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Thoracoscopic Thymectomy for Myasthenia Gravis: Seven Years of Clinical Experience

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Background: Myasthenia gravis (MG) is an autoimmune disease affecting patients' quality of life and necessitating long-term medical therapy. The efficacy of thymectomy for treatment of MG has been well established. Although several techniques have been used for thymectomy, there has been controversy over the best method with highest rate of improvement. Herein, we discuss our seven years of clinical experience with thoracoscopic thymectomy for MG.

Materials and Methods: We evaluated all patients who were operated on with preoperative diagnosis of non-thymomatous MG from 2007 to 2013 in Masih Daneshvari Hospital (Tehran, Iran). All patients underwent thoracoscopic thymectomy, and rates of remission and cumulative improvement were compared to those reported by other studies.

Results: Thoracoscopic thymectomy was performed in 34 patients with MG. The rate of complete remission and cumulative improvement at the end of the third year was 44.1% and 85.3%, respectively. Patients who were operated early after the diagnosis showed higher improvement rate, although it was not statistically significant (P=0.065).

Conclusion: Thoracoscopic thymectomy is a safe procedure for treatment of MG with comparable results to other techniques. Thymectomy soon after the diagnosis may be associated with higher improvement rate.

Key words: Thymectomy; Thoracoscopic thymectomy, Myasthenia Gravis

INTRODUCTION

Myasthenia gravis is an autoimmune neuromuscular transmission disorder, which can affect patients' quality of life if left untreated (1,2). It is not an uncommon disease with an incidence of 30 per one million per year (3). This disorder is characterized by progressive weakness and fatigue of voluntary skeletal muscles and most patients present with ptosis and diplopia (2). It is believed that thymus gland has an important role in the pathogenesis of MG by T-lymphocyte education and self-tolerance (2,3) and therefore in addition to medical therapy, thymectomy has been accepted as a therapeutic option by both surgeons and neurologists (4-8). Although different techniques for thymectomy have been explained, the ideal approach still remains controversial. In this study, we present the results of thoracoscopic thymectomy in Masih Daneshvari Hospital, Tehran, Iran.

MATERIALS AND METHODS

Clinical outcomes of all patients with preoperative diagnosis of non-thymomatous MG who underwent thoracoscopic thymectomy in Masih Daneshvari Hospital

(Tehran, Iran) from 2007 to 2013 were reviewed. Patients who were suspected radiographically for having thymoma were excluded. Neurologic consultation was performed for all patients to confirm the diagnosis and also for preoperative planning.

All patients underwent thoracoscopic thymectomy. Although operations were performed by different surgeons, same dissections were done as a rule in our department.

All patients were followed up for at least 3 years. Postoperative visits were done in distinct intervals and also depending on patients' status. Patients were evaluated for symptoms, medications used, alterations of medications and also satisfaction with the operation.

We defined the results of our operations as: complete remission when there was no muscle weakness and no need for medication, partial remission when there was slight muscle weakness with less amount of medication use in comparison to medications used preoperatively, unresponsive when there was no change in symptoms or medications used and finally deterioration when there was an increase in muscle weakness or need for new or higher dosage of medications in comparison to preoperative status.

Descriptive statistics were applied for presenting the means, standard deviations and percentages. T-test was used for analysis of quantitative variables and other tests such as chi square test were used for qualitative variables.

RESULTS

Our study population consisted of 34 patients with preoperative diagnosis of MG including 24 females and 10 males. The mean age of our patients was 32.1 years (range 15 to 60 years). The most common symptoms were proximal muscle weakness and ptosis (76.5%). Other symptoms and signs included diplopia (44.1%), dysphagia (23.5%), bulbar palsy (17.6%), shortness of breath (11.8%), voice disorder (5.9%), paraparesis and hemiparesis (2.9%).

All patients were operated by thoracoscopic technique except one, in whom, the technique was converted to transsternal approach because of pericardial invasion with final pathology of B1 thymoma and so this patient was excluded from the study.

Although different surgeons performed the operations, the same surgical technique and dissection were applied in all patients as a rule of our department. Right side 3 ports technique was used for all patients. CO_2 insufflation was applied for lung collapse and in 31 patients (91.2%) only one chest tube was inserted and the rest (8.8%) left the operating room with two chest tubes. The mean duration of chest tube use was 3.1 days (range 1 to 8 days). The range of chest tube(s) drainage was 0 to 1000 mL with the mean of 314.4 mL. Postoperative hospital stay was different from one day to 11 days with a mean of 4.58 days.

Complications occurred in 9 patients (26.5%) including myasthenia crisis, severe bleeding leading to reoperation, moderate bleeding managed conservatively, hypertensive crisis and contralateral pleural effusion and pneumothorax. There was no late surgical complication. We did not have any in-hospital or late mortality in our patients.

Cytological examination of the specimens revealed normal thymus in 14.7%, thymic hyperplasia in 76.5%, B1 thymoma in 5.9% and B2 thymoma in 2.9%.

All patients were followed up for at least 3 years. At the end of the first year after operation, the need for medications decreased in 20 patients (58.8%), remained unchanged in 13 patients (38.2%) and increased in one patient (2.9%). At the end of the second year, the need for medications decreased in 21 patients (61.8%), remained unchanged in 12 patients (35.3%) and increased in one patient (2.9%). At the end of follow-up, the final results according to our visits and also neurology consultation revealed complete remission in 15 patients (44.1%), partial remission in 14 patients (41.2%), unresponsive in 4 patients (11.8%) and finally deterioration in one patient (2.9%) (Table 1).

The mean duration from diagnosis to operation was 9 months (range 1-42 months). About 22 patients were operated in less than one year and others between 12 to 42

months after the diagnosis of MG. In the first group, complete remission occurred in 20 patients (90.9%) in comparison to 9 patients (75%) in the second group (P=0.065).

Table 1. Response to thymectomy at the end of the third year

Condition	N(%)
Complete Remission	15 (44.1%)
Partial Remission	14 (41.2%)
Unresponsive	4 (11.8%)
Deterioration	1 (2.9%)
Total	34 (100%)

In our study, 22 patients were operated earlier than one year and 12 patients were operated 12 to 42 months after the diagnosis. In the first group, cumulative remission was seen in 20 patients (90.9%) and in the second group it was achieved in only 9 patients (75%). Unresponsive rate was 4.5% and 16.7%, respectively and deterioration was seen in one patient in both groups (Table 2). Although there was no statistically significant difference (P=0.065) in improvement rates between the two groups, it was also shown in our study that thymectomy soon after the diagnosis may result in higher improvement rate.

Table 2. Response to thymectomy according to time of surgery at the end of third year.

	Group 1 (thymectomy before one year of diagnosis)	Group 2 (thymectomy after one year of diagnosis)
Cumulative improvement	20 (90.9%)	9 (75%)
Unresponsive	1 (4.5%)	2 (16.7%)
Deterioration	1 (4.5%)	1 (8.3%)
Total	22 (100%)	12(100%)

DISCUSSION

Myasthenia gravis is an autoimmune neuromuscular disease that leads to fluctuating muscle weakness and fatigue. In the most common cases, muscle weakness is caused by circulating antibodies that block nicotinic acetylcholine receptors at the postsynaptic neuromuscular junction. It is believed that the thymus gland may give incorrect instructions to developing immune cells, ultimately resulting in autoimmunity and production of acetylcholine receptor antibodies.

Although it is said that the first thymectomy for MG was performed by Sauerbruch (Schumacher and Roth) in 1913, it was popularized after the first notable account by Blalock in 1939 (9,10). At present, thymectomy has been accepted as a therapeutic option by both surgeons and neurologists.

Several techniques have been applied for thymectomy including transsternal, transthoracic, transcervical, infrasternal mediastinoscopic (11) and thoracoscopic thymectomy; however, the best approach leading to higher amount of remission is still controversial.

In order to reduce surgical complications and obtain better esthetic results and greater patient acceptance leading to earlier thymectomy, thoracoscopic thymectomy was introduced in 1992 (12,13). But this approach is not accepted by many surgeons as equivalent to conventional transsternal thymectomy (13-15). Despite this controversy, there are many reports in the literature about the efficacy of this method. Also, we presented here our experience with thoracoscopic thymectomy and compared our results with some other studies.

Rückert et al. compared three different approaches for thymectomy in MG including transthoracic (anterolateral thoracotomy), transsternal and thoracoscopic thymectomy. Although there was no difference in complete remission rate, they concluded that thoracoscopic thymectomy may become the preferred technique for thymectomy because of adequate cumulative median-term improvement of MG and less postoperative morbidity (16).

In a study comparing thoracoscopic and transsternal thymectomy, which was done by Lin and colleagues, there was no statistically significant difference in postoperative improvement between the two groups. They concluded that thoracoscopic thymectomy is technically feasible and safe with a favorable postoperative outcome compared with the transsternal approach (17).

Li et al. showed a 50% complete relief and 83.3% overall effective rate with transthoracic technique, which is comparable to our result with 44.1% complete remission (18). Although Keating and colleagues achieved only 28% complete remission rate at 5 years by thoracoscopic approach, by comparing their results to the literature they concluded that this approach achieves remission and asymptomatic disease rates comparable to other techniques (19). Likewise, in other studies comparing thoracoscopic and transsternal thymectomy, no difference was shown between these two techniques with regard to long-term outcome (20-22). Complete and partial remission rate in our study was 44.1% and 41.2%, respectively at 3 years, which were similar to the results of most studies in the literature.

It is also believed that thymectomy early after the diagnosis of MG would be associated with a higher rate of improvement and remission and so it is recommended to perform thymectomy early after the diagnosis is made regardless of age, stage, thymic pathology and preoperative clinical status (23,24).

CONCLUSION

According to our results and compared to other reports in the literature, we believe that thoracoscopic thymectomy is a safe procedure with acceptable rates of remission in patients with MG and may be associated with higher rates of improvement if performed early after the diagnosis.

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