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RESEARCH ARTICLE

COMPLEX MULTIVALVULAR HEART DISEASE ASSOCIATED WITH TRIPLE-VESSEL CORONARY ARTERY DISEASE AND LOW-FLOW LOW-GRADIENT AORTIC STENOSIS: A CHALLENGING THERAPEUTIC DECISION

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Abstract

Rheumatic heart disease remains a major cause of complex multivalvul ar pathology, particularly in developing countries. The coexistence of severe mitral restenosis, low flow low gradient aortic stenosis, ventricul ar dysfunction, pulmonary hypertension, and multivessel coronary artery disease represents a highly challenging clinical scenario. We report the case of a 67-year-old woman with prior mitro-aortic surgery presenting with progressive dyspnea and advanced heart failure. Echocardiography revealed severe mitral restenosis and classical low-flow low-gradient aortic stenosis with reduced ejection fraction, while coronary angiography demonstrated diffuse triple-vessel disease. The interaction between valvular obstruction, ventricular dysfunction, and coronary ischemia complicated clinical assessment and therapeutic decision making. Following multimodality imaging and multidisciplina ry Heart Team evaluation, redo surgery with coronary bypass was considered but deemed prohibitive, and the patient declined interventio n. An individualized strategy based on optimized medical therapy was adopted.This case highlights the importance of multimodality imaging, Heart Team-based decision-making, and patient-centered care in complex high-risk multivalvular–coronary disease.

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Introduction:-

Rheumatic heart disease remains a major contributor to valvular pathology worldwide, particularly in low- and middle-income countries, where it frequently results in complex multivalvular involvement. The coexistence of pulmonary hypertension, atrial fibrillation, ventricular dysfunction, and concomitant coronary artery disease further amplifies clinical severity and complicates therapeutic decision-making. In this context, low-flow low-gradient aortic stenosis represents a particularly challenging entity, as reduced stroke volume may obscure the true hemodynamic severity of valvular obstruction. The simultaneous presence of these conditions creates a complex interplay that renders both diagnostic evaluation and management strategy highly demanding. This case highlights the critical role of multimodality imaging and multidisciplinary Heart Team assessment in guiding individualized therapeutic decisions in high-risk multivalvular–coronary disease.

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Case Presentation :-

A 67-year-old woman was admitted with a four-month history of progressively worsening exertional dyspnea, now limiting daily activities (NYHA class III). Symptoms were associated with orthopnea, fatigue, reduced exercise tolerance, intermittent palpitations, and bilateral lower-limb edema. She denied chest pain, syncope, or presyncope.
Her medical history included long-standing rheumatic mitro-aortic valvular disease diagnosed in early adulthood. In 1980, she underwent mitral commissurotomy with annuloplasty and concomitant aortic valvuloplasty for symptomatic multivalvular disease. The initial postoperative course was favorable, followed by gradual recurrence of dyspnea over time, suggestive of progressive rheumatic valve degeneration. No prior coronary angiography was available.

On admission, the patient was hemodynamically stable (blood pressure 150/80 mmHg, irregular heart rate 80 bpm, oxygen saturation 98% on room air). Cardiac auscultation revealed a systolic ejection murmur at the aortic area with carotid radiation and a diastolic rumble at the apex, consistent with combined aortic stenosis and mitral restenosis. Pulmonary examination showed basal crackles, and peripheral edema was present. Laboratory findings were unremarkable except for a marked elevation of NT-proBNP, consistent with acute decompensated heart failure. Electrocardiography showed atrial fibrillation with a controlled ventricular response. Chest radiography revealed cardiomegaly with pulmonary congestion and confirmed the presence of a mitral annuloplasty ring (Figure 1).

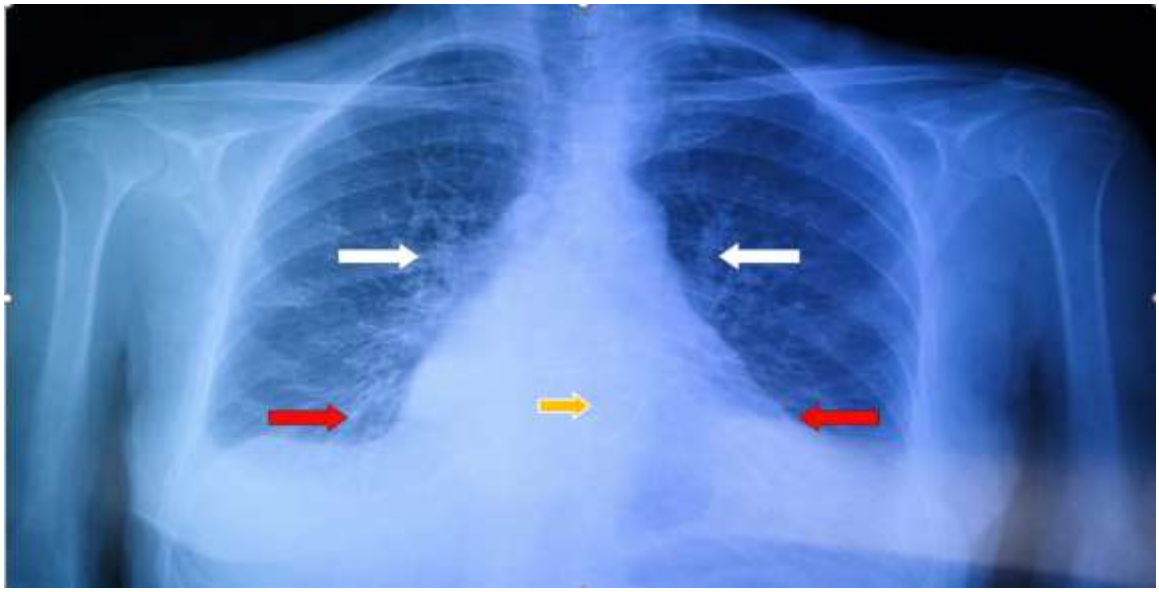

Figure 1. Chest radiograph showing cardiomegaly and pulmonary congestion.

Red arrows indicate an enlarged cardiac silhouette and bilateral perihilar interstitial opacities consistent with pulmonary vascular congestion and elevated left-sided filling pressures in chronic multivalvular heart disease .A radiopaque circular structure consistent with a mitral annuloplasty ring is indicated by the yellow arrow**,** confirming previous mitral valve surgery. Transthoracic echocardiography demonstrated severe rheumatic multivalvular disease. The mitral valve showed restricted mobility with a valve area of 0.5 cm^2 and a mean gradient of 8–9 mmHg, consistent with severe mitral restenosis, with mild associated regurgitation (Figure 2). The aortic valve was heavily calcified with restricted motion, with an aortic valve area of 1.0 cm^2 and a mean gradient of 22 mmHg. The indexed stroke volume was reduced (28 mL/m^2), and the dimensionless index was 0.24, consistent with classical low-flow, low-gradient severe aortic stenosis (Figure 3). Left ventricular systolic function was impaired, with an ejection fraction of 35% and markedly reduced global longitudinal strain (~−6%), indicating advanced myocardial dysfunction. Pulmonary artery systolic pressure was estimated at 62 mmHg, consistent with severe pulmonary hypertension.

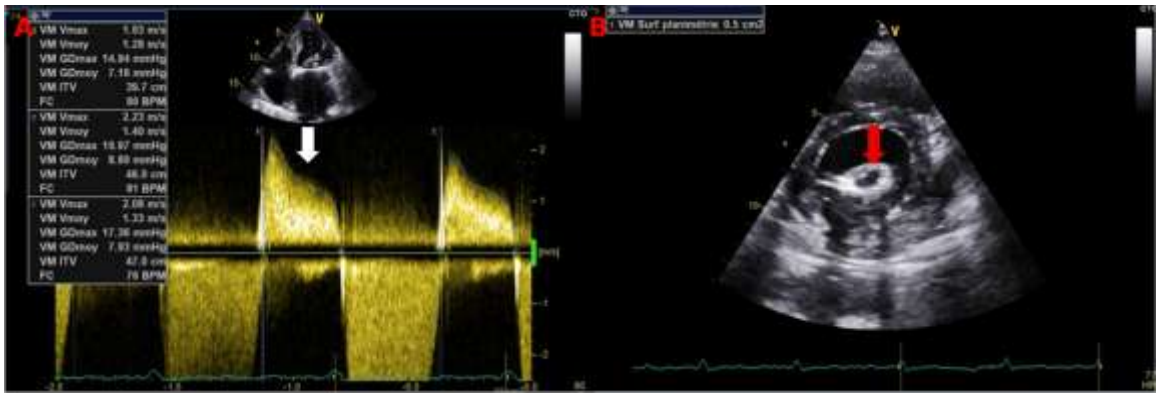

Figure 2: Transthoracic echocardiography demonstrating severe rheumatic mitral restenosis and Doppler hemodynamic assessment.

(A) White arrow indicates elevated transmitral diastolic velocity on continuous-wave Doppler with increased mean gradient (~8–9 mmHg).
(B) Red arrow highlights markedly reduced mitral valve orifice on planimetry (~0.5 cm^2) consistent with severe mitral restenosis.

Figure 3.Echocardiographic assessment of low-flow low-gradient aortic stenosis.

(A) White arrow indicates severely reduced global longitudinal strain (GLS ≈ −6%) consistent with advanced myocardial dysfunction.(B) Red arrow highlights calcified aortic valve with restricted cusp opening and reduced valve area (~1.0 cm^2).
Coronary angiography revealed diffuse triple-vessel coronary artery disease, with severe stenoses of the left anterior descending, circumflex, and right coronary arteries, while the left main was spared. A mitral annuloplasty ring was also visualized (Figure 4).

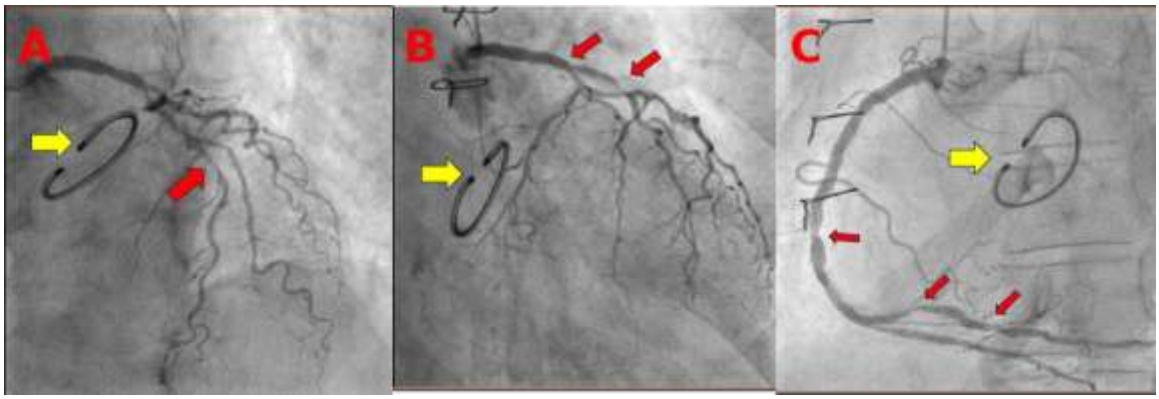

Figure 4. Coronary angiography demonstrating severe triple-vessel coronary artery disease.

(A) Left coronary angiogram showing critical proximal stenosis of the left anterior descending artery (red arrow). The mitral annuloplasty ring is visible (yellow arrow).
(B) Left coronary projections demonstrating severe lesions of the left anterior descending and circumflex arteries (red arrows), with the annuloplasty ring (yellow arrow).
(C) Right coronary angiogram showing significant proximal and mid-segment stenoses (red arrows), consistent with advanced multivessel disease. The annuloplasty ring is also identifiable (yellow arrow).
The case was reviewed by a multidisciplinary Heart Team. Although redo double-valve replacement combined with coronary artery bypass grafting was considered the definitive treatment, surgical risk was deemed prohibitive (STS-PROM ≈18%). After discussion, the patient declined intervention, and a strategy of optimized medical therapy with close follow-up was adopted. A staged percutaneous approach was considered as a potential alternative.

Discussion :-

Rheumatic multivalvular heart disease remains a major clinical challenge, particularly in low- and middle-income countries where patients often present at advanced stages with complex hemodynamic interactions [1–3]. The combined involvement of the mitral and aortic valves creates interdependent loading conditions, as severe mitral stenosis reduces left ventricular preload and transvalvular flow, potentially masking the true severity of concomitant aortic stenosis [4].Low-flow low-gradient aortic stenosis represents a diagnostically challenging entity, as reduced stroke volume may lead to discordance between valve area and Doppler gradients. Accurate assessment therefore relies on a multiparametric approach integrating valve area, flow status, ventricular function, and complementary imaging when necessary [5]. In the presence of prior mitral valve intervention, altered transmitral flow further complicates interpretation, requiring comprehensive echocardiographic evaluation to avoid misclassification.

Therapeutic decision-making in multivalvular disease requires integration of clinical status, ventricular function, pulmonary pressures, coronary anatomy, and prior surgical history. Current guidelines emphasize the central role of multidisciplinary Heart Team evaluation in complex and high-risk scenarios [1,6].Although redo double-valve replacement combined with coronary artery bypass grafting remains the definitive treatment, surgical risk may be prohibitive in patients with advanced ventricular dysfunction, pulmonary hypertension, and prior surgery. In this case, the estimated STS mortality risk (≈18%) and patient preference supported a conservative, individualized approach.The coexistence of triple-vessel coronary artery disease further worsens prognosis and limits therapeutic options. In selected high-risk patients, staged strategies, including percutaneous coronary revascularization followed by reassessment for potential valve intervention, may represent a reasonable alternative, although evidence remains limited [8–10].Overall, this case highlights the importance of multimodality imaging, comprehensive hemodynamic assessment, and individualized Heart Team-based decision-making in managing complex valvular–coronary disease.
Patient Perspective : The patient acknowledged the severity and complexity of her condition and the high surgical risk. After discussion, she opted for a conservative strategy focused on symptom control and quality of life.

Conclusion:-

This case illustrates the diagnostic and therapeutic complexity of advanced rheumatic multivalvular heart disease associated with classical low-flow low-gradient aortic stenosis and multivessel coronary artery disease. Accurate evaluation using multimodality imaging and multidisciplinary Heart Team assessment is essential to determine disease severity and guide management.It also highlights the central role of patient preference in contemporary cardiovascular care. When surgical risk is prohibitive or intervention is declined, an individualized strategy based on optimized medical therapy and selective percutaneous options may represent a reasonable approach.

Learning Points:-
- Multivalvular heart disease may mask the severity of concomitant aortic stenosis, particularly in low-flow states
- Multimodality imaging is essential for accurate assessment of low-flow low-gradient aortic stenosis
- Management of complex valvular–coronary disease requires a multidisciplinary Heart Team approach
- Patient preference is a key determinant when surgical risk is prohibitive

Declarations:-
Ethics approval and consent to participate
Not applicable

Consent for publication:-
Written informed consent was obtained from the patient for publication of this case report and accompanying images

Availability of data and materials:-
All data generated or analyzed during this study are included in this article

Competing interests:-
The authors declare no competing interests

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Authors' contributions:-
H.E. contributed to patient management, data collection, interpretation of findings, and manuscript drafting. M.M. contributed to data analysis and manuscript revision. N.M. supervised the study and critically revised the manuscript. Z.L. contributed to data interpretation and literature review. A.B. contributed to data collection and manuscript preparation. All authors approved the final version

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References:-

1. Otto CM, Nishimura RA, Bonow RO: 2020: ACC/AHA guideline for the management of patients with valvular heart disease. Circulation. 2021, 143:72-227. 10.1161/CIR.0000000000000923
2. Vahanian A, Beyersdorf F, Praz F: 2021: ESC/EACTS guidelines for the management of valvular heart disease. Eur Heart J. 2022, 43:561-632. 10.1093/eurheartj/ehab395
3. Carapetis JR, Beaton A, Cunningham MW, et al.: Acute rheumatic fever and rheumatic heart disease. Nat Rev Dis Primers. 2016, 2:15084. 10.1038/nrdp.2015.84
4. Baumgartner H, Hung J, Bermejo J, et al.: Echocardiographic assessment of valve stenosis: EAE/ASE recommendations. Eur J Echocardiogr. 2009, 10:1-25. 10.1093/ejechocard/jen303
5. Pibarot P, Dumesnil JG: Low-flow, low-gradient aortic stenosis with normal and depressed left ventricular ejection fraction. J Am Coll Cardiol. 2012, 60:1845-1853. 10.1016/j.jacc.2012.06.051
6. Clavel MA, Magne J, Pibarot P: Low-gradient aortic stenosis. Eur Heart J. 2016, 37:2645-2657. 10.1093/eurheartj/ehw096
7. Neumann FJ, Sousa-Uva M, Ahlsson A, et al.: 2018 ESC/EACTS guidelines on myocardial revascularization. Eur Heart J. 2019, 40:87-165. 10.1093/eurheartj/ehy394
8. Leon MB, Smith CR, Mack MJ, et al.: Transcatheter or surgical aortic-valve replacement in intermediate-risk patients. N Engl J Med. 2016, 374:1609-1620. 10.1056/NEJMoa1514616
9. Patel KP, Michail M, Treibel TA, et al.: Coronary revascularization in patients undergoing transcatheter aortic valve replacement for severe aortic stenosis. JACC Cardiovasc Interv. 2021, 14:2083-2096. 10.1016/j.jcin.2021.07.058
10. Fudulu DP, Malkin CJ, Ramlawi B, et al.: Trends and outcomes of concomitant aortic valve replacement and coronary artery bypass grafting: a global multicenter observational study. Eur J Cardiothorac Surg. 2023, 63:259. 10.1093/ejcts/ezad259