

Experience of thymectomy by median sternotomy in patients with myasthenia gravis

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Abstract

Objective: To determine the outcome of thymectomy in patients with myasthenia gravis and safety of median sternotomy approach.

Methodology: An observational descriptive study was conducted in the department of thoracic surgery JPMC from February 2005 to January 2009.

Twenty-two patients having persistent generalized or ocular myasthenia gravis referred to our department by neurologists and general physicians, partially or not responding to medical treatment with or without thymoma, were included in the study. Those who were not fit for anaesthesia were excluded. Preoperatively 2 to 3 sessions of plasmapheresis were done and each patient was given anti myasthenia gravis treatment. Clinical staging was done by Modified Osserman classification. Median sternotomy approach was used. Outcome was assessed on the basis of remission of disease in different Osserman groups. All patients were followed for a minimum of 6 months.

Results: Out of 22 patients, 16 (72.7%) were females and 6 (27.2%) males. Mean age at presentation was 35.2 ± 14.5 years. Mean duration of symptoms was 1.5 ± 1.2 years. A total of 4 (18.1%) patients with myasthenia gravis had thymoma and histopathology of 18 (81.9%) patients showed thymic hyperplasia. Remission was seen in most grades of Osserman. The best response was seen in Grade I where all patients achieved remission. Most patients in Grade II A and II B were benefited. The only patient in Grade III had no improvement of symptoms. No patient in Grade IV underwent thymectomy. Overall 86.3 % had a positive outcome on basis of remission and improvement.

Conclusion: Thymectomy by median sternotomy is safe and effective with more favourable outcomes for patients of myasthenia gravis not responding to medical treatment (JPMA 60:368; 2010).

Introduction

The first evidence of a relation between thymus and myasthenia gravis was observed as early as 1901¹ but it was Blalock and co workers who discovered in 1941 the successful outcomes of thymectomy in these patients.² Since then it has been widely used as a treatment modality for patients with myasthenia gravis.³ Remission rates of around 80 % have been reported in literature.^{4,5} Although controversy exists regarding the best surgical approach for removal of the thymus, median sternotomy is considered effective and safe, especially if found at an ectopic location during the procedure.^{6,7} Data in Pakistan regarding the effectiveness of thymectomy in patients with myasthenia gravis using median sternotomy approach is limited.

In this study, the authors have attempted to determine the outcome of thymectomy in patients with myasthenia gravis and safety of median sternotomy approach in these patients.

Patients and Methods

The study was conducted in the department of thoracic

surgery from February 2005 to January 2009. A total of 22 patients who had persistent generalized or ocular myasthenia gravis, referred to our department by neurologists and general physicians, partially or not responding to medical treatment with or without thymoma were included in the study. Most of the patients were referred from the neurology department of the same hospital. C.T scan was done in every patient to evaluate the Thymoma. Patients were evaluated for anaesthesia fitness; those who were not fit due to renal failure, cardiac arrhythmias and chronic liver disease were excluded. All the patients were prepared preoperatively with 2 to 3 sessions of plasmapheresis to decrease the load of antibodies against acetylcholine receptors and every patient was given anti myasthenia gravis treatment even on the morning before surgery.

Clinical staging of patients was performed by modified Osserman classification (Table-1).

A standard median sternotomy approach was used. All thymic tissue and mediastinal fat were removed from the lower limit of the pericardium inferiorly to the cervical thymic extension superiorly and from one phrenic nerve to the other.

Post operatively all patients were kept in Intensive

Table-1: Osserman classification.

| | |
|------------|--|
| Grade I | Focal disease(restricted to ocular muscle) |
| Grade II A | Mild generalized disease, prominent limb involvement |
| Grade II B | Moderate generalized disease, prominent bulbar involvement |
| Grade III | Acute severe generalized disease with respiratory symptoms |
| Grade IV | Severe generalized disease with respiratory symptoms |

Care Unit until they were vitally stabilized and considered safe to be moved to the ward. They were assessed by neurologists and started on anticholinesterase therapy if any signs of disease was found. Narcotics, muscle relaxants and sedatives were avoided in all patients.

Outcome was assessed on the basis of remission of disease in different Osserman groups. Remission was defined as absence of symptoms of myasthenia gravis or cessation of medical treatment without re appearance of any symptoms. A total of 3 preoperative anti myasthenia gravis treatment groups were identified and then were followed to assess for the development of symptoms post operatively. These groups were:

Group 1: Patients on pyridostigmine alone

Group 2: Patients on pyridostigmine+steroids

Group 3: Patients on pyridostigmine+azathioprine

An extensive assessment of patients post operatively was performed for the development of complications of median sternotomy and they were managed accordingly. All patients were followed for a minimum of 6 months and asked to consult if they experienced any of the signs and symptoms of myasthenia again. Median duration of follow up was 15.5 months.

Results

A total of 22 patients underwent thymectomy using median sternotomy approach. Out of these, 16 (72.7%) were females and 6 (27.2%) were males. The mean age at presentation was 35.2 ± 14.5 years. The mean duration of symptoms was 1.5 ± 1.2 years. A total of 4 (18.1%) patients with myasthenia gravis had thymomas and histopathology of 18 (81.9%) patients showed thymic hyperplasia. Most patients belonged to Class II A of Osserman classification and remission was seen in most grades of Osserman classification (Table-2).

The best response was seen in Grade I where all patients achieved remission. Most patients in Grade II A and

Table-3: Number of patients requiring medications post operatively.

| Group | Medications | Number of patients using pre op medications | Number of patients requiring post op medications | Remission (%) |
|-------|------------------------------|---|--|---------------|
| 1 | Pyridostigmine | 9 | 2 | 77.7% |
| 2 | Pyridostigmine +steroids | 7 | 2 | 71.4% |
| 3 | Pyridostigmine +Azathioprine | 6 | 2 | 66.6% |

II B were also benefited. The only patient in Grade III had no improvement in symptoms. No patient in Grade IV underwent thymectomy. Overall 86.3% had a positive outcome on basis of remission and improvement. Remission was also assessed for different medication groups as shown in Table-3. Patients in group I showed 77.7% remission. Group 2 and 3 also showed good results with 71.4% and 66.6% remission rates.

The most common major complication after median sternotomy was sternal bleeding that was encountered in 2 (9%) patients. This was followed by disruption of the wound. In minor complications, pneumothorax was the most common occurring in 7 (31.8%) patients. This was followed by wound infection 4 (18%) patients, and 2 (9%) each of haemothorax, and seroma. A total of 2 (9%) patients had intraoperative complications including phrenic nerve and innominate vein injury. No long term morbidity or mortality was observed.

Discussion

Myasthenia gravis (MG) is an autoimmune disorder affecting postsynaptic acetylcholine receptors of voluntary muscles.⁸ It leads to progressive weakness and fatigue of ocular or extra ocular muscles and can potentially lead to respiratory failure.⁹ Various studies have demonstrated the significance of different Osserman groups in predicting the likelihood of improvement in patients with myasthenia gravis after thymectomy. Controversy exists and some studies have demonstrated more benefit to patients in severe grades of Osserman classification¹⁰⁻¹² and others have concluded with favourable outcomes for mild to moderate myasthenia.^{9,13} In this study, most patients with mild to moderate disease in grades 1 and 2 of Osserman classification showed greater improvements with patients in Grade 1 achieving 100 % results and Grade II A and II B achieving 90.9% and 83.3%

Table-2: Patients in different stages of Osserman classification.

| Osserman Grade | Number of patients | Remission | Improvement | Total Patients who benefited (%) |
|----------------|--------------------|-----------|-------------|----------------------------------|
| I | 4 | 3(75%) | 1(25%) | 4(100%) |
| II A | 11 | 7(63.6%) | 3(27.2%) | 10 (90.9%) |
| II B | 6 | 4(66.6%) | 1(16.6%) | 5 (83.3%) |
| III | 1 | 0 | 0 | 0 (0 %) |
| IV | 0 | 0 | 0 | 0 |

results. A limitation to the study was presence of only one patient in Grade III of Osserman classification. More patients in this grade could have made the comparison more effective.

Medical treatment of MG includes anticholinergics, immunosuppressants, steroids and in severe cases plasmapheresis.¹⁰ Khan et al⁷ showed improvement in 25.92% (n 7/27) of their patients after thymectomy for myasthenia gravis. Improvement was defined as a decrease in the requirement of post operative anti myasthenia medications. In this study 22.7% (n 5/22) patients showed improvement while majority 63.6% (n 14/22) had remission with no requirement of medications post operatively. In this study, the identification of different medication groups before surgery also allowed the authors to determine the effect of thymectomy on reduction in requirement of individual drugs. Patients who were on preoperative pyridostigmine alone showed best remission with 77.7% results.

Surgical treatment is an increasingly accepted procedure for patients with myasthenia gravis.¹⁴ Approaches like manubriotomy and transcervical thymectomy have been practiced and have claimed to have their own advantages.^{15,16} Although earlier trials demonstrated high levels of morbidity and mortality after median sternotomy, a better understanding of pathophysiology of the disease has lead to a dramatic reduction in morbidity and mortality after median sternotomy for thymectomy in the last decade.¹⁷⁻¹⁹ Zielinski et al²⁰ have observed no difference in morbidity after less invasive procedures like manubriotomy in comparison with median sternotomy. Trans sternal approach is considered standard and safe by many surgeons^{1,21} In this study, median sternotomy was used as the sole method of gaining access to thymic tissue. Complications following the procedure were observed and managed accordingly. Major complications constituted a very small percent of total complications. There were 2 episodes of sternal bleeding while one had disruption of the sternum. In minor complications, pneumothorax was the most frequent complication found in 7 (31.8%) patients. All patients were managed accordingly and no mortality or long term morbidity was observed in any of the patients with complications. Kas et al¹⁶ demonstrated similar results with pneumothorax being the most common minor complication and very few patients developing major or intraoperative complications.

Conclusion

Thymectomy in patients with myasthenia gravis using

median sternotomy is a safe and effective approach with more favourable outcomes for patients in mild to moderate grades of Osserman classification and low risk of any long term morbidity or mortality.

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