linde D. Birth prevalence of congenital heart disease worldwide: a systematic review and meta-analysis.J Am Coll Cardiol. 2011;58:2241-7.
3. Zeitlin J. Preterm birth time trends in Europe: a study of 19 countries. BJOG. 2013;120:1356-65.
4. Tanner K. Cardiovascular malformations among preterm infants. 2005;116:e833-8.
5. Blencowe H. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications.Lancet.2012;379:2162-72.
6. Nguyen B. Sulforaphane pretreatment prevents systemic inflammation and renal injury in response to cardiopulmonary bypass. J Thorac Cardiovasc Surg. 2014;148:690–97.
7. Kumar AB. Association between postoperative acute kidney injury and duration of cardiopulmonary bypass: a meta-analysis. J Cardiothorac Vasc Anesth .2012; 26:64–69.
8. Qu X, N-acetylcysteine attenuates cardiopulmonary bypass-induced lung injury in dogs. J Cardiothorac Surg. 2013; 8:107.
9. Sleeman P. High fat feeding promotes obesity and renal inflammation and protects against post cardiopulmonary bypass acute kidney injury in swine. Crit Care.2013;17:R262.
10. Goebel U. Inhaled carbon monoxide prevents acute kidney injury in pigs after cardiopulmonary bypass by inducing a heat shock response. Anesth Analg.2010; 111:29–37.

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