

Minimally Invasive Trends in Aortic Valve Replacement Procedures

Minimally invasive cardiac surgery trends in US and it's comparison with India

Submitted by,

Dr. Midhun Mathew Tom

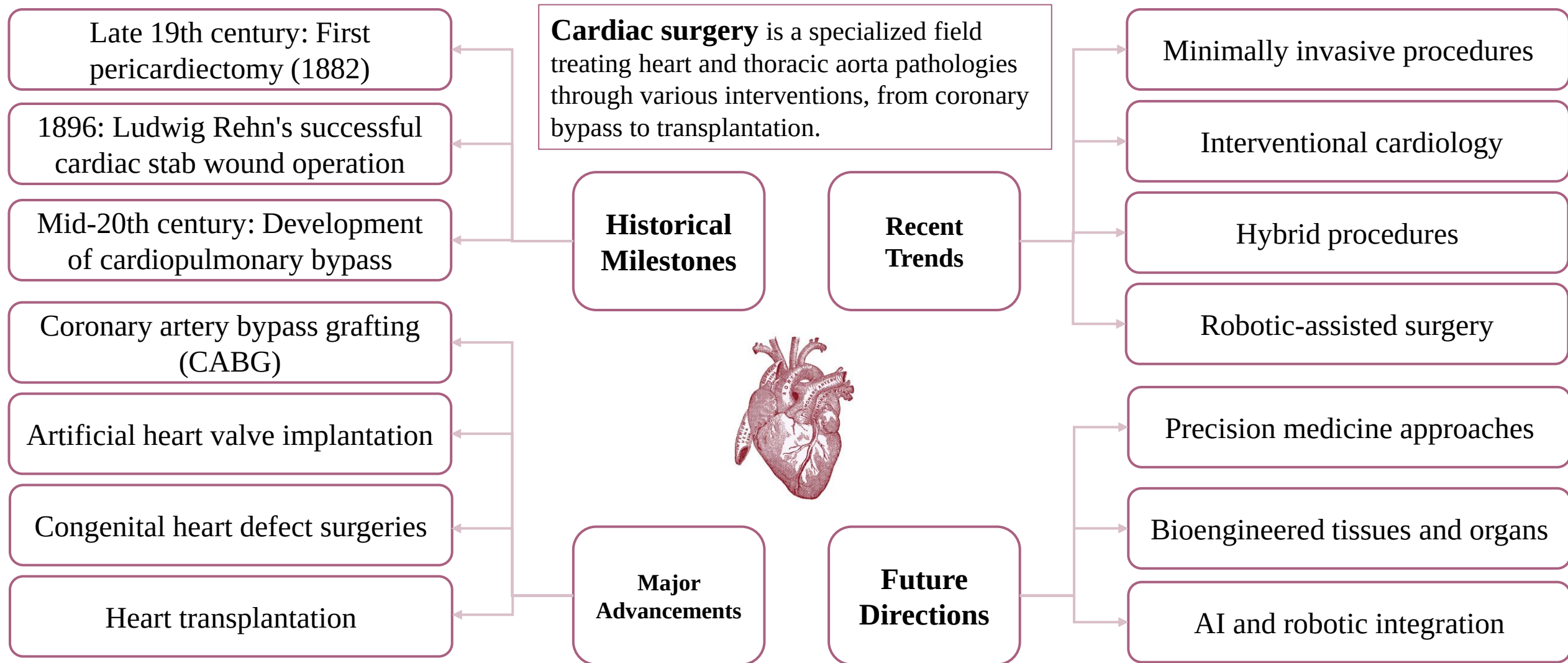
MBA Healthcare Management

HM 27

Contents

1	Introduction
2	Methodology
3	Results
4	Conclusion
5	Recommendations
6	References

The Evolution of Cardiac Surgery: Past, Present, and Future



Minimally invasive cardiac surgery

Reducing invasiveness driven by patient demand and technological advancements

- Less pain
- faster recovery times
- shorter hospital stays
- better cosmetic outcomes

Impact on
Cardiology

- Growth in PCI techniques
- Reduction in CABG procedures
- Expansion into structural heart disease
- Shifting Patient Demographics

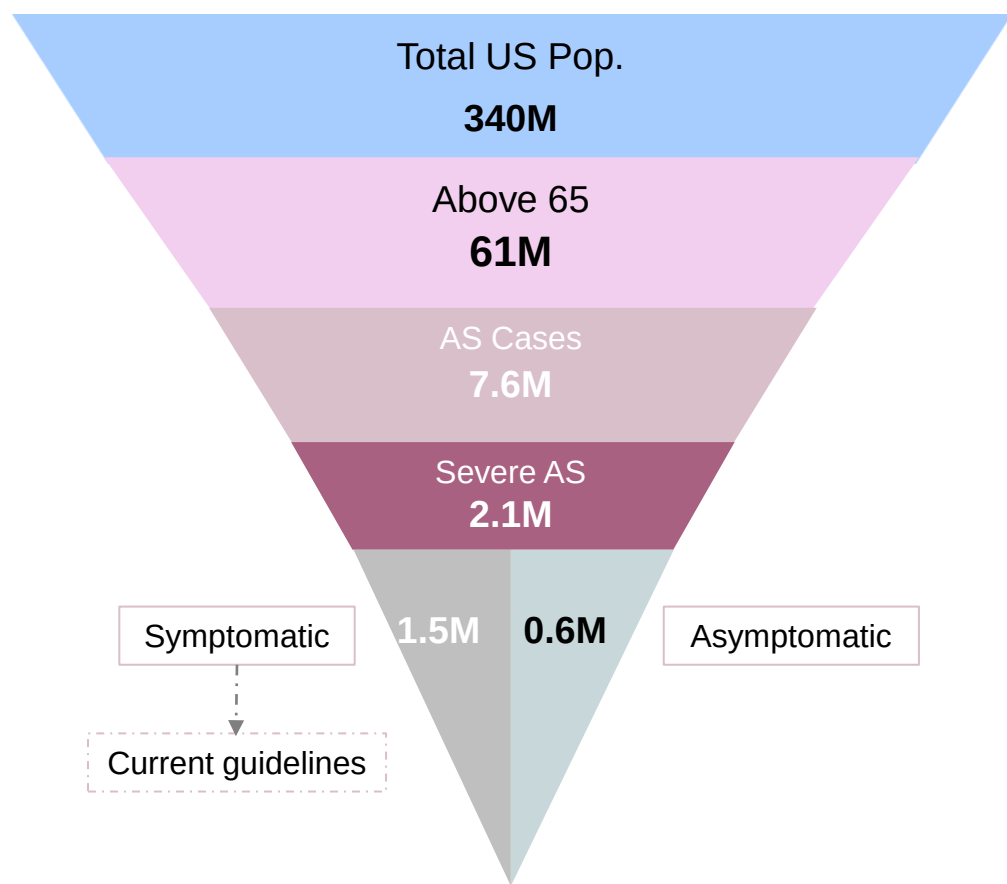
Techniques in MICS

- Small incision surgery
- Endoscopic surgery
- Robotic-assisted surgery

- Minimally invasive CABG
- Valve repairs and replacements
- Atrial fibrillation ablation
- Closure of atrial septal defects

**Common
Procedures
Using MICS**

Focus: Aortic Stenosis



Severe Aortic Stenosis cases amount to 3.4% of US elderly population

Definition

Aortic stenosis is a valvular disease characterized by blockage of the left ventricle's outflow, with an anterograde velocity of at least 2 m/s over the aortic valve.

Causes

- Hereditary (bicuspid/unicuspid valves)
- Rheumatoid arthritis
- Calcific processes

Symptoms

- Exertional dyspnea
- Fatigue
- Chest pain
- Heart failure
- Syncope

Surgical treatment for aortic stenosis

SAVR (Surgical Aortic Valve Replacement) has been the gold standard treatment for Severe aortic stenosis.

Minimally invasivetreatment for aortic stenosis

TAVR (Surgical Aortic Valve Replacement) innovative catheter based treatment for Severe aortic stenosis.

Methodology

Type of study

- Descriptive
- Comparative
- Secondary literature review

Key words used

- Minimally invasive SAVR
- SAVR vs TAVR adoption rates
- TAVR outcomes data
- TAVR availability in India
- Patient demographics in TAVR

Research questions

1. How have adoption rates and timelines for SAVR and TAVR procedures evolved in the USA?

- What are the key factors influencing the shift towards minimally invasive techniques in the USA, such as patient demographics, technological advancements, and surgeon preferences?
- What outcomes data are associated with SAVR and TAVR procedures in the USA, including mortality rates, length of hospital stay, and patient recovery time?

2. What potential parallels can be drawn between the minimally invasive AVR trends observed in the USA and the current or emerging scenario in India?

- How does the availability and accessibility of TAVR technology in India compare to that in the USA?
- What are the current surgical practices and patient demographics in India, and how do they indicate the potential for TAVR adoption?
- What are the main drivers and barriers for the adoption of TAVR in India?

3. Who are the current and potential players in the Indian TAVR market, and what roles do they play in the adoption and dissemination of TAVR technology in India?

Research Objective, Design and Key Findings

Research Objective

To analyze the evolution in minimally invasive trends of SAVR - Surgical Aortic Valve Replacement and TAVR - Transcatheter Aortic Valve Replacement procedures in the USA particularly focusing on:

1. Adoption rates and timeline comparisons between the two procedures.
2. Factors influencing the shift towards minimally invasive techniques (e.g., patient demographics, technological advancements, surgeon preferences).
3. Outcomes data associated with both procedures in the US context (e.g., mortality rates, length of hospital stay, patient recovery time).

To identify potential parallels between the observed trends in the USA and the current or emerging scenario in India for minimally invasive AVR procedures. This could involve:

1. Assessing the availability and accessibility of TAVR technology in India compared to the USA.
2. Evaluating current surgical practices and patient demographics in India to determine the potential for TAVR adoption.
3. Identifying drivers and barriers for adoption of TAVR in India.

To analyze current and potential players in the Indian TAVR market.

Research Design

1. Descriptive comparative study.
2. Systemic review of articles relevant to the topic of study.
3. Data sources: PubMed, American Heart association. Journal of American College of Cardiology.

Key Findings

1. There exists a shift towards minimally invasive procedures in cardiac space.
2. This trend is relevant in AVR procedures as well..
3. Trends in India mirror those in US to some extent, however there still exists differences between both countries.

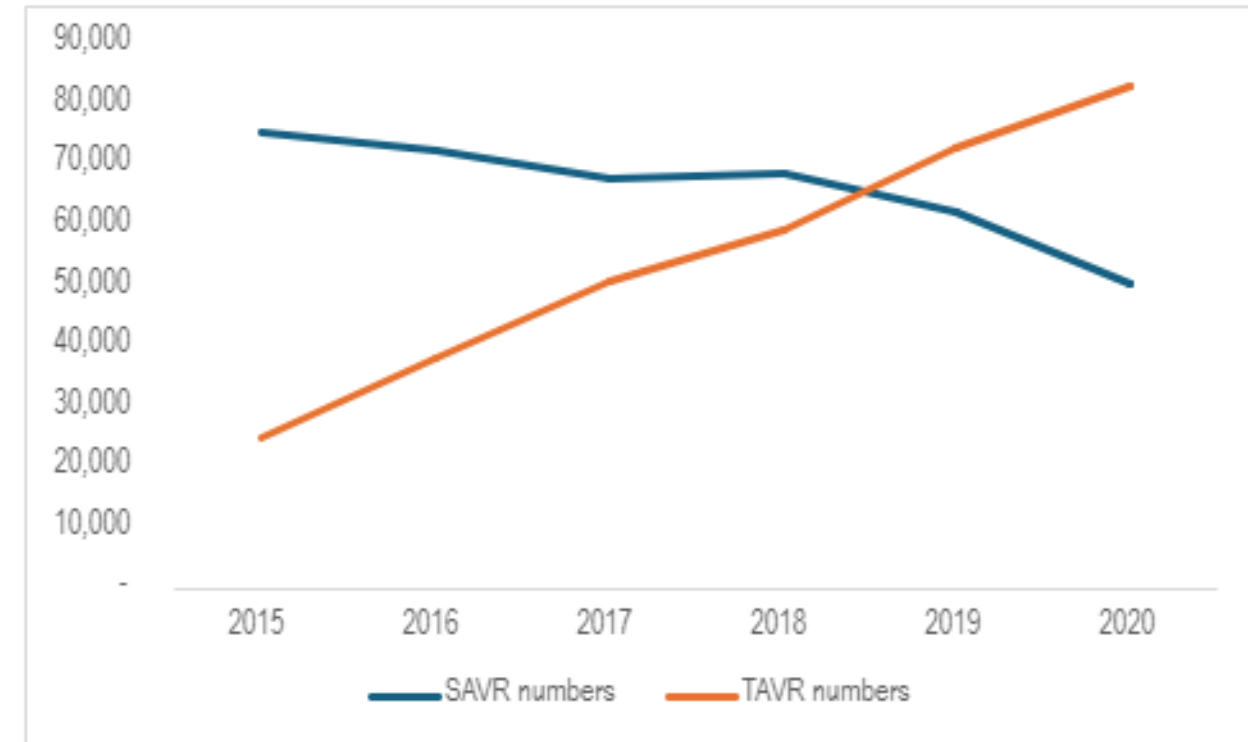
Advent of TAVR and shift towards minimally invasive procedures

Transcatheter treatment for aortic stenosis

TAVR received FDA approval in the US by 2012 and currently is the preferred treatment option for high surgical risk patients with severe aortic stenosis.

Shift towards minimally invasive procedures in aortic stenosis cases

TAVR procedures indications were expanded to intermediate and low surgical risk in 2016 and 2019 respectively. Moderate aortic stenosis cases and asymptomatic cases are expected to receive approval in the coming years, further idening the patient pool by massive margins.



TAVR numbers crossed SAVR number by 2019

Source: Annals of thoracic surgery

Benefits of TAVR

- Less chances of procedural complications
- Lesser chances of hospital based secondary infections
- Shorter hospital stays
- Better cosmetic outcomes
- Faster recovery times

Indian context for TAVR

Opportunities

- Large patient pool
- Double burden of diseases
- Growing aging population

Challenges

- Anatomical differences
- Lesser number of centers
- Expensive than SAVR

How it differs from US?

- Slower growth
- SAVR and TAVR growing at similar rates in India

Major Indian Medtech players

- MyVal by Meril Lifesciences
- Vascular Innovations(SMT)



Recommendations

More studies to better understand peculiar anatomic features of Indian population

Incorporate more cath labs to undertake TAVR procedures

Training of cardiologist and the heart team

Societal awareness and patient education about the procedural benefits

Reimbursements through insurance policies for the procedure.



MyVal



Hydra

References

1. Senst B, Kumar A, Diaz RR. Cardiac Surgery. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Jun 30]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK532935/>
2. Chakravarthy M. Is Cardiac Surgery Threatening to go the Dinosaur Way? *Annals of Cardiac Anaesthesia*. 2023 Jun;26(2):119.
3. Aluru JS, Barsouk A, Saginala K, Rawla P, Barsouk A. Valvular Heart Disease Epidemiology. *Med Sci (Basel)*. 2022 Jun 15;10(2):32.
4. Pujari SH, Agasthi P. Aortic Stenosis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Jun 30]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK557628/>
5. Kim KM, Arghami A, Habib R, Daneshmand MA, Parsons N, Elhalabi Z, et al. The Society of Thoracic Surgeons Adult Cardiac Surgery Database: 2022 Update on Outcomes and Research. *The Annals of Thoracic Surgery*. 2023 Mar 1;115(3):566–74.
6. Thourani VH, Suri RM, Gunter RL, Sheng S, O'Brien SM, Ailawadi G, et al. Contemporary Real-World Outcomes of Surgical Aortic Valve Replacement in 141,905 Low-Risk, Intermediate-Risk, and High-Risk Patients. *The Annals of Thoracic Surgery*. 2015 Jan 1;99(1):55–61.
7. American College of Cardiology [Internet]. [cited 2024 Jul 1]. Feature | TAVR: From Then Until Now. Available from: <https://www.acc.org/Latest-in-Cardiology/Articles/2021/01/01/12/42/http%3a%2f%2fwww.acc.org%2fLatest-in-Cardiology%2fArticles%2f2021%2f01%2f01%2f12%2f42%2fFeature-TAVR-From-Then-Until-Now>
8. Norton EL, Ward AF, Tully A, Leshnower BG, Guyton RA, Paone G, et al. Trends in surgical aortic valve replacement in pre- and post-transcatheter aortic valve replacement eras at a structural heart center. *Front Cardiovasc Med*. 2023 May 22;10:1103760.
9. Perdoncin E, Paone G, Byku I. Valve-in-valve Transcatheter Aortic Valve Replacement for Failed Surgical Valves and Adjunctive Therapies. 2021 Oct 12 [cited 2024 Jul 1]; Available from: <https://www.uscjournal.com/articles/valve-valve-transcatheter-aortic-valve-replacement-failed-surgical-valves-and-adjunctive>
10. van Baal JWPM, Roszek B, van Elk M, Geertsma RE. Transcatheter aortic valve replacement: clinical safety and performance data. *Expert Review of Medical Devices*. 2019 Oct 3;16(10):899–911.
11. Gupta P, Arora S, Qamar A, Gupta M, Seth A. Current status of transcatheter aortic valve replacement in India. *Cardiovascular Diagnosis and Therapy*. 2020 Feb;10(1):838–88.

Thank you