Institutional report - Thoracic non-oncologic

Early outcomes of video-assisted thoracoscopic resection of thymus in 181 patients with myasthenia gravis: who are the candidates for the next morning discharge?

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Abstract

The aims of this study are to present the results of videothoracoscopic thymectomy in patients with myasthenia gravis (MG) and to predict the factors affecting the next morning discharge (NMD). This is a retrospective analysis of the prospectively recorded data of 181 consecutive myasthenic patients who underwent videothoracoscopic thymectomy from June 2002 to September 2009. Sixty-one patients (33.7%) were discharged on the next morning. Univariate and multivariate analyses were evaluated to determine the predictors for NMD. Mean calculated variables were: age (29.8 years), duration of symptoms (22.5 months), duration of surgery (51.3 min), postoperative stay (2.1 days), and visual analogue scale (2.1). No mortality occurred. Four patients were required to stay in intensive care unit (ICU) with a mean of 18.6 h. With logistic regression analysis, duration of operation (DoO) was calculated to be the only predictive factor for NMD (P=0.006). Video-assisted thoracoscopic thymectomy (VAT thymectomy) is a safe surgery procedure with a smooth postoperative period for MG. Although a detailed analysis was performed, only DoO was found to be a predictive factor for NMD in MG patients.

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Keywords: Thoracoscopic thymectomy; Myasthenia gravis; Discharge

1. Introduction

The thymus is accepted to be involved in the pathogenesis of myasthenia gravis (MG) by sustaining an autoimmune response against acetylcholine receptors (AchR) [1, 2]. Thymectomy is recommended in patients with nonthymomatous autoimmune MG as an option to increase the probability of remission or improvement [3]. The traditional surgical approach to thymus in MG has been the partial upper sternotomy. Technical development in endoscopic instrumentation and surgical video capabilities have proven that video-assisted thoracic surgery is a valuable tool in the surgery for nonthymomatous thymus. Medical literature on videothoracoscopic techniques in thymectomy remains to be limited and usually represents small sample size studies with the exception of some articles presenting higher number of patients from a few big centers [4–6].

Although it has been shown that video-assisted thoracoscopic thymectomy (VAT thymectomy) is associated with a shorter postoperative stay, the independent variables affecting the length of stay in hospital have not been evaluated and defined, except the previous study that was reported from our center [6]. In this present article, our experience on successfully completed VAT thymectomy in 181 MG patients was presented and factors contributing to next morning discharge (NMD) after the operation were evaluated.

2. Material and methods

2.1. Patient characteristics

All patients who were referred for thymectomy to Istanbul Medical Faculty between June 2002 and September 2009 were informed and explained in detail about the operative and perioperative results of thymectomy by videothoracoscopy and through partial upper sternal splitting. Data from 217 patients were analysed. Sixteen (7.3%) patients who initially were intended to have videothoracoscopic surgery; transitioned to open surgery during the surgery and, therefore, they were excluded from the analysis. Two hundred and one patients who consented to have the videothoracoscopic thymectomy technique had their operation with VAT techniques and 20 patients who were diagnosed to have thymoma were also excluded. Thus, results of 181 patients were reported from this study who underwent VAT thymectomy for MG. Patient’s age, gender, dura-
tion of disease, body mass index (BMI), medication (daily prescribed dosage of pyridostigmine bromide and immunosuppressives), intravenous immunoglobulin treatment (IVlg), length of the operation, chest tube duration time, amount of drainage (AoD), pain score, complications and duration of hospital stay were recorded prospectively. Grading of MG with the modified Osserman classification; 0: asymptomatic, 1: Ocular sign and symptoms, 2: Mild generalized weakness, 3: Moderate generalized weakness, bulbar dysfunction or both, and 4: Severe generalized weakness, respiratory dysfunction or both, was used in patients [6]. Complications of VATS thymectomy were defined as any postoperative problem increasing the length of stay and any condition requiring special care such as air leak, chylothorax, bleeding, effusion, persistant space, phrenic –laryngeal nerve palsies and any surgical problems causing readmission to the surgical ward. Indications for NMD were defined as: stable myasthenic condition, amount causing readmission to the surgical ward. Indications for NMD were analyzed by comparing the results of NMD patients when the patient was diagnosed with a thymoma. This patient was discharged without any sequaleas six days postoperatively. These patients were also excluded from the study.

2.4. Perioperative management

Anesthetic and final neurological assessments were performed at the ward 24 h before the surgery by specialists with extensive experience on MG (Z.S.). Patients took their morning doses of pyridostigmine and/or corticosteroids peroral with a small amount of water. If there was a delay in initiating surgery before the same day afternoon, further doses of pyridostigmine were given. No other premedication was used. Anesthesia was induced with propofol 2-2.5 mg/kg and fentanyl 1 μg/kg. Muscle relaxation was achieved with mivacurium 0.1 mg/kg (1 × ED95 dose). The trachea was intubated with a left double-lumen tube (Mallinckrodt, Ireland; No. 39 for male and No. 37 for female patients). The position of the tube was confirmed with both auscultation and fiberoptic bronchoscopy (Karl Storz Company, Germany). Anesthesia was maintained with propofol infusion and supplemental doses of fentanyl. One-lung ventilation was applied throughout the thoracoscopic procedure. Muscle relaxation was monitored by both the ‘train-of-four’ (TOF) monitoring and the vision of diaphragmatic movement. Supplemental doses of mivacurium 2 mg were applied if (train-of-four) ratio was > 25% or a diaphragmatic movement was observed through the thoracoscope.

2.5. Operative technique

Thymus was resected with both-sided mediastinal pleuras. Fatty tissue in the mediastinum, right cardiophrenic angle were dissected completely and in the left cardiophrenic angle partially [6].

2.6. Data collection

This is a retrospective analysis of prospectively recorded data of 181 consecutive myasthenic patients from June 2002 to September 2009 who underwent VAT thymectomy. Sixty-one patients (33.7%) were discharged on the next morning.

2.7. Statistical analysis

Factors potentially affecting NMD were analyzed by independent samples test [BMI, age, duration of symptoms, DoO, amount of pyridostigmine bromide/day, amount of corticosteroids/day, length of drainage (LoD), AoD], Fisher’s exact test (Complications). Logistic regression analysis was performed, calculating the odds ratio (OR) with 95% confidence interval (CI) in multivariate analyses.

3. Results

Mean of the calculated variables and range of the variables are presented in Table 1. Univariate analysis of the variables according to the NMD and late discharge are demonstrated to show significant difference in terms of LoD (P < 0.00), AoD (P < 0.00), DoO (P = 0.000), age (P = 0.04) and BMI (P = 0.03) (Table 2). None of the patients were readmitted to hospital among NMD patients while four patients were readmitted to hospital in the other group (P = 0.3 Fisher’s exact test).
The logistic regression analysis on the factors affecting the NMD demonstrated significance for duration of operation (Table 3). No mortality occurred. Intensive care unit (ICU) stay was required in four patients with a mean of 18.6 h.

4. Discussion

Studies examining thymectomy through VATS have shown that this procedure is associated with less pain, shorter drainage time, shorter hospital stay, and improved cosmesis when compared to upper sternotomies [7–9]. Surgeons remain skeptical of the value of this recent surgical option since it involves extended technical difficulties. In addition, experience with more patients is required to overcome learning curve [10]. On the other hand, the selected technique should not intervene with the primary disease MG and should not create extra complications related with the primary disease. Surgery with the shortest hospital stay and with maximal tissue extraction should be the aim. One night postoperative admission and less morbidity for this type of surgery could increase the number of patients considering this option.

In this study, DoO was shown to be the only predictive factor for NMD. In our previous study, the factors contributing to the length of operation and duration of postoperative hospital stay had been investigated. The sole factor for longer postoperative stay was demonstrated to be the daily prescribed dose of pyridostigmine [6]. In the same study, the sole factor for longer operation time was shown as higher BMI [6]. In the present study, it is demonstrated that age and BMI were also the factors contributing to NMD when univariate analysis was performed, however, logistic regression analysis failed to show these two variables as contributing factors to NMD. Logistic regression analysis showed that the DoO was the sole factor on NMD. The DoO as a significant factor rather than the underlying pathology and severity of MG may not seem too convincing for some readers. However, since then, the number of patients who underwent this surgery was doubled, and, therefore, extended experience might be the reason in improved management of patients with higher dose of daily prostigmine and higher BMI. In addition, anesthesia time and type of anesthetic medication were affected by the shorter DoO. Therefore, we believe that the time of operation is more important than the selected type of surgery for a myasthenic patient in terms of hospital stay. Modified Ossermann Genkins Score, prescribed pyridostigmine bromide and corticosteroid were not significantly different in both groups. Four patients were required to stay in ICU with a mean of 18.6 h. Two possible reasons for that were: 1) Preoperative examinations were performed on the first visit day to the outpatient clinic and on the same day of surgery. It is of utmost importance that the day of operation was the only contributing factors to NMD. In our previous study, the factors contributing to NMD were shown. Independent samples test showed that age and BMI were also the factors contributing to NMD when univariate analysis was performed, however, logistic regression analysis failed to show these two variables as contributing factors to NMD. Logistic regression analysis showed that the DoO was the sole factor on NMD. The DoO as a significant factor rather than the underlying pathology and severity of MG may not seem too convincing for some readers. However, since then, the number of patients who underwent this surgery was doubled, and, therefore, extended experience might be the reason in improved management of patients with higher dose of daily prostigmine and higher BMI. In addition, anesthesia time and type of anesthetic medication were affected by the shorter DoO. Therefore, we believe that the time of operation is more important than the selected type of surgery for a myasthenic patient in terms of hospital stay. Modified Ossermann Genkins Score, prescribed pyridostigmine bromide and corticosteroid were not significantly different in both groups.

Four patients were required to stay in ICU with a mean of 18.6 h. Two possible reasons for that were:

- Preoperative examinations were performed on the first visit day to the outpatient clinic and on the same day of surgery by anesthesiologists and neurologists who had extensive experience with more patients is required to overcome learning curve.

- The selected technique should not intervene with the primary disease MG and should not create extra complications related with the primary disease.

Table 3
Logistic regression analysis of the factors affecting NMD

<table>
<thead>
<tr>
<th></th>
<th>Sig.</th>
<th>Exp (B)</th>
<th>95% CI for Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>Upper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>0.555</td>
<td>1.029</td>
<td>0.937</td>
</tr>
<tr>
<td>Age</td>
<td>0.155</td>
<td>1.023</td>
<td>0.992</td>
</tr>
<tr>
<td>DoO</td>
<td>0.006</td>
<td>1.027</td>
<td>1.007</td>
</tr>
<tr>
<td>PB</td>
<td>0.982</td>
<td>1.000</td>
<td>0.997</td>
</tr>
<tr>
<td>Constant</td>
<td>0.068</td>
<td>0.142</td>
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BMI, body mass index; NMD, next morning discharge.
experience with MG patients, hence surgery was performed only after optimised conditions, if necessary; by using IVlg. It was never performed due to arising emergency as an unplanned surgery. Z – Postanesthesia care unit (PACU) was used for patients (who could not be extubated in theatre) often lasting from 30 min to 4 h when the patient was required to use mechanical ventilation after completion of the operation. Nearly almost all of the patients were extubated on the surgery table right after the surgery except those who needed an additional time for a smooth extubation who had been transferred to PACU and the extubation was performed. The criteria for ICU admission was defined as, mechanical ventilation lasting > 4 h in PACU. After extubation and stabilization of the patient, the patient was sent to the ward and regularly visited by the same neurologist who followed the patient.

Postoperative stay of 1 to 2 days was reported in the publications with minimally invasive techniques and promising long-term results could be verified when compared to those of transsternal techniques [11–13]. Minimally invasive surgeons are also strong supporters of full resection of mediastinal adipose tissue and they demonstrated their abilities to accomplish this type of resection. With minimally invasive techniques, surgeons do more than a complete thymectomy and almost equal to extended thymectomy. Minimally invasive surgery does not necessarily mean a minimal approach to the thymus. An extended thymectomy could have been performed if additional holes were opened to the left hemithoracic cavity, but it could be painful. Thus, all fatty tissue was resected in the right cavity but most of the fatty tissue was removed in the left hemithoracic cavity from right chest. Our surgical technique could, therefore, be named properly as near extended thymectomy.

In conclusion, the thymectomy team includes physicians from diverse clinical specialties like neurology, anesthesiology and surgery with extensive experience. This team could help patients during recovering from surgery and having an NMD. Faster surgery after gaining expertise would increase the number of patients having NMD.

References