



Videothoracoscopic thymectomy for myasthenia gravis: an overview of complications on 387 VATS thymectomies for myasthenia gravis

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Introduction

Video assisted thoracoscopic (VAT) thymectomy operations for the treatment of myasthenia gravis (MG) and thymic malignancies are increasingly preferred (1,2).

Operative and postoperative morbidity, mortality and complete stable remission rates of VAT thymectomy procedures have been shown to be similar to open procedures, even the duration of hospital stay, perioperative blood loss and patient satisfaction parameters have been demonstrated to be superior in VAT thymectomy procedures (1,2). However, these procedures have the potential to cause dangerous intraoperative/postoperative complications. Management strategies should be known to prevent morbidity and mortality (3). In this article, we aimed to evaluate the intraoperative events and early postoperative complications of VAT thymectomy operations in myasthenic patients, in one of the largest single centre experience.

Patients and methods

Four hundred and seventy-two VAT thymectomy operations performed in Department of Thoracic Surgery, at Istanbul University, Istanbul Medical School, between June 2002 and November 2016. Seven patients (1.4%) were converted to open due to various reasons which will be described later in this article, 465 were completed by VAT and from them 387 had myasthenia gravis (MG). Seventy-eight patients were operated on for thymoma, for parathyroid adenoma, for suspected thymic malignancy, for thymic carcinoids

and thymic cysts. Patients with MG included in this study in order to evaluate also disease combined complications. The data was recorded prospectively and evaluated retrospectively. In addition to operative and post-operative complications; age, sex, duration of disease, body mass index, prescribed medication, duration of the operation, chest tube duration, length of postoperative hospital stay, and pain score using a visual analogue scale were analysed.

Patients with generalised MG were recommended for thymectomy by the department of neurology. We performed right sided three portal VAT thymectomy which has been defined previously (4).

Results

Of the 472 procedures (403 non thymoma and 69 thymoma patients), 7 patients (1.4%) experienced major perioperative complications and converted to open surgery. After the subtraction of 78 non myasthenic patients, we had a group of 387 patients with MG, VAT thymectomy population included this study (Table 1).

The mean age was 31.2 years (range, 11–75 years); 285 (73.6%) of the patients were female, and 102 (26.4%) were male. The mean body mass index (BMI) of the patients was 24.6 ± 4.5 . Of all of the patients, 2 (0.5%) were Osserman 1, 249 (64.3%) were Osserman 2A, 107 (27.7%) were Osserman 2B and 29 (7.5%) were Osserman 3. Electromyography was positive in 284 (73.5%) patients, acetylcholine receptor antibody test was positive in 244 (63%) patients and the mean QMG was calculated to be 9.7. Three hundred fifty (90.4%) patients were treated

Table 1 Outcomes of the VAT thymectomy/thymothymectomy operation

| | |
|---|-----------------|
| Conversion to open surgery (Perioperative major complications) | 7/472 (1.5%) |
| Innominate vein injuries | 3 |
| Superior vena cava injury | 1 |
| Aortic injury | 1 |
| Sudden cardiac arrest | 1 |
| Diaphragmatic injury | 1 |
| Patients completed with VAT | 465/472 (98.5%) |
| Patients with MG | 387/465 (83.2%) |

VAT, video assisted thoracoscopic; MG, myasthenia gravis.

with pyridostigmine bromide, with an average dosage of 209 ± 112 mg/day. One hundred ninety five (50.4%) patients also received corticosteroid medication and 135 (34.9%) patients received intravenous immunoglobulin (IVIg) treatment prior to the surgery. The average time between the diagnosis and thymectomy was 28.9 ± 63.7 months (Table 2).

The average duration of the operation was 49.9 ± 37.3 min (range, 25–180 min). Thirty three (8.8%) patients required a mean of 9.4 ± 12.8 h of mechanical ventilation postoperatively. Twenty-nine (7.5%) patients developed complications. The average duration of drainage was 36.6 ± 24.8 h. The average pain score using a visual analogue scale was 2.8 ± 1.2 (range, 1–7). The average time of discharge was 2.4 ± 1.5 days (range, 1–13 days). The long term histopathological examination was reported as thymoma in 54 (14%) patients in MG group (Table 3).

Discussion

VAT thymectomy has been shown to provide better or at least similar long-term outcomes and quality of life compared to open surgery (5). Open surgery and thoracoscopic procedures have been shown to be associated with equivalent long-term symptomatic improvement, in the same study thoracoscopic approach was associated with significantly less blood loss, shorter hospital stay and decreased requirement for postoperative narcotic analgesia (6).

A recent study reported that the thoracoscopic thymectomy is a safe and minimally morbid operation that is successful in improving MG symptoms. VAT thymectomy

Table 2 Demographics of the VAT thymectomy/thymothymectomy operation in 387 MG patients

| Characteristics | n (%) |
|--|----------------------------------|
| Age [mean \pm SD (range, years)] | 31.2 \pm 2.2 [11–75] |
| Sex | |
| Male | 102 (26.4) |
| Female | 285 (73.6) |
| BMI [mean \pm SD (range)] | 24.5 \pm 4.5 [15.0–44] |
| Osserman score | |
| 1 | 2 (0.5) |
| 2A | 249 (64.3) |
| 2B | 107 (27.7) |
| 3 | 29 (7.5) |
| EMG | |
| Positive | 369 (95.3) |
| Negative | 18 (4.7) |
| Anti-acetylcholine receptor antibody | |
| Positive | 346 (89.4) |
| Negative | 41 (10.6) |
| Corticosteroid medication [n (%)] | 195 (50.4%) |
| IVIg [n (%)] | 135 (34.9%) |
| Pyridostigmine median [mean \pm SD (range)] | 209 \pm 112 mg/day [60–420] |
| QMGs [range] | 11.5 \pm 5.3 [5–25] |
| Duration of disease from diagnosis to surgery [mean \pm SD (range, months)] | 28.9 \pm 63.7 [2–144] |

VAT, video assisted thoracoscopic; MG, myasthenia gravis; IVIg, intravenous immunoglobulin; QMGs, quantitative myasthenia gravis score.

resulted in a decrease in the amount of medication, length of hospital stay and admission-related hospital expenses, and a reduced or similar operative time compared with that reported for a historical series of open thymectomies (7).

We previously demonstrated that a certain group of VAT thymectomy patients (33.7%) could be discharged the next morning following surgery (8). For this reason, VAT thymectomy could also be considered as a model of fast-track surgery, with early discharge period and short duration of drainage time. However, this operation requires a steep learning curve for surgeons and it is one of the most dangerous operations in inexperienced surgeons' hands.

Table 3 Outcomes of the VAT thymectomy/thymothymectomy operation in 387 MG patients

| Outcomes | n (%) |
|---|--------------------------|
| Mean operation time [mean \pm SD (range, min)] | 49.9 \pm 37.3 [25–180] |
| Mean chest tube duration [mean \pm SD (h)] | 20.5 \pm 12.1 |
| Requirement of ICU stay [n (%)] | 34 (8.8%) |
| Mean length of intensive care unit [mean \pm SD (range, hours)] | 9.4 \pm 12.8 [1–36] |
| Mean length of hospital stay [mean \pm SD (range, days)] | 2.4 \pm 1.5 [1–13] |
| Mean VAS pain scale [mean \pm SD (range)] | 2.8 \pm 1.2 [1–7] |
| Postoperative complications | 29 (7.5) |
| Atelectasis requiring bronchoscopy | 7 (1.8) |
| Haemorrhage redrainage | 6 (1.6) |
| Nosocomial pneumonia | 4 (1.0) |
| Myasthenic crisis-reintubation | 4 (1.0) |
| Pneumothorax | 3 (0.8) |
| Phrenic paralysis | 3 (0.8) |
| Chylothorax | 2 (0.5) |
| Perioperative mortality | None |

VAT, video assisted thoracoscopic; MG, myasthenia gravis.

Even experienced surgeons in thymic procedures may face catastrophic complications including; cardiac arrest, aortic and superior vena caval ruptures. VAT thymectomy patients may also develop postoperative complications similar to the other VAT surgery patients such as; there are 7 patients with atelectasis requiring bronchoscopy (1.8%), 6 patients with undrained haemothorax requiring redrainage (1.6%), 4 patients with nosocomial pneumonia (1.0%). One of the best result in our study is only 4 patients developed myasthenic crisis requiring reintubation (1.0%), 3 phrenic paralysis (0.8%)

Another possible problem for many surgeons with a right-sided approach is the possible inadequacy of visualisation of the left phrenic nerve. During a thymectomy, the left phrenic nerve should be seen and dissected meticulously to prevent an injury to the nerve. Especially in patients with high BMI over 35, left phrenic nerve cannot be evaluated safely and may be injured. Surgeons may consider to approach bilaterally in such patients.

VAT thymectomy for treatment of myasthenia gravis is a relative safe procedure but potential dangerous operative and postoperative complications and management strategies should kept in mind to prevent morbidity and mortality.

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Footnote

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to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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