



P3.365: Real-world transition and perioperative outcomes of surgical approaches for mediastinal tumors and myasthenia gravis

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INTRODUCTION

BACKGROUND

- **Total thymectomy** is an important surgical procedure for anterior mediastinal diseases, including thymic epithelial tumors (TETs) and myasthenia gravis (MG).
- **Minimally invasive surgery (MIS)** for mediastinal tumors and MG has increasingly shifted from VATS to robot-assisted thoracoscopic surgery (RATS) ^{1,2}.
- Real-world evidence regarding temporal transition and the relative benefits of RATS remains limited.

OBJECTIVE

To evaluate temporal trends in surgical approaches and compare perioperative outcomes after total thymectomy in contemporary real-world practice.

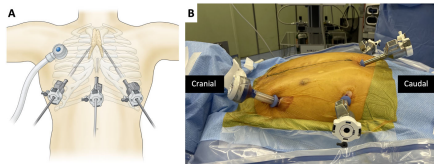
METHODS

DESIGN & COHORT

- **Single-center retrospective cohort** at Kyoto Prefectural University of Medicine.
- Patients undergoing total thymectomy for anterior mediastinal tumors or MG from Jan 2010 to Jan 2026.
- Excluded cases requiring great-vessel resection or extended thoracotomy beyond conventional sternotomy.

SURGICAL APPROACHES

- **Open**: conventional median sternotomy
- **VATS**: similar subxiphoid/intercostal port configuration
- **RATS**: robotic subxiphoid-optical thymectomy (RST) as shown below



³⁾Shimomura M, Ishihara S, Okada S, Inoue M. Robotic subxiphoid-optical thymectomy. Interact Cardiovasc Thorac Surg. 2022 Jul 9;35(2):ivac104.

ENDPOINTS & ANALYSIS

- Temporal trends were assessed descriptively.
- Perioperative outcomes included operative time, blood loss, chest drainage, hospital stay, conversion, complications, and R0 resection.
- Stabilized IPTW compared Open vs RATS after excluding VATS cases; covariates were balanced with absolute SMD <0.1.

ABBREVIATIONS & DISCLOSURES

ABBREVIATIONS

IPTW, inverse probability of treatment weighting; MG, myasthenia gravis; MIS, minimally invasive surgery; RATS, robot-assisted thoracoscopic surgery; RST, robotic subxiphoid-optical thymectomy; TET, thymic epithelial tumor; VATS, video-assisted thoracoscopic surgery.

COI / FUNDING

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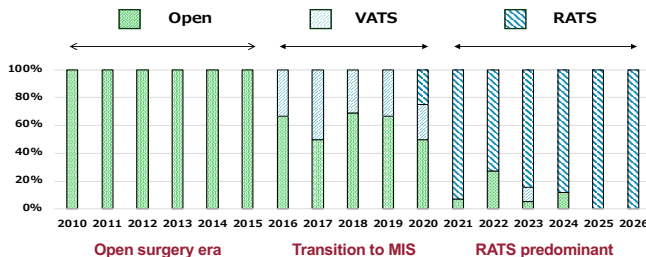
RESULTS

139
total thymectomy patients

65 / 14 / 60
Open / VATS / RATS

93
TET (including thymoma-associated MG)

Temporal transition of surgical approaches



Unadjusted perioperative outcomes by surgical approach

Outcome	Open (N=65)	VATS (N=14)	RATS (N=60)	P
Operative time, min	202 [159–261]	224 [159–268]	174 [140–207]	0.005
Blood loss, g	166 [89–276]	3 [3–5]	3 [3–3]	<0.001
Chest drainage, d	2 [1–3]	1 [1–1]	1 [1–1]	0.001
Postop stay, d	8 [5–13]	5 [4–7]	6 [5–7]	0.001
Complications	5 (7.7%)	1 (7.1%)	5 (8.3%)	>0.99
R0 resection	60 (92.3%)	13 (92.9%)	59 (98.3%)	0.24

Stabilized IPTW-adjusted comparison: Open surgery vs RATS

Adjusted comparison after covariate balancing

Variables	Before weighting			After stabilized IPTW		
	Open surgery (N=65)	RATS (N=60)	ASMD	Open surgery (weighted)	RATS (weighted)	ASMD
Age, years	58.7 ± 14.7	60.9 ± 16.9	0.138	58.9 ± 15.5	59.6 ± 18.3	0.042
Male sex	41 (63.1%)	29 (48.3%)	0.300	56.8%	59.8%	0.061
BMI, kg/m ²	22.8 ± 4.0	22.6 ± 3.2	0.060	22.8 ± 3.9	22.7 ± 2.9	0.031
Smoking history	30 (46.2%)	27 (45.0%)	0.023	41.4%	46.0%	0.092
Tumor/lesion size, cm	4.58 ± 2.74	3.43 ± 2.25	0.457	3.80 ± 2.83	3.88 ± 2.43	0.031
Disease category						
TET without MG	34 (52.3%)	32 (53.3%)	0.021	49.4%	51.4%	0.039
Thymoma associated with MG	18 (27.7%)	4 (6.7%)	0.580	17.5%	16.9%	0.015
MG without thymoma	4 (6.2%)	3 (5.0%)	0.050	6.2%	5.9%	0.015
Non-TET malignancy	4 (6.2%)	6 (10.0%)	0.142	8.8%	7.9%	0.032
Benign disease	5 (7.7%)	15 (25.0%)	0.481	18.1%	18.0%	0.004
Combined resection	15 (23.1%)	7 (11.7%)	0.305	17.2%	17.0%	0.007

All assessed covariates achieved adequate balance after stabilized IPTW (absolute SMD <0.1).

Operative time



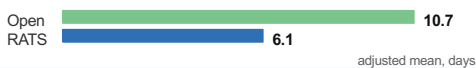
Blood loss



Duration of chest drainage



Postoperative length of stay



- No significant differences were observed in postoperative complication rates or R0 resection rates.

KEY FINDINGS

- ✓ **Approach transition:** Open surgery shifted to minimally invasive approaches, with RATS predominant in the later period.
- ✓ **After IPTW:** RATS remained associated with shorter operative time, lower blood loss, shorter chest drainage, and shorter postoperative stay than open surgery.
- ✓ **Safety signals:** conversion to open surgery was 0% in RATS; complications and R0 resection were comparable.

Overall message

Transition to robotic subxiphoid thymectomy was accompanied by favorable perioperative outcomes in selected patients.

INTERPRETATION

DISCUSSION

- This institutional transition is consistent with recent nationwide studies showing increasing adoption of minimally invasive approaches for mediastinal tumors and MG surgery ^{4,5}
- Insurance coverage in Japan may affect this transition: RATS for mediastinal tumors was approved in 2018; extended thymectomy for MG in 2020.
- Open surgery remains important for complex cases requiring extensive exposure.
- The results are consistent with the contemporary adoption of minimally invasive thymectomy and suggest that robotic subxiphoid access may reproduce total thymectomy with less perioperative invasiveness in selected cases ³.

LIMITATIONS

- Retrospective single-center design.
- Small VATS cohort limited robust three-way comparisons.
- Open and RATS cases were performed mostly in different periods; residual temporal and selection effects may remain.

CONCLUSION

RATS demonstrated favorable perioperative outcomes and a low conversion rate, supporting its technical feasibility and potential advantages over conventional approaches.

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