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ORIGINAL ARTICLE
Cardiovascular Surgery

Outcomes of Robotic Mitral Valve Repair for Degenerative Mitral Valve Regurgitation in Patients Aged ≥80 Years

— Its Role in the Era of Expanding Transcatheter Edge-to-Edge Repair —

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Background: Transcatheter edge-to-edge repair (TEER) has increasingly been used for elderly patients with degenerative mitral regurgitation (DMR), while minimally invasive surgical approaches such as robotic mitral valve repair (RMVr) may offer durable repair with reduced invasiveness. We evaluated the safety and durability of RMVr in octogenarians with DMR and assessed its role in contemporary treatment strategies by comparison with younger patients as a reference cohort.

Methods and Results: We retrospectively analyzed 412 patients who underwent RMVr for DMR from 2018 to 2025. Patients were divided into an elderly group (E; age ≥80 years; n=42) and a younger group (Y; age <80 years; n=370). Octogenarians had higher operative risk with more atrial fibrillation, heart failure, pulmonary hypertension, and renal dysfunction. Cardiopulmonary bypass and cross-clamp times, repair complexity, and concomitant procedures were comparable. In the E group, hospital mortality and stroke were both 2.4%; there were no conversions to sternotomy, re-explorations for bleeding, or new renal replacement therapy. At discharge, mitral regurgitation was none or trivial in most patients in both groups. At 5 years, overall survival was lower in the E group (80.3% vs. 97.3%), but freedom from cerebrovascular events, reoperation, and moderate or greater mitral regurgitation was similar.

Conclusions: RMVr is a feasible and durable surgical option in selected octogenarians considering patient-specific risk, anatomical suitability, and institutional expertise.

Key Words: Degenerative mitral regurgitation; Mitral valve repair; Octogenarians; Robotic surgery; Transcatheter edge-to-edge repair

Current guidelines recommend transcatheter edge-to-edge repair (TEER) for degenerative mitral regurgitation (DMR) primarily in patients deemed to be at high or prohibitive surgical risk by the heart team and who have favorable anatomy for TEER, as stated in the 2025 ESC/EACTS guidelines.[1]

This recommendation is supported by existing evidence, including the EVEREST II randomized trial and subsequent large observational registries and propensity-adjusted studies from Europe and the United States.[2–4] These data suggest that TEER offers comparable short-term safety compared with surgical mitral valve repair (MVr) but is associated with higher rates of repeat intervention and less favorable longer-term outcomes, largely driven by recurrent mitral regurgitation (MR).[2–6] Nevertheless, the use of TEER has increased substantially in contemporary clinical practice, particularly among elderly patients. Data from the Society of Thoracic Surgeons–American College of Cardiology Transcatheter Valve Therapy Registry (STS-ACC TVT Registry) and U.S. Medicare analyses have demonstrated a rapid rise in TEER utilization for DMR, exceeding the number of surgical MVr by more than twofold in 2019.[5–7] This trend is likely driven by the perception that TEER is a less invasive therapeutic option for elderly patients.

At the same time, surgical MVr has also evolved toward less invasive strategies. Minimally invasive approaches, including right mini-thoracotomy and totally endoscopic

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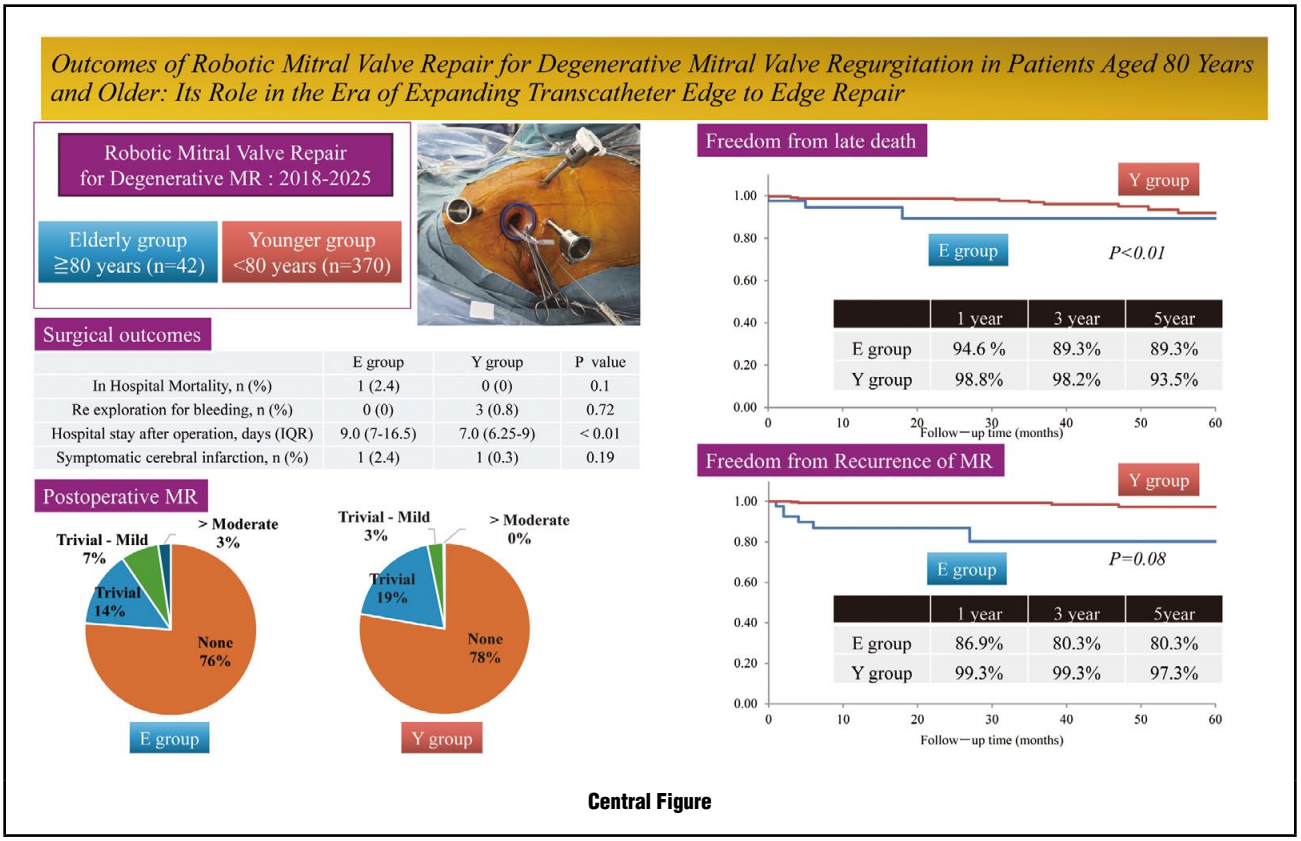

Central Figure

techniques, have been developed to reduce procedural trauma while preserving the established durability of surgical repair.[8] In particular, robotic mitral valve repair (RMVr) offers 3-dimensional visualization and articulated instrumentation, which enables complex repairs with safety and long-term outcomes comparable with conventional sternotomy.[9–11]

Despite these advances, evidence specifically addressing RMVr in elderly patients with DMR remains limited. Therefore, the present study aimed to evaluate the clinical outcomes of RMVr in octogenarians with DMR and to assess its role within current treatment strategies in the era of expanding TEER use. To further clarify the clinical characteristics, operative outcomes, and mid-term outcomes of elderly patients undergoing RMVr, these outcomes were compared with those of patients aged <80 years as the reference cohort.

Methods

Study Population

For the present study, we retrospectively reviewed 412 consecutive patients who underwent RMVr at our institution between June 2018 and May 2025. Among these, 42 patients aged ≥80 years were categorized as the elderly group (E group), and 370 patients aged <80 years served as a reference cohort (Y group). Patients undergoing emergency surgery, surgery for infective endocarditis, reoperations, valve replacement, or concomitant procedures on other valves were excluded. RMVr was performed using the da Vinci Surgical System (Intuitive Surgical, Sunnyvale, CA, USA), with chordal replacement or leaflet resection as required, followed by routine annuloplasty. Study endpoints included perioperative morbidity and mortality and mid-term survival, which was assessed using Kaplan–Meier analysis. TEER was introduced at our institution on March 2023, and a total of 67 TEER procedures had been performed. Among these, 19 cases involved DMR, including patients with combined degenerative and functional MR, and 14 of these patients were aged ≥80 years. When limited to isolated DMR, 10 patients underwent TEER, of whom 8 were octogenarians. At our institution, TEER for DMR is only considered for patients deemed to be at high surgical risk through a multidisciplinary heart team conference, in which chronological age is regarded as one of several contributing factors rather than the sole determinant. Before the introduction of TEER, patients with symptomatic severe DMR were considered for RMVr even in the presence of increased surgical risk, provided that the anticipated clinical benefit was judged to outweigh the procedural risk, complete repair was deemed technically feasible, and thorough informed consent was obtained from the patient and their family. This study was approved by the institutional review board of Chibanishi General Hospital (TGE 02712-025).

Definitions of key clinical variables are as follows: pulmonary hypertension was defined as a pulmonary artery systolic pressure >45 mmHg, as estimated using preoperative echocardiography; and chronic renal dysfunction was defined as a serum creatinine level ≥1.5 mg/dL, or the presence of chronic kidney disease documented in the medical record. All procedures followed were in accordance with the Declaration of Helsinki and the ethical standards of the responsible committee on human experimentation.

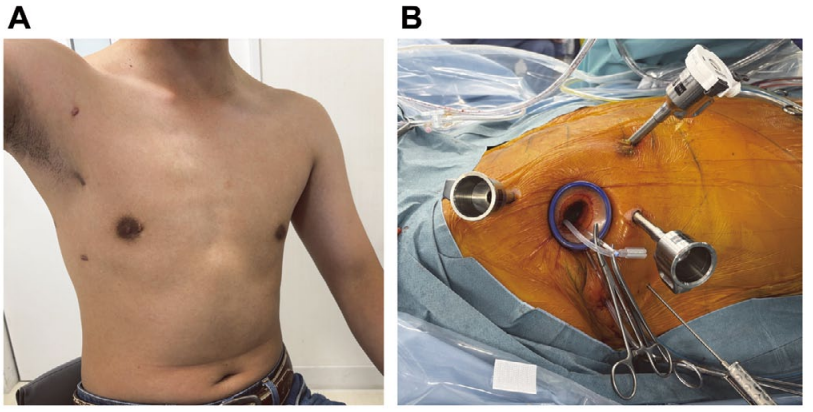

Figure 1. (**A**) Operative skin incision for robotic mitral valve repair. (**B**) Port placement for robotic mitral valve repair. Three 8-mm robotic ports were placed in the 3rd intercostal space (Arm 1), 4th intercostal space (Arm 3, atrial retractor), and 5th or 6th intercostal space (Arm 4), with a 0° camera inserted through the main incision (Arm 2).

Surgical Technique

Preparation After induction of general anesthesia with differential lung ventilation, an arterial pressure monitoring line and a central venous catheter were placed via the right internal jugular vein. Patients were positioned in a 30–40° left lateral position with a pillow under the right thorax.

Peripheral Cannulation Cardiopulmonary bypass (CPB) was established via right femoral artery (PCKC-A cannula; MERA, Tokyo, Japan) and femoral vein (HLS cannula; Maquet, Rastatt, Germany) cannulation through a 2.5-cm skin incision in the groin. The right femoral artery was used in most cases. Vacuum assistance was used for venous drainage. Perfusion was maintained at 2.2–2.6 L/min/m^2. The lowest blood temperature during CPB was 32°C.

Port Placement A right lateral mini-thoracotomy, 2.5 cm in length, was performed in the 4th intercostal space, with the incision placed 2–3 cm lateral to the nipple in males and in the inframammary crease in females (**Figure 1**). After dissecting the space under the pectoralis major muscle anteriorly, thoracotomy was performed through the 4th intercostal space in all mitral valve cases. A soft tissue retractor was used in most cases without a rib spreader. We used the da Vinci Xi or da Vinci 5 system for robotic assistance. Three 8-mm da Vinci ports were placed in the 3rd intercostal space (ICS; Arm 1, left hand), 4th ICS (Arm 3, atrial retractor), and 5th or 6th ICS (Arm 4, right hand). A 0° camera (Arm 2) was inserted through a port within the main incision.

MVr The pericardium was opened anterior to the phrenic nerve and retracted to expose the right side of the left atrium. After insertion of the aortic root cannula, the ascending aorta was cross clamped using a Cygnet flexible clamp (Vitalitec Inc., Plymouth, MA, USA) through the main incision. All procedures were performed under endoscopic visualization with robotic assistance. The mitral valve was exposed using an atrial retractor, and leaflet pathology was assessed using a saline injection (water) test. Repair techniques for prolapsed leaflets included resection and suture, neochordal reconstruction, or a combination of these techniques, according to the anatomic characteristics of the valve. Annuloplasty using a band or ring was performed in all patients. Partial rings were predominantly used in both groups. The choice of annuloplasty device and ring size was based on intraoperative assessment of annular dimensions and leaflet morphology.

Statistical Analysis

Continuous variables are expressed as mean±standard deviation, or as median with interquartile range (IQR), depending on the distribution. Categorical variables are summarized as counts and percentages. Comparisons between the E and Y groups were performed using the Student's t-test or Wilcoxon rank-sum test for continuous variables and the chi-square test or Fisher's exact test for categorical variables, as appropriate. Two-tailed $P<0.05$ was considered statistically significant. Time-to-event outcomes, including overall survival, freedom from reoperation, and freedom from recurrent moderate or greater MR, were assessed using Kaplan–Meier analysis and compared with the log-rank test. No imputation was performed for missing data. All statistical analyses were conducted using IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, NY, USA).

Results

Patient Characteristics and Echocardiographic Data

Patients in the E group were older (83.0±2.1 vs. 61.0±8.5 years; $P<0.01$) and had a smaller body size (body surface area 1.43±0.15 vs. 1.60±0.17 m^2; $P<0.01$) than the Y group (**Table 1**). Preoperative atrial fibrillation (38% vs. 21%; $P=0.02$), a history of heart failure (48% vs. 26%; $P<0.01$), pulmonary hypertension (36% vs. 15%; $P<0.01$), and chronic renal dysfunction (41% vs. 10%; $P<0.01$) were more prevalent in the E group. The EuroSCORE II was significantly higher in the E group compared with the Y group (3.34±1.20 vs. 1.47±0.81). Preoperative hemoglobin levels were significantly lower in the E group (11.9±1.2 vs. 13.2±1.2 g/dL; $P<0.01$). Left ventricular ejection fraction (LVEF) was comparable between the 2 groups (68.2±6.2% vs. 69.3±5.6%; $P=0.32$), as were left ventricular dimensions and left atrial diameter. As an exploratory assessment, the mean Clinical Frailty Scale score in the E group was 4.1±0.8.

Intraoperative Data

CPB and aortic cross-clamp times did not differ significantly between groups (**Table 2**). Number of concomitant procedures was significantly higher in the E group (48% vs. 33%; $P=0.04$).

Table 1. Patient Characteristics and Preoperative TTE Data

Patient characteristic	E group (age ≥80 years; n=42)	Y group (age <80 years; n=370)	P value
Mean age (years)	83±2.5	62±9.8	<0.01
Sex, male	23 (54.8)	226 (83.6)	0.51
BSA (m^2)	1.43±0.14	1.60±0.16	<0.01
Preoperative atrial fibrillation	16 (38.1)	77 (20.8)	0.02
Preoperative hemoglobin (g/dL)	11.9±1.2	13.2±1.2	<0.01
NYHA class			
I	13 (31.0)	156 (42.2)	0.19
II	19 (45.2)	97 (26.2)	0.02
III	6 (14.3)	36 (9.7)	0.42
IV	2 (4.8)	7 (1.9)	0.23
Congestive heart failure	20 (47.6)	95 (25.7)	<0.01
Pulmonary hypertension (>45 mmHg)	15 (35.7)	55 (14.9)	<0.01
euroSCORE II (%)	3.34±1.20	1.47±0.81	<0.01
Comorbidities			
Hypertension	26 (61.9)	196 (53.0)	0.33
Dyslipidemia	13 (31.0)	133 (35.9)	0.61
Diabetes	4 (9.5)	28 (7.6)	0.55
Cerebrovascular disease	2 (4.8)	14 (3.8)	0.67
Ischemic heart disease	4 (9.5)	15 (4.1)	0.12
Chronic renal failure	17 (40.5)	38 (10.3)	<0.01
Chronic lung disease	2 (4.8)	2 (0.5)	0.05
TTE results			
LVEF (%)	68.2±6.2	69.3±5.6	0.32
LVDd (mm)	48.6±5.9	53.2±4.5	<0.01
LVDs (mm)	30.7±4.1	32.3±4.0	0.15
Mitral regurgitation grade			
Moderate–severe	9 (21.4)	74 (20.0)	0.84
Severe	31 (73.8)	291 (78.6)	0.44
Tricuspid valve regurgitation grade			
Mild	10 (23.8)	96 (25.9)	0.85
Moderate	7 (16.7)	26 (7.1)	0.06
Severe	4 (9.5)	6 (1.6)	0.01

Data are presented as n (%), or mean±SD. E, elderly; LVEF, left ventricular ejection fraction; LVDd, left ventricular diastolic diameter; LVDs, left ventricular systolic diameter; NYHA, New York Heart Association; TTE, transthoracic echocardiography; Y, young.

Table 2. Intraoperative Data

	E group (age ≥80 years; n=42)	Y group (age <80 years; n=370)	P value
Procedure time (min)	214.6±35.3	219.1±39.5	0.58
Cardiopulmonary bypass (min)	147.8±30.5	154.2±34.7	0.37
Aortic cross-clamp (min)	110.9±27.2	116.4±29.5	0.36
Second cross-clamp required	0 (0)	9 (2.4)	0.61
Concomitant procedures	20 (47.6)	122 (33.0)	0.04
Tricuspid surgery	8 (19.0)	44 (11.9)	0.22
LA cryomaze	10 (23.8)	68 (18.4)	0.41
Left atrial appendage closure	15 (35.7)	94 (25.4)	0.19
ASD closure	0 (0)	2 (0.5)	0.80

Data are presented as n (%), or mean±SD. ASD, atrial septal defect; E, elderly; LA, left atrium; Y, young.

Table 3. Repair Techniques and Artificial Band

	E group (age ≥80 years; n=42)	Y group (age <80 years; n=370)	P value
Repaired leaflet			
Anterior leaflet	11 (26.2)	103 (27.8)	1.00
Posterior leaflet	28 (66.7)	248 (67.0)	1.00
Anterior and posterior leaflet	6 (14.3)	46 (12.4)	0.81
Commissure (AC/PC)	7 (16.7)	67 (18.1)	1.00
Repair technique			
Annuloplasty	42 (100)	368 (99.5)	0.80
Restoration	18 (42.9)	196 (53.0)	0.25
Resection and suture	11 (26.2)	105 (28.4)	0.86
Neochordal reconstruction	17 (40.5)	129 (34.9)	0.50
Folding plasty	4 (9.5)	60 (16.2)	0.37
Edge to edge	6 (14.3)	45 (12.2)	0.63
No. techniques used per patient			
1	28 (66.7)	240 (64.9)	0.87
2	11 (26.2)	93 (25.1)	0.85
>3	2 (4.8)	37 (10.0)	0.41
Implant size (mm)	30 [28–30]	32 [30–34]	
Band shape			
Full ring	5 (11.9)	17 (4.6)	0.06
Partial ring	37 (88.1)	351 (94.9)	0.08

Data are presented as n (%), or median [IQR]. AC, anterior commissure; E, elderly; PC, posterior commissure; Y, young.

Table 4. Surgical Outcomes

Operative outcomes	E group (age ≥80 years; n=42)	Y group (age <80 years; n=370)	P value
In-hospital mortality	1 (2.4)	0 (0)	0.1
Re exploration for bleeding	0 (0)	3 (0.8)	0.72
Valve reintervention	0 (0)	1 (0.3)	1.0
Prolonged ventilation >24 h	1 (2.4)	8 (2.2)	0.62
ICU stay (days)	2.5 [2–4]	2.0 [1–2]	<0.01
Hospital stay after operation (days)	9.0 [7–16.5]	7.0 [6.25–9]	<0.01
Low cardiac output state	1 (2.4)	0 (0)	0.1
Symptomatic cerebral infarction	1 (2.4)	1 (0.3)	0.19
Blood transfusion (intra or post)	22 (52.4)	67 (18.1)	<0.01
New onset atrial fibrillation	5 (11.9)	61 (16.5)	0.66
Postoperative TTE outcomes			
LVEF (%)	61.5±6.0	60.3±6.2	0.39
LVDd (mm)	43.1±5.6	46.6±4.3	<0.01
LVDs (mm)	29.3±3.7	39.9±17.1	0.67
Mitral regurgitation grade			
None	32 (76.2)	287 (77.6)	0.51
Trivial	6 (14.3)	70 (18.9)	0.62
Trivial–mild	3 (7.2)	11 (2.9)	0.61
Mild	0 (0)	0 (0)	1.00
>Moderate	1 (2.4)	1 (0.2)	1.00
Tricuspid valve regurgitation grade			
None	6 (14.3)	132 (35.7)	<0.01
Trivial	24 (57.1)	197 (53.3)	0.74
Mild	12 (28.6)	40 (10.8)	<0.01
>Moderate	0 (0)	0 (0)	1.00

Data are presented as n (%), median [IQR], or mean±SD. ICU, intensive care unit. Other abbreviations as in Table 1.

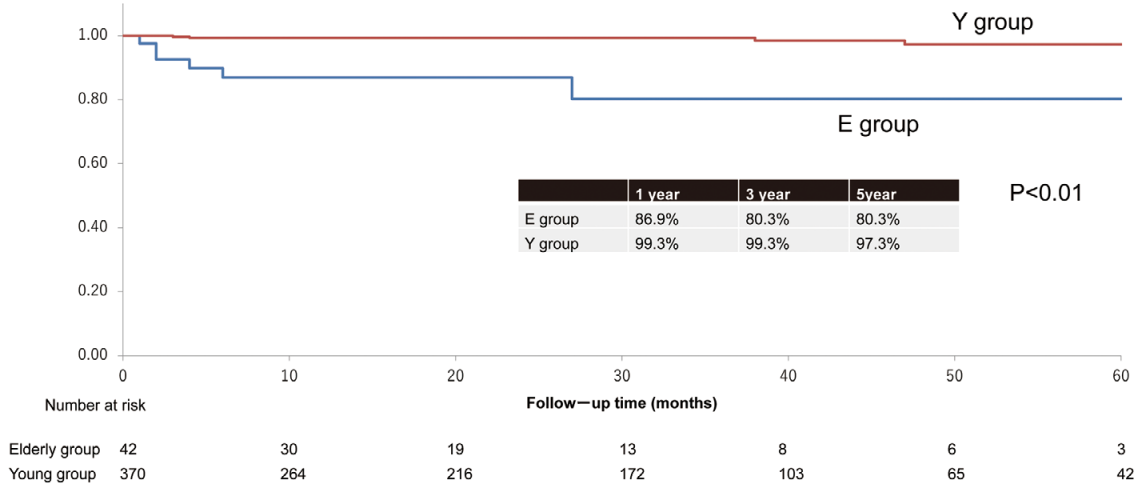

Figure 2. Freedom from all-cause mortality after robotic mitral valve repair in elderly and younger patients. Kaplan–Meier curves comparing overall survival between the E group (age ≥80 years) and the Y group (age <80 years). Five-year survival was significantly lower in the E group (80.3% vs. 97.3%; log-rank P<0.001). Number at risk is shown below the x-axis.

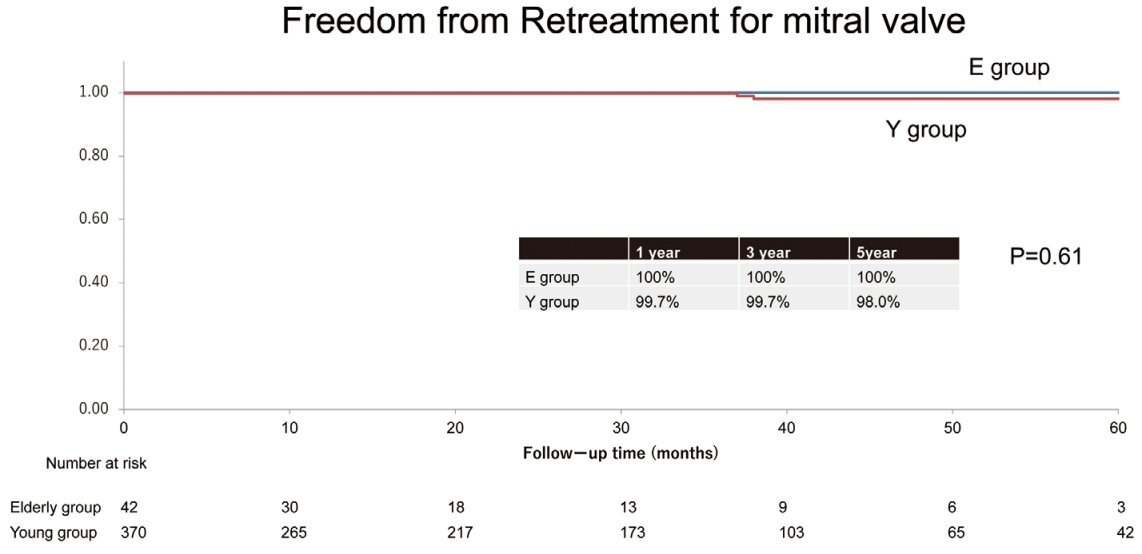

Figure 3. Freedom from reoperation following robotic mitral valve repair. Kaplan–Meier analysis demonstrating freedom from mitral valve reoperation in the E (age ≥80 years) and Y (age <80 years) groups. No octogenarian required late surgical or catheter-based reintervention. Five-year freedom from reoperation was 100% in the E group and 98.0% in the Y group (log-rank P=0.61). Number at risk is shown below the x-axis.

MVr Techniques

As shown in **Table 3**, repair complexity and strategies were comparable between the E and Y groups, including the frequency of chordal replacement and bileaflet disease, with no significant differences in repaired leaflet distribution. Posterior leaflet prolapse was the most common lesion in both groups (66.7% vs. 67.0%; P=1.00), followed by anterior leaflet involvement (26.2% vs. 27.8%) and bileaflet disease. The use of major repair techniques – triangular resection, neochordal reconstruction, folding plasty, and edge-to-edge suturing – did not differ between groups; neochordal reconstruction was performed in 40.5% and 34.9% of patients, and leaflet resection/suture in 26.2% and 28.4%, respectively. Approximately one-third of patients in both groups required more than 1 technique. Annuloplasty was performed in all patients, predominantly using partial

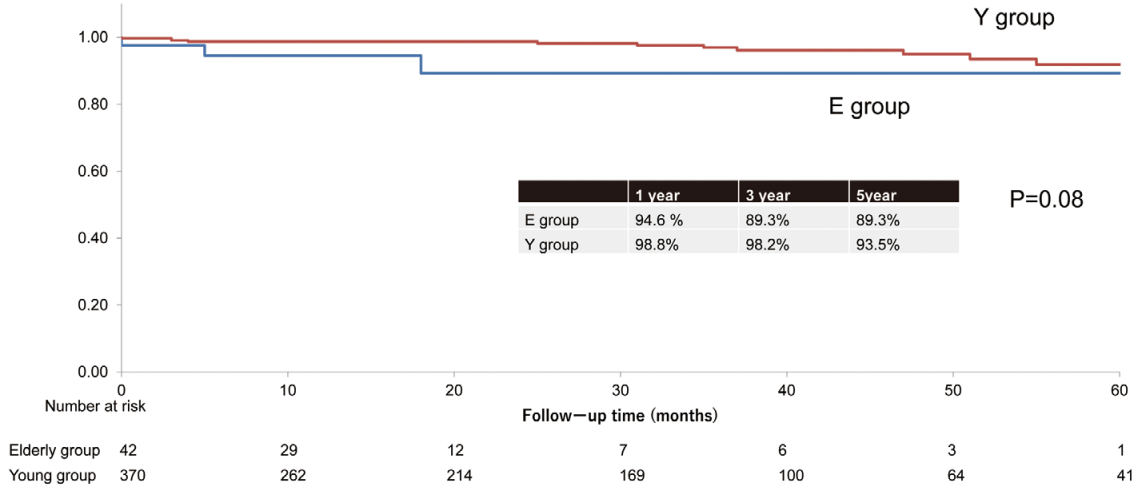

Figure 4. Freedom from recurrent moderate or greater mitral regurgitation. Kaplan–Meier curves illustrating freedom from recurrent moderate or greater mitral regurgitation (MR) in the elderly (E group; age ≥80 years) and younger (Y group; age <80 years) cohorts. Five-year freedom from recurrent MR was comparable (89.3% vs. 93.5%; log-rank P=0.08). Number at risk is provided below the x-axis.

rings (88.1% vs. 94.9%). As detailed in the **Supplementary Table**, device selection varied, and the median ring size was slightly smaller in the E group (30 mm [IQR 28–30] vs. 32 mm [IQR 30–34]), consistent with differences in body size and annular dimensions.

No conversions to sternotomy occurred in either group. In the E group, there was 1 (2.4%) hospital death in a patient with severe chronic obstructive pulmonary disease (STS-predicted risk 10%). Symptomatic cerebral infarction occurred in 1 (2.4%) patient; however, the patients did not have any disability. No patients required re-exploration for bleeding or new renal replacement therapy. Blood transfusion was more frequent in the E group (52% vs. 18%; P<0.01). Postoperative TTE at discharge revealed absent or trivial MR in 90.5% and mild MR in 7.2% of patients in the E group, with only 1 case of moderate MR, which was comparable with the outcome in the Y group.

Outcomes of follow-up duration beyond 6 months was available in 285 (77%) of 370 patients in the Y group and in 30 (73%) of 41 patients in the E group (**Table 4**). The median duration of follow up was 25.0 months (IQR 7.0–44.3 months) in the Y group and 15.5 months (IQR 4.8–33.5 months) in the E group. The maximum follow-up duration was 83 months in the Y group and 67 months in the E group. Patients with follow up shorter than 6 months mainly consisted of those who were still in the early postoperative period or who were lost to follow up due to relocation or other non-procedure-related reasons. During follow up, survival and valve-related outcomes demonstrated distinct patterns between the 2 groups. Freedom from all-cause mortality was significantly lower in the E group, with 5-year survival of 80.3% compared with 97.3% in the Y group (log-rank P<0.001; **Figure 2**). In contrast, the durability of MVr was excellent in both cohorts. Freedom from reoperation at 5 years was 100% in the E group and 98.0% in the Y group (P=0.61; **Figure 3**), indicating that no octogenarian required late surgical or catheter-based reintervention. Similarly, freedom from recurrent moderate or greater MR remained high and comparable (89.3% vs. 93.5% at 5 years; P=0.08; **Figure 4**). Echocardiographic assessment at follow up showed preserved left ventricular size and function in both groups, with slightly smaller ventricular dimensions in the E group.

Discussion

This study demonstrates that RMVr can be performed safely and effectively in carefully selected patients aged ≥80 years, achieving excellent early outcomes and durable mid-term valve competence despite their higher baseline risk profile. Valve-specific outcomes, including postoperative MR stability and freedom from reoperation and valve-related adverse events, were comparable with those in younger patients.[12] Although overall survival was lower in octogenarians, this appeared to reflect age and comorbidities rather than valve performance.

Consistent with the potential advantages of minimally invasive robotic surgery, our octogenarian cohort demonstrated low in-hospital mortality and favorable early postoperative recovery, including a relatively short intensive care unit and hospital stay, suggesting that RMVr can translate into faster recovery in appropriately selected elderly patients. Although perioperative transfusion was more frequent in octogenarians, this likely reflects lower preoperative hemoglobin levels and a higher prevalence of concomitant procedures rather than procedure-specific factors. RMVr uniquely integrates the durability of surgical repair with the advantages of minimally invasive access. The robotic platform provides stable 3-dimensional visualization and articulated instrumentation, enabling precise repair in complex anatomy, including anterior leaflet prolapse, bi-leaflet disease, and redo cases. Large contem-

porary series have consistently reported high repair rates, low operative mortality, and long-term durability comparable with conventional sternotomy approaches.[9,10,13] Japanese experiences also indicate that robotic programs can be implemented safely, even during the learning phase, with very low rates of mortality, stroke, and major perioperative complications.[11,14,15] Despite these potential benefits, evidence specifically focused on RMVr in elderly patients remains limited. Our study helps address this gap by demonstrating that RMVr can be performed safely in carefully selected octogenarians, supporting its role as a valuable surgical option for an aging population.

The single in-hospital death in our series occurred in an 81-year-old patient with critically severe chronic obstructive pulmonary disease, underscoring the limitations of RMVr in the presence of extreme physiological risk. The patient ultimately died of respiratory failure 2 months after surgery. At the time of this case, TEER was not yet available at our institution; in the present era, such a patient could reasonably be considered for TEER rather than RMVr. This experience highlights an important principle that TEER and RMVr should not be viewed as competing technologies, but rather as complementary treatment options, with appropriate patient selection being paramount.[16–18] Recent reports from Japan further support this complementary framework by demonstrating that post-procedural geometry and hemodynamic indices after mitral TEER provide important prognostic information.[18–22] These findings emphasize that careful patient selection and individualized treatment strategies are essential when choosing between TEER and RMVr.

From a broader clinical perspective, the observed 5-year survival of approximately 80% after RMVr in octogenarians should be interpreted in the context of the expected life expectancy of the general elderly population in Japan. According to national life tables, the estimated 5-year survival of individuals aged ≥80 years is approximately 77% in men and 87% in women.[23] In this context, survival after surgical MVr in the present study appears consistent with the natural prognosis of age-matched individuals, supporting the clinical relevance of appropriately selected surgical intervention beyond short-term symptom relief. Freedom from recurrent moderate or greater MR at 5 years was 89.3%. Recurrent MR occurred in 2 elderly patients (early postoperative and at 18 months) and was associated with mixed (degenerative and atrial functional) mechanisms and unexpectedly advanced anterior leaflet degeneration leading to restricted motion and shallow coaptation. Such complex leaflet pathology and mixed MR mechanisms are relatively common in elderly patients and require particular attention during surgical planning and repair. In such settings, alternative strategies may be reasonable when durable repair is unlikely; notably, robotic mitral valve replacement is also feasible in selected patients and has been reimbursed in Japan since 2024, and this procedural versatility may represent an additional advantage of the robotic platform.

From a methodological perspective, the principal advantage of TEER over surgical MVr lies in its markedly less invasive nature. However, with respect to valve repair itself for DMR, surgical repair offers important advantages by directly targeting diseased leaflet segments and addressing annular dilatation, rather than creating a double-orifice configuration.[16,17] With the evolution of minimally invasive surgical approaches, including RMVr, procedural invasiveness has been substantially reduced, thereby narrowing the gap in invasiveness between TEER and surgical repair. In centers where minimally invasive surgical approaches, including RMVr, can be performed safely with low operative risk, this reduction in invasiveness may allow selected elderly patients who might previously have been considered marginal surgical candidates to undergo definitive surgical repair with outcomes comparable with those of younger patients. These considerations underscore the central role of the multidisciplinary heart team, in which treatment decisions should integrate patient-specific risk, institutional surgical outcomes, and the availability of advanced repair techniques, including robotic platforms. Chronological age alone should not be the sole determinant of treatment selection. Within this framework, RMVr has the potential to expand the population of elderly patients who can be reasonably considered for surgical MVr, while TEER remains an important option for patients whose surgical risk is prohibitive, allowing individualized, risk-adjusted management of DMR in an aging population.

Study Limitations

This study has several important limitations. First, it was a retrospective, single-center analysis, which may limit generalizability. Second, although the study groups were defined by age, the primary aim was descriptive rather than comparative, and patients aged <80 years were included as a reference cohort to provide clinical context. Given the limited sample size and number of outcome events, adjusted analyses using propensity-based methods or multivariable Cox regression were not performed to avoid overfitting and unstable estimates; therefore, comparisons between age-defined groups should be interpreted descriptively. Third, the number of octogenarian patients was relatively small, and longer follow up is required to fully evaluate the mid-term durability of RMVr in this population. Fourth, comparisons with TEER were indirect, as no head-to-head analysis was possible within this cohort. Last, selection bias cannot be excluded, because patients deemed suitable for surgery may have had more favorable anatomical or physiological characteristics than elderly patients referred for TEER.

Conclusions

In the era of expanding TEER, this study demonstrates that RMVr remains a feasible and durable surgical option in selected octogenarians. While TEER represents an important alternative for patients at high surgical risk, the role of RMVr should be determined within a multidisciplinary heart team-based decision-making framework, taking into account patient-specific risk, anatomical suitability, and institutional expertise.

Disclosures

The authors declare that there are no conflicts of interest.

IRB Information

The present study was approved by the institutional review board of Chibanishi General Hospital (reference no. TGE 02712-025).

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Supplementary Files

Please find supplementary file(s);
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