

INTRODUCTION

Thymoma-associated myasthenia gravis (TAMG) requires simultaneous tumor control and durable stabilization of MG-related disability. International guidance recommends thymectomy in thymomatous MG primarily for oncologic control, while the magnitude and durability of neurological benefit remain uncertain [1,2]. Extended thymectomy is widely used, yet published TAMG series vary in surgical extent, neurological endpoints, and follow-up duration [3–5]. We therefore evaluated perioperative safety, oncologic control, and longitudinal patient-reported MG outcomes in a consecutive single-center cohort treated with a relatively consistent surgical strategy.

MATERIALS AND METHODS

Design and cohort. We retrospectively reviewed 39 consecutive patients with pathologically confirmed thymoma and clinically diagnosed MG who underwent extended thymectomy between January 2009 and March 2025. **Outcome domains.** Perioperative endpoints were operative time, blood loss, drain duration, surgical length of stay, and postoperative myasthenic crisis. Surgical length of stay was defined as the interval from admission to discharge or transfer from the thoracic surgery service. Oncologic endpoints were R0 resection, recurrence, and survival. Sex, MG phenotype, preoperative MGFA clinical class, pathologic tumor size, Masaoka–Koga stage, and WHO histology were summarized as baseline characteristics. **Neurological and statistical analysis.** MG-ADL was assessed preoperatively, at 12 months, and at the most recent follow-up. Paired analyses required both the baseline and corresponding follow-up score; Wilcoxon signed-rank tests compared postoperative values with baseline. Continuous data are median [IQR]. Missing values were not imputed. Exploratory VATS versus non-VATS comparisons used the Mann–Whitney U test for continuous variables and Fisher’s exact test for categorical variables; VATS was introduced later in the study period.

Primary neurological outcome

MG-ADL

Myasthenia Gravis Activities of Daily Living profile; 8-item patient-reported scale (0–24). Lower scores indicate less symptom burden, better daily function, and a ≥ 2 -point decrease is clinically meaningful [6].

Paired MG-ADL analysis sets

Baseline TAMG patients
Extended thymectomy
N=39
available in all patients

12 months
30/39
baseline + 12-month score

Last follow-up
35/39
baseline + last score

Paired n denotes patients with both the baseline and corresponding postoperative MG-ADL score.

LIMITATIONS

- Retrospective single-center design and modest sample size.
- Paired MG-ADL data were available for 30/39 patients at 12 months and 35/39 at last follow-up.

RESULTS: BASELINE CHARACTERISTICS

Patient characteristics

Variable	Overall
Patients, n	39
Age, years	57.9 [44.6–72.2]
Sex, male / female, n (%)	23 (59.0%) / 16 (41.0%)
MG phenotype, ocular / generalized, n (%)	13 (33.3%) / 26 (66.7%)
Preoperative MGFA class, I / II / III / V	9 / 22 / 6 / 2

Tumor characteristics

Variable	Overall
Pathologic tumor size, mm	48 [35–67.5]
Masaoka–Koga stage, I–II / III	34 (87.2%) / 5 (12.8%)
WHO histology, AB / B1 / B2 / B3 / unknown	4 / 10 / 18 / 6 / 1

Values are median [IQR] or n (%). MGFA, Myasthenia Gravis Foundation of America clinical classification [7]

RESULTS: SURGICAL & ONCOLOGIC OUTCOMES

Perioperative profile

Surgical outcome	Overall	VATS	Non-VATS	P value
Patients, n	39	14	25	—
Operative time, min	147.5 [103.8–199.3]	115 [93–138.8]	178.5 [141.3–209.8]	0.009
Blood loss, mL	60 [5–105]	0 [0–5]	100 [65–190]	<0.001
Drain duration, days	2 [2–3]	2 [1–3]	2 [2–3]	0.174
Surgical length of stay, days	12 [9–16.5]	8.5 [6–10]	15 [12–24]	<0.001
Postoperative myasthenic crisis, n (%)	3/39 (7.7%)	0/14 (0%)	3/25 (12.0%)	0.540

Values are median [IQR] or n (%). Available-case analysis: operative time n=36 (VATS 14; non-VATS 22); blood loss n=35 (14; 21).

Oncologic control

Oncologic outcome	Overall
Complete resection (R0)	39/39 (100%)
Combined resection, lung / pericardium / vessel	6 / 6 / 3
Tumor recurrence	2/39 (5.1%)
Follow-up duration, months	73.0 [10.9–147.2]
Death during follow-up	1/39 (2.6%); non-MG-related

Recurrence pattern

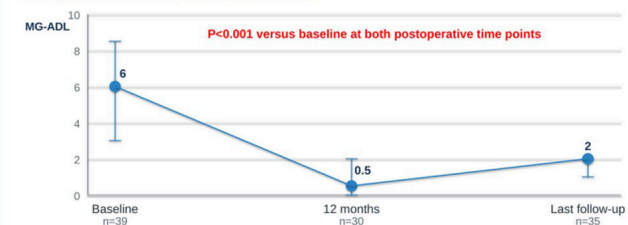
Case	Stage / WHO	Interval	Site
1	IIa / B3	125.8 mo	Pleura
2	III / B1	88.8 mo	Pleura

Both recurrences were isolated pleural events occurring more than 7 years after R0 resection. No MG-related death occurred.

Late pleural recurrences support prolonged postoperative imaging surveillance.

RESULTS: NEUROLOGICAL OUTCOMES

Changes in MG-ADL Score Over Time



Paired MG-ADL analysis

Time point	MG-ADL	Evaluable n*	MG-ADL improvement (≥ 2 -point decrease), n/N (%)
Baseline	6 [3–8.5]	39	—
12 months	0.5 [0–2]	30	25/30 (83.3%)
Last follow-up	2 [1–2]	35	27/35 (77.1%)

At postoperative time points, evaluable n denotes patients with both baseline and the corresponding follow-up MG-ADL score. The median paired decrease in MG-ADL was 4 points at both 12 months and last follow-up (both $P < 0.001$).

DISCUSSION

Integrated clinical value

Extended thymectomy achieved R0 resection in all 39 patients, including five with stage III disease; tumor recurrence occurred in two patients during a median follow-up of 73.0 months. Among patients with paired MG-ADL data, clinically meaningful improvement, defined as a ≥ 2 -point decrease, was observed in 25/30 patients (83.3%) at 12 months and 27/35 patients (77.1%) at last follow-up. The median paired decrease was 4 points at both time points, exceeding the established 2-point threshold for clinical improvement [6]. These findings are directionally consistent with previous TAMG series, although those studies used different neurological outcome measures [3–5].

Surveillance and surgical approach

Both recurrences were isolated pleural events at 89 and 126 months after R0 resection, supporting prolonged imaging surveillance. VATS was associated with shorter operative time, less blood loss, and shorter surgical length of stay, whereas drain duration and postoperative myasthenic crisis did not differ significantly. These comparisons remain exploratory because VATS was introduced later and included no stage III cases.

CONCLUSION

CENTRAL MESSAGE

Extended thymectomy for TAMG achieved R0 resection in all patients, with low recurrence and sustained, clinically meaningful improvement in MG-related symptom burden.

TAKE-HOME MESSAGE

Assess TAMG outcomes from both oncologic and neurological perspectives, and maintain long-term imaging surveillance even after R0 resection.

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