



Robotic chordae shortening in mitral valve repair

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Background: Cusp-level chordae shortening was largely abandoned after suboptimal durability in the sternotomy era. We postulated that the enhanced visualization and wristed instrumentation of totally endoscopic robotic mitral repair could enable precise shortening with durable hemodynamics and acceptable peri-operative risk.

Methods: We retrospectively analyzed 523 consecutive degenerative mitral regurgitation (MR) repairs performed robotically at the National Taiwan University Hospital (January 2012–November 2024). Chordae shortening was used in 68 patients (13%; 46 primary, 22 adjunct) and compared with 455 contemporaneous repairs without shortening.

Results: Baseline characteristics and operative times were similar [cross-clamp 74±27 vs. 75±25 min; cardiopulmonary bypass (CPB) 120±30 vs. 120±25 min]. All shortening cases achieved successful repair without conversion or valve replacement. At discharge, none/trace MR was more frequent after shortening (95.6% vs. 93.4%); no patient in the shortening group had ≥ moderate MR. Early events were low: 30-day mortality 0% vs. 0.2%, stroke 0% vs. 0.2%, renal failure 1.5% vs. 1.8%, and reoperation for bleeding 1.5% vs. 0%. Reintubation (2.9% vs. 0%) and new-onset atrial fibrillation (33.8% vs. 13.6%) were more common with shortening, yet median ventilation time was comparable, and resource use favored shortening [intensive care unit (ICU) stay 19±28 vs. 27±25 h; hospital stay 7.0±2.9 vs. 9.5±2.7 days]. Follow-up echocardiography (median, 3.6 years) showed sustained competence: 92% of shortening patients remained MR-free. Ten-year freedom from ≥ moderate MR was 95.6% with shortening vs. 94.5% without (log-rank P=0.66).

Conclusions: Robotic chordae shortening adds negligible operative time, shortens ICU and hospital stay, and delivers long-term valve competence equivalent to contemporary robotic repairs relying on chordal transfer or neochordae. Although new-onset atrial fibrillation was more frequent, other adverse events were rare. The robotic platform appears to overcome historical limitations of chordae shortening, restoring this tissue-preserving option for anterior leaflet prolapse in degenerative mitral disease.

Keywords: Robotic valve surgery; chordae tendineae shortening; mitral valve repair; minimally invasive cardiac surgery; surgical outcomes



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Introduction

Degenerative mitral regurgitation (MR) secondary to elongation or rupture of primary anterior leaflet chordae remains one of the most demanding lesions in reconstructive mitral surgery. Although leaflet resection,

chordal transfer, and expanded-polytetrafluoroethylene (ePTFE) neochordae have become today's mainstays, each technique sacrifices either native tissue or operative simplicity. Cusp-level chordae shortening—first described more than three decades ago—preserves endogenous

anatomy and avoids foreign material, yet it fell out of favor after several series reported suboptimal long-term competence when performed through a median sternotomy under direct vision (1-3).

Subsequent comparator studies reinforced that impression: Smedira *et al.* demonstrated superior 5-year freedom from reoperation with chordal transfer *vs.* shortening (96% *vs.* 74%) (4), and Phillips *et al.* likewise documented a higher re-repair rate after shortening than after neochordal replacement (3). These durability concerns, coupled with the technical challenge of titrating suture length deep within the ventricular cavity, effectively relegated shortening to historical footnote status—despite its conceptual attractiveness (5).

The advent of totally endoscopic, robot-assisted mitral surgery has fundamentally altered the operative environment. Three-dimensional high-definition optics, tremor filtration, and wristed instruments enable centimeter-level manoeuvres to be executed with millimeter-level precision. National Taiwan University Hospital has leveraged this platform for a broad range of complex valve repairs, including combined robotic aortic and mitral procedures with excellent outcomes (6). We posited that the same technological advantages might overcome the historical limitations of cusp-level shortening, restoring it as a viable, tissue-preserving option for anterior leaflet prolapse.

To test this hypothesis, we analyzed our consecutive experience with robotic chordae shortening performed between 2012 and 2024, comparing early morbidity, resource utilization, and mid-term hemodynamic durability with contemporary robotic repairs that relied exclusively on chordal transfer or neochordae. We aimed to determine whether robotic assistance could deliver reliable valve competence without incurring excess operative risk, thereby re-establishing chordae shortening in the modern mitral-repair armamentarium.

Methods

Ethics approval and study design

This single-center, retrospective cohort study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of National Taiwan University Hospital (IRB No. 202401213RINC); the requirement for individual informed consent was waived owing to the retrospective design.

Patient population

We reviewed all consecutive patients who underwent totally endoscopic robotic mitral valve repair for degenerative MR at National Taiwan University Hospital between 1 January 2012 and 30 November 2024. Exclusion criteria were rheumatic disease, active endocarditis, or concomitant mitral replacement. The study cohort comprised 523 repairs, divided a priori into those in which elongated primary chordae were shortened (n=68, 13%) and those repaired without shortening (n=455). Chordae-shortening cases were further stratified as primary (shortening was the principal leaflet intervention, n=46) or adjunct (performed in addition to leaflet resection or neochord implantation, n=22). Baseline demographics are summarized in *Table 1*.

Operative set-up and myocardial protection

Setting

The setting for the robotic surgery was the same as that reported previously for mitral valve surgery (7,8). After general anesthesia was administered via a single-lumen endotracheal tube, the patient was positioned supine with the right chest elevated. A 3-cm working port safeguarded by a soft-tissue protector was created in the fourth intercostal space around the right anterior axillary line. The third and sixth intercostal spaces served as sites for insertion of the left and right robotic arm ports, respectively. The atrial retractor was positioned in the fourth intercostal space, while the camera port was situated just above the working port and the sub-working port to vent below it. Two suture-mediated closure system devices (ProGlide™; Abbott, North Chicago, IL, USA) were used for right common femoral arterial cannulation. Venous cannulations were performed in the right jugular and right femoral veins under transesophageal echocardiographic guidance. After heparin administration, cardiopulmonary bypass (CPB) was initiated, and the robotic cart was docked. After the pericardium was opened, a long-shaft cardioplegic needle was used on the aortic root, and a detachable aortic clasper (Glauber clamp; Cardio Medical GmbH, Langenhagen, Germany) was inserted through the working port into the thoracic cage. Antegrade cardioplegia [St. Thomas Hospital No. 2, histidine-tryptophan-ketoglutarate (HTK), and adenosine] was administered. Typically, a left atrial approach was achieved, which involved an incision through Sondergaard's plane, with the mitral valve exposed using an atrial retractor.

Table 1 Baseline characteristics

Variables	Overall (n=523)	Chordae shortening (n=68)	Primary (n=46)	Adjunct (n=22)	No shortening (n=455)	P value [†]
Age (years)	57.1±12.0	54.6±12.3	53.0±13.1	58.2±9.9	57.5±12.0	0.07
Male	308 (58.9)	40 (58.8)	29 (63.0)	11 (50.0)	268 (58.9)	0.99
Hypertension	177 (33.8)	24 (35.3)	19 (41.3)	5 (22.7)	153 (33.6)	0.79
Diabetes mellitus	127 (24.3)	20 (29.4)	16 (34.8)	4 (18.2)	107 (23.5)	0.29
Coronary artery disease	37 (7.1)	5 (7.4)	4 (8.7)	1 (4.5)	32 (7.0)	0.81
Chronic kidney disease	48 (9.2)	7 (10.3)	5 (10.9)	2 (9.1)	41 (9.0)	0.73
Atrial fibrillation	192 (36.7)	25 (36.8)	18 (39.1)	7 (31.8)	167 (36.7)	0.99
Stroke history	54 (10.3)	9 (13.2)	7 (15.2)	2 (9.1)	45 (9.9)	0.39
NYHA III–IV	112 (21.4)	12 (17.6)	9 (19.6)	3 (13.6)	100 (22.0)	0.42
LVEF <50%	57 (10.9)	6 (8.8)	4 (8.7)	2 (9.1)	51 (11.2)	0.56

Data are presented as mean ± standard deviation or n (%). [†], P value comparison is between the chordae shortening and the no shortening groups. LVEF, left ventricular ejection fraction; NYHA, New York Heart Association.

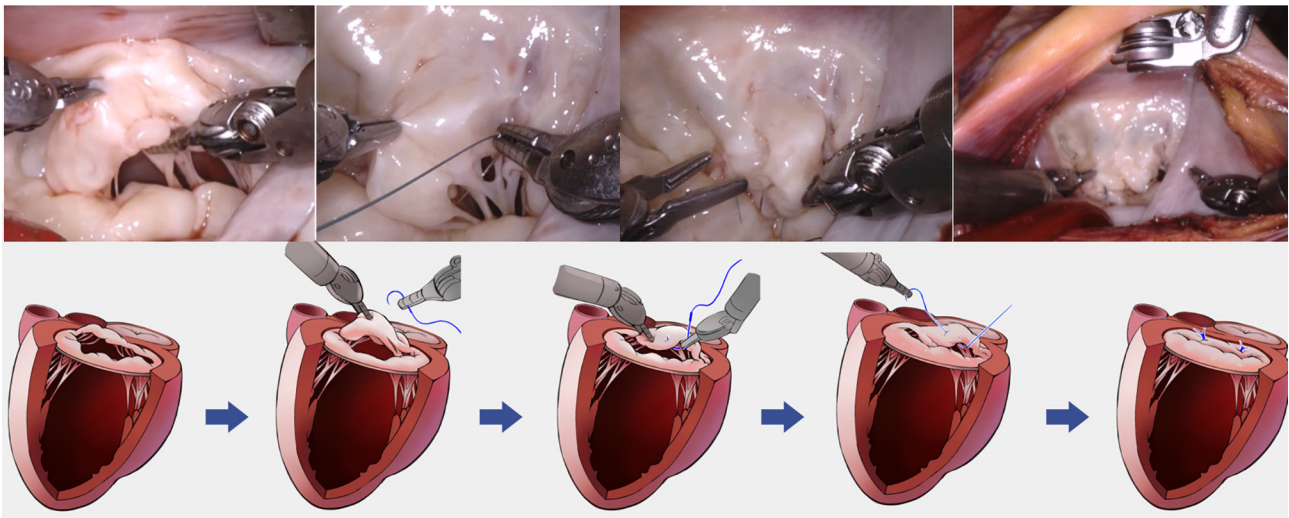


Figure 1 Robotic cusp-level chordae-shortening technique. Selection of target chord: only elongated but intact primary chordae supplying the prolapsing anterior leaflet segment are addressed. Suture material: a double-armed 5-0 polypropylene suture, one needle is inserted through the target chorda about 2–3 mm from the leaflet free edge, perpendicular to its long axis to avoid longitudinal splitting. The needle then penetrates the corresponding leaflet margin, exiting on the atrial surface.

Chordae-shortening technique

Primary lesions

This technique is applied to cases of anterior leaflet prolapse without chordae rupture, identified through preoperative cardiac echocardiography (*Figure 1*). During surgery, the anterior leaflet prolapse, typically extending 2–5 mm

beyond the annulus plane, is confirmed. The robotic system provides enhanced visualization and precision.

The surgeon locates the chordae near the margin of the prolapsed leaflet. A suture is placed approximately 3 mm from the edge of the leaflet. This suture is then tied back onto the leaflet itself, effectively shortening the chordae

Table 2 Post-operative outcomes

Variables	Overall (n=523)	Chordae shortening (n=68)	Primary (n=46)	Adjunct (n=22)	No shortening (n=455)	P value [†]
Conversion	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.99
Reoperation (bleeding)	1 (0.2)	1 (1.5)	1 (2.2)	0 (0.0)	0 (0.0)	0.13
Reintubation	2 (0.4)	2 (2.9)	1 (2.2)	1 (4.5)	0 (0.0)	0.01
Post-operative stroke	1 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.2)	0.99
Post-operative renal failure	10 (1.9)	1 (1.5)	1 (2.2)	0 (0.0)	8 (1.8)	0.88
Post-operative dialysis	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.99
New-onset atrial fibrillation	85 (16.3)	23 (33.8)	15 (32.6)	8 (36.4)	62 (13.6)	0.01
30-day mortality	1 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.2)	0.97
Mechanical ventilation time (h)	5.2±2.5	6.8±15.4	6.5±14.0	7.2±17.0	5.0±2.0	0.18
ICU stay time (h)	26±25	19±28	18.5±27	20±29	27±25	0.04
Hospital stay (days)	9.0±2.8	7.0±2.9	7.0±3.0	7.0±2.8	9.5±2.7	0.01
Follow-up LVEF (%)	62.0±11.5	62.3±12.7	63.0±12.0	61.0±13.0	62.0±11.2	0.85
None-trace MR at discharge	490 (93.7)	65 (95.6)	45 (97.8)	20 (90.9)	425 (93.4)	0.53
Mild MR at discharge	31 (5.9)	3 (4.4)	1 (2.2)	2 (9.1)	28 (6.2)	0.58
Moderate MR at discharge	2 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.4)	0.99

Data are presented as mean ± standard deviation or n (%). [†], P value comparison is between the chordae shortening and the no shortening groups. ICU, intensive care unit; LVEF, left ventricular ejection fraction; MR, mitral regurgitation.

by 3 mm. This shortening corrects the prolapse, restoring proper valve function and reducing MR.

Adjuvant techniques

This technique is also employed as an adjunctive procedure. During mitral valve repair, after addressing the primary lesion, if the morphology of the valve does not appear optimal under the saline test, this technique is applied to shorten the prolapsed area. This additional step ensures improved coaptation and enhances the overall appearance and function of the valve.

Data collection and definitions

Clinical variables were extracted from electronic medical records: age, sex, co-morbidities, New York Heart Association (NYHA) functional class, echocardiographic measurements, operative times, associated procedures, and early outcomes. Post-operative complications were defined according to the Society of Thoracic Surgeons

criteria. Echocardiographic follow-up was scheduled at 3 months, 1 year, and annually thereafter; MR was graded per the American Society of Echocardiography. The primary endpoint was freedom from ≥ moderate MR. Secondary endpoints included 30-day mortality, major morbidity, mechanical-ventilation time, intensive care unit (ICU) length of stay, and total hospital stay (*Table 2*).

Statistical analysis

Continuous data are presented as mean ± standard deviation and were compared with Student's *t*-test or one-way analysis of variance (ANOVA) as appropriate. Categorical variables are expressed as counts (percentages) and were compared using χ^2 or Fisher's exact test. Time-to-event outcomes (freedom from ≥ moderate MR) were estimated with the Kaplan-Meier method and compared with the log-rank test. Two-sided $P < 0.05$ was considered statistically significant. Analyses were performed using SPSS version 26 (IBM Corp., Armonk, NY, USA).

Table 3 Operative data

Variables	Overall (n=523)	Chordae shortening (n=68)	Primary (n=46)	Adjunct (n=22)	No shortening (n=455)	P value [†]
Operation time (min)	188±60	187±62	191±72	179±31	188±60	0.98
Cross-clamp time (min)	75±24	74±27	76±29	68±19	75±25	0.74
CPB time (min)	120±25	120±30	122±33	113±19	120±25	0.89
Ring implanted	521 (99.6)	68 (100.0)	46 (100.0)	22 (100.0)	453 (99.6)	0.54
Neo-chord used	279 (53.3)	33 (48.5)	21 (45.7)	12 (54.5)	246 (54.1)	0.39
Chordae release (other)	41 (7.8)	2 (2.9)	1 (2.2)	1 (4.5)	39 (8.6)	0.12
Mitral valve replaced	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.99
TV repair	82 (15.7)	12 (17.6)	7 (15.2)	5 (22.7)	70 (15.4)	0.64
Cryo-ablation	133 (25.4)	18 (26.5)	13 (28.3)	5 (22.7)	115 (25.3)	0.83

Data are presented as mean ± standard deviation or n (%). [†], P value comparison is between the chordae shortening and the no shortening groups. CPB, cardiopulmonary bypass; TV, tricuspid valve.

Results

Patient characteristics

Between January 2012 and November 2024, a total of 523 patients underwent totally endoscopic robotic mitral valve repair for degenerative MR at National Taiwan University Hospital. Chordae shortening was performed in 68 patients (13%), including 46 cases in which shortening was the primary repair strategy and 22 in which it was used as an adjunct to other leaflet techniques. The remaining 455 patients underwent repair without chordae shortening.

Baseline demographic and clinical characteristics were comparable between the shortening and non-shortening groups (*Table 1*). Mean age was 54.6±12.3 years in the shortening group and 57.5±12.0 years in the non-shortening group (P=0.07). The proportion of male patients was similar between groups (58.8% vs. 58.9%, P=0.99).

The prevalence of major comorbidities did not differ significantly, including hypertension (35.3% vs. 33.6%, P=0.79), diabetes mellitus (29.4% vs. 23.5%, P=0.29), coronary artery disease (7.4% vs. 7.0%, P=0.81), chronic kidney disease (10.3% vs. 9.0%, P=0.73), atrial fibrillation (36.8% vs. 36.7%, P=0.99), and prior stroke (13.2% vs. 9.9%, P=0.39). Advanced functional status (NYHA class III–IV) was present in 17.6% of patients in the shortening group and 22.0% in the non-shortening group (P=0.42). Reduced left ventricular ejection fraction (<50%) was observed in 8.8% and 11.2% of patients, respectively (P=0.56).

Operative details

Operative characteristics are summarized in *Table 3*. Total operative time was similar between patients undergoing chordae shortening and those repaired without shortening (187±62 vs. 188±60 min, P=0.98). Aortic cross-clamp time (74±27 vs. 75±25 min, P=0.74) and CPB time (120±30 vs. 120±25 min, P=0.89) did not differ significantly between groups.

Annuloplasty ring implantation was performed in nearly all patients in both cohorts (100.0% vs. 99.6%, P=0.54). The use of ePTFE neochordae was comparable between the shortening and non-shortening groups (48.5% vs. 54.1%, P=0.39). Other adjunctive chordal procedures were infrequent and did not differ significantly (2.9% vs. 8.6%, P=0.12).

Concomitant procedures were similarly distributed between groups, including tricuspid valve repair (17.6% vs. 15.4%, P=0.64) and surgical cryoablation for atrial fibrillation (26.5% vs. 25.3%, P=0.83). No patient required conversion to sternotomy or mitral valve replacement.

Early postoperative outcomes

Early postoperative outcomes are detailed in *Table 2*. Thirty-day mortality was low in both groups, with no deaths in the chordae-shortening cohort and 1 death (0.2%) in the non-shortening group (P=0.97). No patient in the shortening group experienced postoperative stroke, compared with 1 event (0.2%) in the non-shortening group

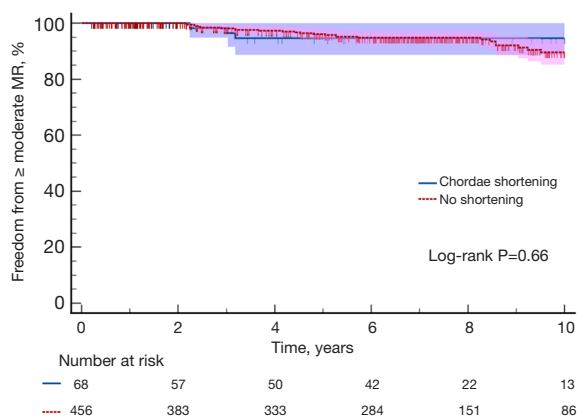


Figure 2 Kaplan-Meier freedom from \geq moderate MR. Robotic mitral repair with cusp-level chordae shortening (n=68) *vs.* no shortening (n=455). Ten-year freedom from \geq moderate MR was 95.6% in the chordae shortening cohort and 94.5% in the no shortening cohort (log-rank P=0.66). Shaded bands indicate 95% confidence intervals. MR, mitral regurgitation.

(P=0.99). Postoperative renal failure occurred in 1.5% of patients undergoing chordae shortening and 1.8% of those without shortening (P=0.88), and no patient in either group required postoperative dialysis.

Reoperation for bleeding was infrequent, occurring in 1 patient (1.5%) in the shortening group and in none of the non-shortening group (P=0.13). Reintubation occurred more frequently among patients undergoing chordae shortening (2.9% *vs.* 0%, P=0.01).

New-onset atrial fibrillation was significantly more common in the chordae-shortening group (33.8% *vs.* 13.6%, P=0.01). Despite this difference, postoperative respiratory support and overall resource utilization were not adversely affected. Mechanical ventilation time was comparable between groups (6.8 \pm 15.4 *vs.* 5.0 \pm 2.0 h, P=0.18). Patients undergoing chordae shortening had a shorter ICU stay (19 \pm 28 *vs.* 27 \pm 25 h, P=0.04) and a reduced total hospital length of stay (7.0 \pm 2.9 *vs.* 9.5 \pm 2.7 days, P=0.01).

At discharge, echocardiography demonstrated excellent valve competence in both cohorts. None or trace MR was observed in 95.6% of patients in the shortening group and 93.4% of those in the non-shortening group (P=0.53). Mild MR was present in 4.4% and 6.2% of patients, respectively (P=0.58). No patient in the shortening cohort had moderate or greater MR at discharge, compared with 2 patients (0.4%) in the non-shortening group (P=0.99).

Long-term outcomes

Median follow-up was 3.6 years (range, 0.2–10 years). Ten-year freedom from \geq moderate MR was 95.6% in the shortening group and 94.5% in the non-shortening group (log-rank P=0.66; *Figure 2*). Kaplan-Meier curves are shown in *Figure 2*.

MR-grade transitions for the shortening cohort are illustrated in *Figure 3*; most patients with pre-operative grade 4 MR were grade 0–1 at long-term follow-up.

Discussion

Main findings

Robotic chordae shortening is feasible, reproducible, and durably effective. Ten-year freedom from \geq moderate MR exceeded 95%, 30-day mortality was 0%, and intensive-care and hospital stays were shortened. Robotic optics (10-fold three-dimensional magnification) and wristed instruments convert millimeter-scale adjustments at the cusp level into predictable leaflet coaptation, overcoming the technical imprecision that limited conventional shortening.

Comparison with traditional chordae shortening

Carpentier's original technique shortens primary chordae at the papillary-muscle level, several centimeters from the leaflet edge (1). Determining the exact truncation length is indirect, knot-tying is restricted, and late elongation or slippage contributed to higher re-repair rates in early series (2–4). Cusp-level shortening under robotic vision is more intuitive: the operative field and the target chordae are viewed in the same plane, and the residual leaflet prolapse can be titrated in real time. Our cross-clamp and cardiopulmonary-bypass times were identical to repairs using neochordae, indicating that the robotic method adds no procedural burden.

Focus on anterior leaflet prolapse without chordal rupture

The cohort was restricted to elongated—but intact—primary chordae, a pattern typical of anterior leaflet involvement in Barlow's disease. In this setting, shortening preserves native tissue and restores physiologic leaflet kinematics. For ruptured chordae, we favor ePTFE neochordae or chordal transfer, techniques better suited to replacing absent support. Future work should explore

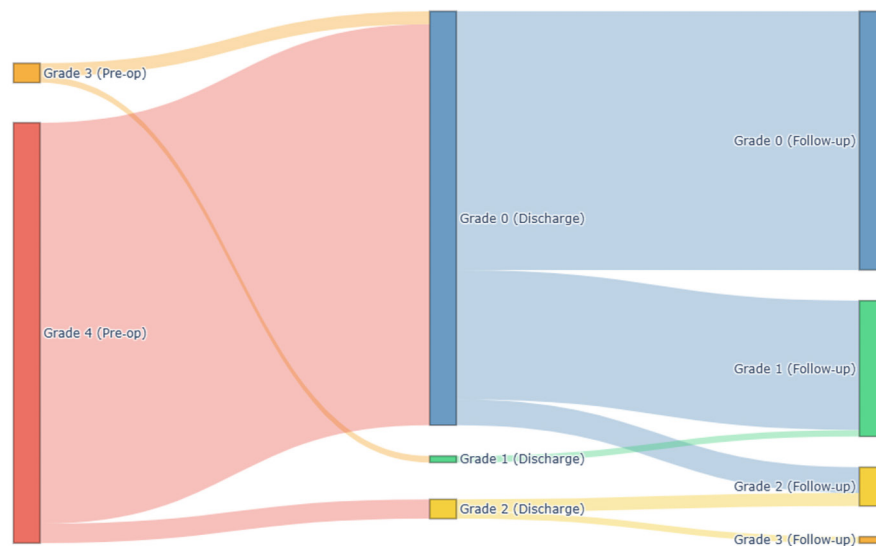


Figure 3 Sankey diagram. Illustrating MR-grade transitions in the chordae-shortening cohort (n=68). Each flow represents the number of patients progressing from pre-operative MR (grade 3 or 4) through discharge echocardiography (grade 0–1 or 2) to the latest follow-up (median 3.6 years). Line width is proportional to patient count; 92% of patients remained grade 0–1 at final follow-up. MR, mitral regurgitation.

hybrid strategies—shortening intact secondary chordae while placing neochordae for ruptured primary cords—to optimize leaflet coaptation with minimal foreign material.

Role as an adjuvant manoeuvre

When intra-operative saline testing showed residual focal prolapse after the primary repair, a single cusp-level shortening suture effectively corrected the defect. Although the incremental benefit did not reach statistical significance because of small numbers, clinical improvement in valve morphology was obvious, and no additional morbidity was incurred. This versatility makes shortening a valuable adjunct, particularly in multi-segment disease where multiple mechanisms coexist.

Atrial fibrillation and post-operative respiratory support

An increased incidence of new-onset atrial fibrillation was observed in patients undergoing chordae shortening. Several considerations may explain this finding. First, chordae shortening was selectively applied to valves with elongated but intact primary chordae, a morphology frequently encountered in advanced degenerative disease and often

associated with larger left atrial size and a longer pre-operative volume overload history—factors known to predispose to postoperative atrial arrhythmias. Second, shortening was occasionally used as an adjunctive manoeuvre to optimize leaflet coaptation after the primary repair, potentially reflecting a higher degree of leaflet manipulation rather than a direct arrhythmogenic effect of the technique itself.

Importantly, the higher incidence of postoperative atrial fibrillation did not translate into increased early morbidity or resource utilization. Mechanical ventilation duration was comparable between groups, while ICU and total hospital stays were shorter in the shortening cohort. Moreover, atrial fibrillation was managed according to standard postoperative protocols and resolved in the majority of cases without long-term sequelae. These findings suggest that the observed difference represents a transient, clinically manageable postoperative phenomenon rather than a marker of procedural risk or repair failure.

Benefit of robotic approach

The robotic system confers several critical advantages specifically for cusp-level chordae shortening. High-definition, three-dimensional optics furnish roughly 10-fold

magnification, bringing 1- to 2-mm primary chordae into sharp focus and allowing the surgeon to visualize subtle differences in length along the leaflet edge. Motion-scaling and tremor-filtration translate millimeter hand movements at the console into sub-millimeter bites inside the heart, enabling suture placement through the chorda and leaflet margin with micrometric accuracy. Seven-degree-of-freedom, wristed instruments can approach the chorda perpendicularly—something nearly impossible with rigid thoracoscopic tools. A surgeon-controlled, stabilized camera maintains constant, centered visualization of the target chordae, eliminating assistant-dependent drift. Collectively, these features simplify measurement of the required truncation, reduce the risk of chorda fracture, and provide secure, reproducible fixation at the cusp level—advantages that directly address the technical limitations that undermined traditional shortening performed under direct open vision.

Study limitations

The analysis is retrospective, single-center, and involves a modest sample of shortening cases. Propensity matching was not performed; therefore, unmeasured confounders may persist. Echocardiographic follow-up was mid-term (median, 3.6 years). Multicenter registries and longer surveillance are warranted.

Conclusions

Robotic magnification, instrument stability, and tremor filtration eliminate the technical constraints that once undermined chordae shortening. Applied to elongated primary chordae—commonly responsible for anterior leaflet prolapse—cusp-level shortening restores durable competence, shortens peri-operative recovery, and can be deployed rapidly as an adjunct when residual prolapse persists. These data support incorporating robotic chordae shortening into the contemporary mitral repair armamentarium.

Acknowledgments

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Footnote

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Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: This study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of National Taiwan University Hospital (IRB No. 202401213RINC); the requirement for individual informed consent was waived owing to the retrospective design.

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References

1. Murala JS, Kumar AS. Long-term results of cusp-level chordal shortening for anterior mitral leaflet prolapse. *Tex Heart Inst J* 2004;31:246-50.
2. David TE, Omran A, Armstrong S, et al. Long-term results of mitral valve repair for myxomatous disease with and without chordal replacement with expanded polytetrafluoroethylene sutures. *J Thorac Cardiovasc Surg* 1998;115:1279-85; discussion 1285-6.
3. Phillips MR, Daly RC, Schaff HV, et al. Repair of anterior leaflet mitral valve prolapse: chordal replacement versus chordal shortening. *Ann Thorac Surg* 2000;69:25-9.
4. Smedira NG, Selman R, Cosgrove DM, et al. Repair of anterior leaflet prolapse: chordal transfer is superior to chordal shortening. *J Thorac Cardiovasc Surg* 1996;112:287-91; discussion 291-2.
5. Fundaró P, Lemma M, Di Mattia DG, et al. Repair of anterior leaflet prolapse: chordal transfer versus chordal shortening. Which is better? *J Thorac Cardiovasc Surg* 1997;114:1125-7.
6. Wei LY, Chen JW, Chou NK, et al. Outcomes of robotic and endoscopic combined aortic and mitral valve surgery: experience from National Taiwan University Hospital. *Ann Cardiothorac Surg* 2025;14:210-7.

7. Cheng BC, Chi NH. Robotic septal myectomy for hypertrophy cardiomyopathy. *Ann Cardiothorac Surg* 2022;11:632-3.
8. Chou NK, Wang YC, Huang CH, et al. Robotic mitral valve repair in National Taiwan University Hospital: 10-year results. *Ann Cardiothorac Surg* 2022;11:605-13.

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