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EDITORIAL COMMENT

Surgical Repair as a Reference Standard in Degenerative Mitral Regurgitation

Benchmarks, Not Battles

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Surgical repair for degenerative mitral regurgitation (DMR) is supported by a robust body of evidence demonstrating excellent early safety, durable valve competence, and long-term survival that approaches that of matched populations when mitral valve repair (MVR) is successful.[1,2] Across single-center series and longitudinal cohorts, freedom from reoperation and recurrent severe mitral regurgitation (MR) has remained high over follow-ups extending beyond a decade.[1,2] These observations form the foundation of contemporary clinical management. The central issue is no longer whether surgical repair is effective, but how its performance should inform and calibrate expectations for emerging transcatheter strategies. Accordingly, defining contemporary surgical benchmarks remains essential to appropriately contextualize emerging alternatives.

In this issue of *JACC*, Chu et al[3] report outcomes from a surgical cohort derived from a multicenter trial infrastructure, focusing on patients with DMR accompanied by mild or moderate tricuspid regurgitation, rather than isolated mitral valve disease.[3] Among 314 patients undergoing MVR, early outcomes were excellent, with 30-day mortality of 1% and stroke occurring in 1.6%. Over 2 years of follow-up, all-cause mortality was 3.5%. Mitral valve reintervention remained infrequent (2.2%), with severe MR recurrence in only 3.2% and moderate or greater MR in 13%. These findings are consistent with established surgical experience in patients undergoing MVR in the presence of concomitant tricuspid disease.

> *"In the present study, anterior and bileaflet pathology were associated with higher rates of repair failure compared with isolated posterior leaflet disease, albeit with limited model discrimination."*

Interpretation of these results requires appropriate methodologic guardrails. Importantly, outcomes in this cohort were conditional on successful MVR, because patients requiring conversion to valve replacement were excluded from the analysis. As such, this cohort does not define an all-comers surgical benchmark, but rather illustrates outcomes in a selected repair population. Although the operative risk is not explicitly reported, the echocardiographic profile, characterized by preserved left ventricular ejection fraction and end-systolic dimensions, is consistent with intervention before adverse left ventricular remodeling has occurred. These outcomes should therefore be interpreted within the framework of careful selection, timely referral, and current standards of surgical practice. Accordingly, they should not be directly extrapolated to broader populations, such as those represented in historical transcatheter experience, which largely comprised

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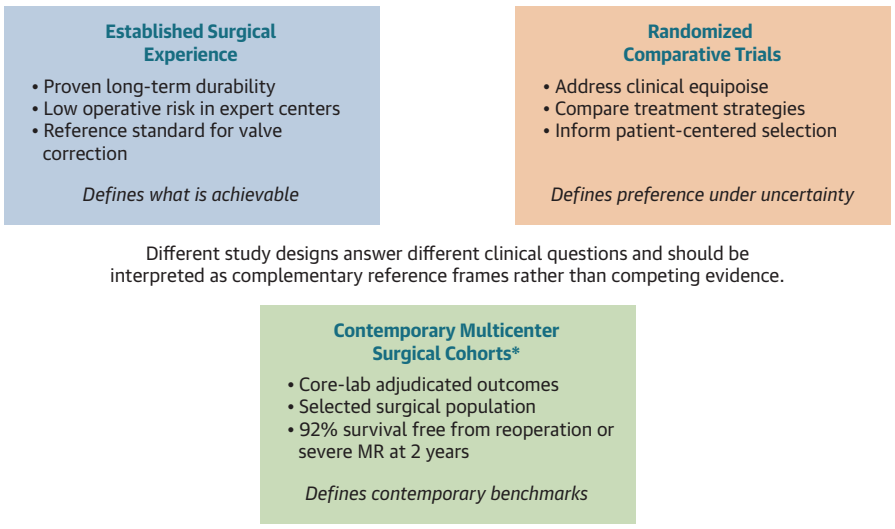
FIGURE 1 Complementary Roles of Surgical Series, Contemporary Cohorts, and Randomized Trials



Different study designs address distinct and complementary clinical questions in degenerative mitral regurgitation (MR). Contemporary surgical cohorts define current performance benchmarks, whereas randomized trials guide decision making when uncertainty persists. *Chu et al.[3]

high or prohibitive risk patients often treated later in the disease course. Failing to account for these differences in baseline risk may conflate underlying patient risk with the apparent treatment effect. Beyond overall performance, the value of such benchmarks also lies in identifying subgroups that may drive failures. In the present study, anterior and bileaflet pathology were associated with higher rates of repair failure compared with isolated posterior leaflet disease, albeit with limited model discrimination. Though exploratory, this finding is clinically relevant and may help refine heart team decision making, especially in the setting of complex mitral valve anatomy.

Previous work has examined outcomes after MVR across historical cohorts, multicenter registries, and trials addressing complementary questions, including surgical technique, access route, institutional volume, and comparison with transcatheter edge-to-edge repair (TEER).[1-5] In specialized centers, elective MVR can be performed with low operative mortality, near-universal repair rates, and excellent long-term survival.[1,2] In national Society of Thoracic Surgeons (STS) data, higher hospital and surgeon volumes were associated with lower 30-day and 1-year mortality and higher repair success, with a median predicted mortality <1% for most patients.[4,5] Randomized surgical trials have shown that neochordal techniques, leaflet-preserving strategies, and minimally invasive access can achieve similar or improved hemodynamics with faster recovery in experienced centers.[6,7] In parallel, trials and registries show that TEER is a viable alternative for selected patients with DMR, particularly those at higher surgical risk and with favorable anatomy. In this setting, residual regurgitation and transmitral gradients remain key determinants of postprocedural hemodynamics. Accordingly, in the STS/American College of Cardiology Transcatheter Valve Therapy registry, nearly 90% of TEER procedures achieved procedural success, with outcomes primarily driven by residual MR severity and transmitral gradients.[8]

From a pathophysiologic perspective, these differences are clinically meaningful because residual regurgitation and transmitral gradients translate into persistent volume and pressure overload with potential long-term hemodynamic consequences. Importantly, in the present study, moderate MR recurrence, rather than severe MR, accounted for most cases meeting the moderate or greater MR durability endpoint at 2 years. This is particularly relevant when surgical outcomes are contrasted with transcatheter strategies, where residual moderate MR is often considered to be an acceptable procedural result. Accordingly, moderate MR emerges as a key driver of composite durability outcomes and a

critical reference point for TEER comparisons. Conversely, surgical trade-offs must also be acknowledged, including postoperative atrial fibrillation and the physiologic burden associated with sternotomy or thoracotomy.

Placed alongside the existing literature, the present study occupies a distinct and clearly defined position in the evidentiary landscape. It is best viewed as a benchmark rather than a contestant. Notably, this is one of the few contemporary multicenter surgical repair data sets with prespecified echocardiographic follow-up and independent core laboratory adjudication, providing a rigorous durability reference. Historical surgical series primarily established feasibility and long-term potential, whereas contemporary cohorts such as this one define what is currently achievable in expert centers under standardized follow-up conditions. Their value lies in calibrating what constitutes best-in-class performance, in systematically identifying drivers of failure, and in informing the design and interpretation of future trials, rather than dictating practice in isolation. Understood in this way, these studies are not competing answers to the same question, but convergent contributions addressing distinct clinical uncertainties across differing risk strata and care environments.

Whereas Chu et al's cohort defines what surgery can achieve under optimal conditions, REPAIR MR (MitraClip REPAIR MR Study; NCT04198870) and PRIMARY (Percutaneous or Surgical Repair in Mitral Prolapse and Regurgitation for ≥60-Year-Olds; NCT05051033) address treatment choice under genuine equipoise in low and intermediate risk patients. They address a fundamentally different clinical question. The present study neither anticipates nor refutes these trials, but rather defines achievable outcomes within a controlled surgical environment shaped by patient selection, expertise, and adjudication. These benchmarks will remain essential to contextualize future randomized data.

Good evidence does not remove uncertainty; it makes it navigable. In DMR, the expanding literature reflects a diversity of study designs, populations, and clinical contexts, rather than a single, unified narrative. Evidence should define the boundaries for clinical judgment, not replace it. Framed in this way, contemporary surgical cohorts transform therapeutic battles into benchmarks that guide decision making (**Figure 1**).

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