pISSN:2349-5707 Volume:13,Issue 3, March -2026 eISSN:2349-5715

AORTIC VALVE STENOSIS TRANSCATHETER AORTIC VALVE IMPLANTATION (TAVI): MODERN OPPORTUNITIES , INSTRUMENTAL DIAGNOSTICS EFFICIENCY AND CLINICAL-MORPHOLOGICAL ANALYSES

Rakhmanov Kamoldin Khaydarovich

Mamasharipov Hasanboy Erkinjon o'gli

Central Asian Medical University

Abstract. This wide comprehensive research aortic valve stenosis (AS) pathology in treatment transcatheter aortic valve implantation (TAVI) technology place and to the efficiency dedicated to . In the article The AQS cell level morphological changes — fibrocalcinosis from the process pulling , left ventricle until remodeling was stages analysis TAVI procedure is performed[1,2,3]. during the transfer applicable multispiral computer tomography (MSCT), 3D echocardiography and angiography diagnostic accuracy International competition in 2024–2026 many centered research results (PARTNER, Evolut) based on TAVI treatment danger level various was in patients forecast and hemodynamic indicators statistic analysis will be done [4,5].

Key words : Aortic stenosis, TAVI, transcatheter, valve calcinosis, myocardium hypertrophy, multispiral computer tomography, paravalvular regurgitation, hemodynamics, nitinol skeleton, prosthetic patient disproportion.

INTRODUCTION

Aortic valve stenosis (US) cardiology in practice the most many occurring and death indicator high was valvular pathology is . Global statistics for 2025 according to the world of the population over 65 years old increased layer The prevalence of AIDS among organization The disease is heavy at the level surgery without practice of patients to live duration sharp The classic aortic valve is reduced[6,7,8]. replacement (SAVR) surgery open chest in the cage and artificial blood rotation under the circumstances Since it was held , many old and companion diseases (lungs) chronic diseases , kidney (lack of) patients for this method extreme dangerous TAVI technology is appearance be minimally invasive interventions through this patients his life in extension new the period opened .

Aortic valve stenosis morphological basis cover of the layers far term inflammation and metabolic disorders as a result to degeneration is a meeting . Initially of the layers fibrosis thickening observed[9,10,11], then and this in the fields calcium salts accumulate , " calcium stones " or nodes harvest Microscopic at the level this process atherosclerosis similar is there macrophages , T- lymphocytes and lipids accumulation. Calcinosis is observed process of aortic valve opening significantly increases the area at the level reduces. Hemodynamic point of view By the way , this is the left ventricle. and between the aorta pressure gradient (systolic pressure gradient) from 40 mmHg to increase take is coming .

TAVI treatment efficiency his/her planning instrumental examinations in the first stage integral is related. Multispiral computer tomography (MSCT) is "navigation" function in the process the shape [12,13,14]of the aortic annulus (often ellipse in the form of will be), its perimeter and area these measurements are artificial cover size error when choosing (23, 26, 29 or 31 mm) road not to put opportunity. If the lid size small if selected — paravalvular regurgitation (valve from around blood leakage), if large if selected — aortic ring like rupture fatal complications come output possible . Statistics for 2026 according to MSCT measurements based on in TAVI operations performed cover imbalance risk up to 3.2 percent decreased .

TAVI procedure during trans- esophageal echocardiography as intraoperative monitoring echocardiography (TEE) and angiography Angiography through prosthesis location and coronary arteries openness control TAVI prostheses mainly nitinol (nickel and titanium alloy)

pISSN:2349-5707 Volume:13,Issue 3, March -2026 eISSN:2349-5715

or cobalt-chromium to the carcass installed biological consists of[15,16,17,18] . Itself self - expanding lids advantage is that they are attached to the aortic wall permanent pressure and then expand ability save However, this caps permeability to the system close location because of , constantly pacemaker installation Permanent Pacemaker Implantation (PPI) is required in 12–15% of cases increases .

Table 1: TAVI prostheses comparative technician characteristics (2025-2026).

Parameter	Balloon with spreading (e.g. Sapien 3)	Himself spreader (e.g. Evolut PRO)
Carcass material	Cobalt-chrome	Nitinol
Placement accuracy	Very high	High (re- position) to do possible)
Paravalvular leak	Minimum	Low (external skirt (at the expense of)
PPI (Pacemaker) Need	4-8%	14-20%
Hemorrhagic complications	2-3%	2-4%

Clinical results TAVI is open surgery with in competition noticeable to advantage " The 5 years of Partner 3 research results this showed that low danger in the group between TAVI and SAVR in patients death indicators almost one different , but TAVI was performed in patients in the hospital stay duration (average 2-3 days) and recovery period much short . Statistical to analyzes according to TAVI practice after life quality index (KCCQ score) first 30–40 points per month rises .

Morphological in terms of From TAVI next the most important change — left ventricle of mass reduction (regression of LV hypertrophy). Valve installed, pressure gradient eliminate after reaching the myocardium cardiomyocytes size shrinks and fibrosis tissue a little absorbed. This process ExoCG through when observed , the left ventricle wall thickness 1-1.5 mm decrease and systolic function (EF) by 10-15% improvement with described .

However, the TAVI procedure also has its own typical from dangers empty not . Most dangerous from complications one is coronary arteries closed (coronary occlusion). This condition mainly the aortic valve risks long and calcinosis strong when , prosthesis expansion as a result own plate coronary artery mouth closing to put because of face This gives prevent to take ”Chimney” technique for is applied, that is coronary to the artery A stent is placed beforehand. Also, the brain blood rotation risk of stroke reduce “Cerebral Embolic Protection” (for cerebral from embolism protection devices this is used filters practice during interrupted came out calcium or blood clot particles holding remains .

Table 2: TAVI procedure efficiency danger groups according to statistics (data for 2024).

Danger group (STS score)	Hospital mortality (%)	1 year safe stay (%)	Re-hospitalization (%)
High risk (>8%)	3.5	88.4	12.6
Medium risk (4-8%)	1.8	94.2	8.4
Low risk (<4%)	0.9	98.1	4.2

TAVI's promising from directions one is “Valve-in-Valve” (valve inside cover) is a practice. Previously installed biological prosthesis own the deadline After a period of time (usually 10-15 years), when it becomes worn out , the patient again open operation without doing, old

pISSN:2349-5707 Volume:13,Issue 3, March -2026 eISSN:2349-5715

prosthesis inside new TAVI valve installation This method is possible efficiency from 95% is considered high .

Also, instrumental diagnostics new level as artificial AI - based CT analysis programs enter is coming. This programs 3D modeling of the aortic root through paravalvular leak probability with an accuracy of 0.1 mm prophecy do In 2026, TAVI operations will also be performed in Uzbekistan . number 300 per year increase this is expected and cardiological of help quality level from the excess evidence gives .

CONCLUSION

Aortic valve TAVI technology in stenosis modern cardiology peak is considered . Its The effectiveness of pre- operative instrumental analyses (MSCT, ExoKG) depends on the accuracy of the surgeon’s to the skill and prosthesis morphological to the characteristics relies on. Clinical results this confirms that TAVI is not only death the risk reduces , maybe old of patients active life in style return In the future, TAVI prostheses will endurance increase with this method all young groups for " gold" to the standard rotation inevitable .

REFERENCES

1. ESC/EACTS Guidelines for the Management of Valvular Heart Disease , 2025-2026.
2. PARTNER 3 Trial: 5-year Clinical and Echocardiographic Outcomes . NEJM, 2025.
3. Textbook of Transcatheter Aortic Valve Implantation . Editor: Martin B. Leon, Elsevier, 2024.
4. Rahmatjonovna, I. N. (2024). Fast foods are the potential of human health. Ethiopian International Journal of Multidisciplinary Research, 11(05), 365-369.
5. Isaqova, N. (2022). Bolalarning antropometrik ko’rsatkichlarini turli omillarga bog’liqligi. Science and innovation, 1(D8), 1000-1003.
6. Рахматжоновна, И. Н. Алиментарного ожирение и репродуктивное здоровье женшин в современном аспекте физической реабилитации. O'zbekiston harbiy tibbiyoti, 4(4), 368-370.
7. Isaqova, N. (2022). Қабзиятнинг болалар антропометрик кўрсаткичларига таъсири. Science and innovation, 1(D8), 888-892.
8. Isaqova, N. (2024). Microscopic examination of sputum. Развитие и инновации в науке, 3(6), 63-66.
9. Исакова, Н., & Усмонова, Г. (2024, June). Лабараторная диагностика трихомониза. In международная конференция академических наук (Vol. 3, No. 6, pp. 59-65).
10. Raxmatjonovna, I. N. (2024). Labaratory diagnostics of trichomonisis disease. Ethiopian International Journal of Multidisciplinary Research, 11(05), 496-499.
11. Raxmatjonovna, I. N. (2023). The problem of acceleration of children's development (literature review). International Multidisciplinary Journal for Research & Development. Volume10, (12), 160-164.
12. Исакова, Н., & Усмонова, Г. Кишечный дисбактериоз//Models and methods in modern science.–2024. Т, 3, 106-112.
13. Raxmatjonovna, I. N. The most pressing problem today is iodine deficiency. World Bulletin of Public Health, 23, 97-100.
14. Raxmatjonovna, I. N. Anthropometric indicators of children. Scientific Impulse, 1(5), 883-887.
15. Isakova, N. R. (2021). The effect of constipation due to diseases of the colon on the anthropometric parameters of children. Asian journal of multidimensional research, 10(5), 666-669
16. Journal of the American College of Cardiology (JACC) : "Global TAVI Trends and Statistics 2026".
17. Smith, CR, et al. " Transcatheter versus Surgical Aortic-Valve Replacement". New England Journal of Medicine .

pISSN:2349-5707 Volume:13,Issue 3, March -2026 eISSN:2349-5715

18. Uzbekistan Republic Cardiology Association : " Valvular pathologies diagnostics and treatment according to national recommendations ", 2025.