



## Advanced Comprehensive Rehabilitation Approach for Post-operative patient with Anterior Mediastinal Tumor: Atypical Case Report

Angela Kapoor<sup>1</sup>, Vaishnavi Yadav<sup>1</sup>, Pratik Phansopkar\*<sup>2</sup>

<sup>1</sup>Department of Cardio-Respiratory Physiotherapy, Ravi Nair Physiotherapy College, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India

<sup>2</sup>Department of Musculoskeletal Physiotherapy, Ravi Nair Physiotherapy College, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India

### Article History:

Received on: 22 Jun 2020  
Revised on: 09 Jul 2020  
Accepted on: 10 Aug 2020

### Keywords:

Myasthenia gravis,  
Thymoma,  
Thymectomy,  
Rehabilitation

### ABSTRACT



Myasthenia gravis (MG) is an autoimmune disease in which muscle weakness and fatigability of the skeletal muscle are as a result of an antibody at the neuromuscular junction against the acetylcholine receptor (AChR) affecting ladies and older men. A thymoma occurs in approximately 15 per cent of adult diagnosed with Myasthenia gravis (MG). Thymectomy is used as a surgical approach which helps to reduce the symptoms. Structured comprehensive physiotherapy rehabilitation post-surgery helps to achieve a successful functional recovery. A 61 year old male patient was admitted with complain of lump in neck region, generalised weakness and early fatigability while doing Activities of daily living since 2 months. Investigations were done for the same which revealed thymoma and surgical intervention i.e. thymectomy was performed. Patient was referred to post opt rehabilitation with complains of incisional pain, cough with expectoration, early fatigue performing basic Activities of daily living and reduced strength. Following the surgery patient underwent physiotherapy which comprised of exercises, breathing retraining and early mobilization. The case report concludes that early excision of thymoma with prompt tailor made supervised exercise program helps in early recovery and achievement of functional goal.

### \*Corresponding Author

Name: Pratik Phansopkar

Phone:

Email: [drpratik77@gmail.com](mailto:drpratik77@gmail.com)

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL4.4251>

Production and Hosted by

IJRPS | [www.ijrps.com](http://www.ijrps.com)

© 2020 | All rights reserved.

### INTRODUCTION

A thymoma, which is a benign thymus gland epithelial tumor, occurs in approximately in 15 per cent of adult Myasthenia gravis(MG) patients.

Myasthenia gravis (MG) is a chronic autoimmune disease (Calik-Kutukcu *et al.*, 2019) in which muscle weakness (Lizarraga *et al.*, 2016) and fatigability of the voluntary skeletal muscular muscles are due to an antibody at the neuromuscular junction against the acetylcholine receptor (AChR) (Kang *et al.*, 2007). The important cardinal symptoms of MG is muscle fatigue followed by Ptosis, Ocular myasthenia, diplopia, changes in facial expression, problem in swallowing, shortness of breath, and defect of speech .

Commonly used therapeutic options seek to control autoimmunity through surgical excision of thymus, where the development of AChR-Ab occurs (Mantegazza and Cavalcante, 2019). It has long been believed that in the pathogenesis of MG the thymus or thymoma may play an important role (Ambrogio and Mineo, 2017).

Thymectomy is done when the drug regimen is ineffective or the patient is considered unfit for drug therapy or in cases if a tumor is located within the mediastinum. The patient is considered to be fit for surgery after immunoglobulins (Ig) and plasmapheresis treatment is been administered. During thymectomy, it extracts the thymus gland, the tumor and its neighbouring tissue, and the tissue between the phrenic nerves on the right and left (Seyfari et al., 2018).

Thymectomy may improve the myasthenic symptoms, (Yang et al., 2020) and contributes to decrease the mortality (Wolfe et al., 2016) and increase recovery of the patient (Calik-Kutukcu et al., 2019). This case report describes an Anterior mediastinal tumor in a 61 year old male who underwent surgical treatment (Kang et al., 2016) and subsequently treated under Physiotherapy rehabilitation department with structured rehabilitation protocol.

#### PATIENT INFORMATION

A case of 61-year-old who was a member of Gram panchayat right hand dominance. As per the history given by the patient he was apparently alright 2 months back when he first noticed dropping of eyelid with 75 % of right eye involvement. The patient visited a general practitioner in his home town where he was managed symptomatically and improved. There were two more consecutive episodes of dropping of eyelid which the patient noticed when driving the bike. The patient gradually experienced difficulty in swallowing which was aggravated while consuming solid food than liquid.

For the above mentioned complain the patient visited the hospital and was admitted, was diagnosed with Myasthenia gravis on the investigation (Serum Acti Ach R – Positive). In the hospital 2cycles of plasmapheresis was done and was on regular medication post discharge. Patient continued to have difficulty in swallowing solid food and experienced weight loss since a month.

Patient noticed a lump in his neck and along with that weakness in his bilateral upper limb since a month for the above mentioned complaint patient visited the hospital where the investigation of CT chest showed thymoma. He was diagnosed to have thymoma and was advised for its excision. Hence a surgical procedure of thymectomy was performed.

The patient had a history of Type II Diabetes Mellitus. He belonged to a lower- middle class family according to kuppuswamy scale.

Surgical history: It was a elective surgical, operated under general anaesthesia for a duration of approx-

imately 4hrs procedure. An extended thymectomy operative procedure was done. A midline sternotomy incision was made. The operative diagnosis was Anterior mediastinal tumor (Thymoma with Myasthenia gravis). The findings were large anterior mediastinal tumor, adherent to anterior pericardium and innominate veins.

A provisional diagnosis in the opinion to Myasthenia gravis foundation of America Clinical Classification was IIA.

**Table 1: The examination extra-ocular movement was mild adductor restriction present**

Timeline	
Date of Admission	17-03-2020
Date of Surgery	21-03-2020
Date of Physiotherapy Rehabilitation	22-03-2020
Date of Suture removal	27-03-2020

**Table 2: Showing Response to Mobilisation**

Vitals	Pre	Post	
		In Bed	Walking
PR	80	100	120
SPO2	100 on 4l of O2	100 on 4l of O2	100 on 4l of O2
RR	21	24	30
RPE	0	4	5

#### Clinical Findings

A proper informed consent was taken from the patient prior.

#### Inspection

1. Patient was alert, co-operative, well oriented and related most of his current medical history
2. Patient position: Supine position with head end elevation to approximately 45degree
3. Use of accessory muscle present while breathing
4. Cough and expectoration assessment : Quantity- 1tsp, more in morning, non-foul smelling expectoration, yellowish in colour, Miller's grading - M1

5. On inspection, it was discovered that owing to discomfort caused due to incision on the anterior midline of the chest and pain as a limiting factor, the individual was unable to take deep breaths or to cough effectively and had low level of saturation of oxygen.
6. There was presences of a single scar mark on the anterior aspect of upper chest (vertical scar extending from sub-sternal notch to around the xiphoid process)
7. Length of scar mark

A) Anterior midline of chest: - Vertical scar - 10cm (Pre-operative radiographic image is shown in figure 1 and figure 2 depicts post- operative radiographic image with stainless steel wires)

8. Tenderness was present grade.
9. Local temperature was normal.

#### System review

##### CVS System

1. PR:- 86
2. BP:- 110/80 mm Hg

##### Respiratory System

1. Shape of the chest

Normal shaped

AP Diameter- 20cms, Transverse Diameter- 25cms

2. Respiratory Rate

21 breaths/min

Rhythm – Regular

Type- Abdominal

4. Chest Excursion

Bilaterally symmetrical

5. Chest Expansion

Axillary- 1cms,

Nipple- 1cms,

Xiphisternum- 3cms

6. Percussion

Dullness present from Rt 5th intercostal space

7. TVF

Resonant b/l

8. Auscultation

Rhonchi in upper zones and middle zones bilaterally, crepts bilaterally in lower zones.

#### Musculoskeletal System

##### Pain Assessment

Dull aching, sudden in onset, intermittent type of pain, which was located on the midline (centrally) of the chest with VAS score of 6/10. The pain aggravated on coughing and changing in position, relieved with splinting and medication.

Restricted muscle examination of the shoulder and scapular muscle was positive for the major symptoms of chest pain and was rated 3/5 with associated discomfort giving way to fatigue (Table 1).

##### Diagnostic Assessment

1. Visual analogue scale: Pre: 6/10 Post: 2/10
2. Functional Independent Measure Score: Pre: 84/126 Post: /126
3. Major Depression Inventory (MDI) Pre : 26/50 Post 19/50
4. The Myasthenia Gravis Quality of Life 15 (MG-QoL15)
5. Modified Fatigue Impact Scale (MFIS) Pre: 64/84 Post: 40/84
6. Myasthenia gravis composite score Pre: 20/50 Post: 16/50

#### Therapeutic Intervention

##### Pharmacological Management

Inj Adrenaline, Tab Atropin, Tab Atracurium , Tab Amikacin, Tab Betaloc , Tab Calcium, Inj Dopamin.

#### PHYSIOTHERAPY MANAGEMENT

The patient had expectations that at the end of 7 days patient wants to be independent in his self-care activities (brushing, Swallowing food, dressing, bathing) comfortably with decreased level of perceived pain and fatigue, mobilise without O2 requirement for 15mins.

##### Patient Education

Considering this, physiotherapist's goal is to explain to patient the importance of adherence to the regime, the importance of prescribed techniques and strategies need to alleviate the dyspnoea, use of accessory muscles, and decrease incisional pain that can be achieved through patient education (Veenhuizen *et al.*, 2019). To alleviate use of accessory muscle and to relax the diaphragm which

leads to relaxation and decreased respiratory rate, Diaphragmatic breathing exercise in semi fowler's position should be done (2\*10). To alleviate incisional pain patient should be taught to use chest binder with comfortable fitting which does not restricts the breathing or splinting with the help of pillows or towel roll.

As the patient also had cough with expectoration, he was instructed to support the chest while coughing. The management strategies for speech and voice will be strengthening exercise for vocal cords, using compensatory strategies to help aid in communication and avoid excessive talking or interspersed with rest periods. To alleviate swallowing difficulty, opt for softer food to reduce chewing, smaller more frequent meals, resting prior to meals and crushing medications when required.

### Airway Clearance Techniques

Airway clearance helps to relieve dyspnoea, improve oxygenation, and prevent frequent infections. Active cycle of breathing technique, to mobilize secretions from the larger airways. This should be followed by draining of lung segments with appropriate and modified postural drainage positions and percussion, vibrations considering his comfort and checking for desaturation.

Breathing retraining with Diaphragmatic breathing exercise and Pursed Lip Breathing, incorporated to provide improvement in respiratory pattern which increases tidal volume and minute ventilation, and decreases respiratory rate thus preventing the collapse of airways and reducing hyperinflation at rest and performing any activity. Adherence should be ensured by requesting documentation of Rate of Perceived Exertion, sputum quantity, and grade of dyspnoea. Incentive spirometer, was also started to improve lung volumes and flow rates ([Hristara-Papadopoulou et al., 2008](#)).

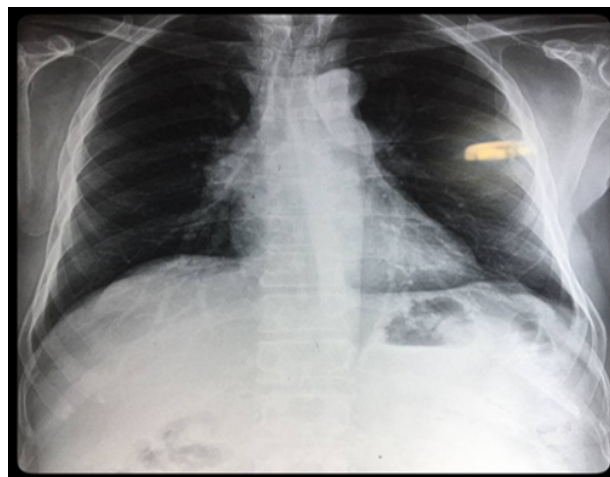
### Progressive resistance training and Aerobic training

A structured aerobic exercise program ([Birnbaum et al., 2018](#)) which consisted of 5mins of warm up phase, 30mins of interval training of progressive resisted exercise which consisted of targeting voluntary muscle of upper and lower extremity biceps curl, triceps pushdown, biceps curl, triceps pushdown, seated leg curl, cable pull-down exercise, leg extension, cable rowing, sit-ups, and leg press of 3 sets with 12 repetitions of low intensity in 1st week, low to moderate in 2nd to 3rd weeks, and moderate intensity in 4th week. A cool down phase of 5mins. RPE was monitored for the exertion rate ([de Freitas Fregonezi et al., 2005](#)).

### Mobilization

Monitored Graded mobilization was started in bed, progressed to walking ([Salci et al., 2019](#)), (Table 2) and home program prescribed on the same observations. Energy conservation and pacing techniques were taught for ADLS.

The Long term goals was to improve and prevent further deterioration of symptoms, home program was given before discharge that included, patient tailored exercise training program and follow up after one month to pulmonary rehab OPD. Exercise training inclusive of aerobic and progressive resisted exercises. Patient was motivated to perform the exercise and make a note of the vitals. The patient was monitored over a telephonic conversation for an appropriate training or assistance. After one month of discharge patient came back to rehabilitation OPD with the improvement in symptoms of dyspnoea , fatigue while doing basic activity of daily living ([Ries et al., 2007](#)).



**Figure 1: Pre-operative radiographic image with Anterior Mediastinal Tumour**

### Follow Up and Outcomes

As improvement was observed on lung function, Activities of daily living, fatigue level and exercise tolerance as documentation of RPE maintained by patient that has been taught during home program exercise prescription and also contacted telephonically.

The case presented to physiotherapy department with concerns of complains of incisional pain, cough with expectoration, early fatigue performing primary Activities of daily living and decreased strength .After clinical evaluation therapeutic intervention was designed which included Breathing retraining ([de Freitas Fregonezi et al., 2005](#)) and airway clearance technique which has a benefit in improving the respiratory patterns which included



**Figure 2: Post- operative radiographic image with stainless steel wires**

increase in tidal volume, increase in minute ventilation and decreased respiratory rate (Freitag *et al.*, 2018).

Secretion accumulation in airways is one of the most important factors for exacerbation of symptoms which leads to easy fatigue (Tran *et al.*, 2018) and dyspnoea to deal with the same chest physiotherapy which consisted of percussion and vibrations technique was performed in patient department and active cycle of breathing technique was given as an exercise of home program was advised.

A interval based exercise training program was designed which consisted of aerobic and progressive resistance training to reduce the easy fatigability (Vinge *et al.*, 2019) and improving strength of the voluntary group of muscles and thus leading to improvement in activities of daily living and improving the functional capacity (Calik-Kutukcu *et al.*, 2019).

There is evidence to aid the significance of specific exercise regimens to reduce impairments and enhance these functions. The exercise program has given according to the FITT principle as per the guidelines of ATS for pulmonary rehabilitation. The intensity was 3 on RPE scale, and monitoring vitals and saturation while walking (Ries *et al.*, 2007).

The patient was instructed to follow all the exercises as a part of home program and was provided with written protocol and advised for follow-up visits. A timely telephonic report was taken from the patient. This case report's purpose was to focus on the significance of prompt surgical treatment and essential physiotherapy rehabilitation to attain the functional goals with respect to patient and its prognosis.

## CONCLUSIONS

The case report concludes that early excision of thymoma with prompt tailor made supervised exercise program which consisted of breathing retraining, aerobic and resistance exercise with energy conservation technique in a form of tailored made home program helps in early recovery and achievement of functional goal.

## ACKNOWLEDGEMENT

The authors are grateful to AVBRH, Datta Meghe Institute of Medical Sciences University, Ravi Nair Physiotherapy College, Dr R.K. Sinha, Dr Waqar Naqvi and Dr Kiran Kumar for their kind support and cooperation.

## Funding Support

The authors declare that they have no funding support for this study.

## Conflict of Interest

The authors declare that they have no conflict of interest for this study.

## REFERENCES

- Ambrogi, V., Mineo, T. C. 2017. Benefits of Comprehensive Rehabilitation Therapy in Thymectomy for Myasthenia Gravis. *American Journal of Physical Medicine & Rehabilitation*, 96(2):77-83.
- Birnbaum, S., Hogrel, J.-Y., Porcher, R., Portero, P., Clair, B., Eymard, B., Demeret, S., Bassez, G., Gargiulo, M., Louët, E., Berrih-Aknin, S., Jobic, A., Aegerter, P., Thoumie, P., Sharshar, T. 2018. The benefits and tolerance of exercise in myasthenia gravis (MGEX): study protocol for a randomised controlled trial. *Trials*, 19(1):49-49.
- Calik-Kutukcu, E., Salci, Y., Karanfil, E., Fil-Balkan, A., Bekircan-Kurt, C. E., Armutlu, K. 2019. Expiratory muscle strength as a predictor of functional exercise capacity in generalized myasthenia gravis. *Neurosciences*, 24(2):95-100.
- de Freitas Fregonezi, G. A., Vanessa Regiane Resqueti, Güell, R., Pradas, J., Casan, P. 2005. Effects of 8-Week, Interval-Based Inspiratory Muscle Training and Breathing Retraining in Patients With Generalized Myasthenia Gravis. *Chest*, 128(3):1524-1530.
- Freitag, S., Hallebach, S., Baumann, I., Kalischewski, P., Ressler, B. 2018. Effects of long-term respiratory muscle endurance training on respiratory and functional outcomes in patients with Myasthenia gravis. *Respiratory Medicine*, 144:7-15.

- Hristara-Papadopoulou, A., Tsanakas, J., Diomou, G., Papadopoulou, O. 2008. Current devices of respiratory physiotherapy. *Hippokratia*, 12(4):211-220.
- Kang, C. H., Hwang, Y., Lee, H. J., Park, I. K., Kim, Y. T. 2016. Robotic Thymectomy in Anterior Mediastinal Mass: Propensity Score Matching Study With Transsternal Thymectomy. *Ann. Thorac. Surg*, 102(3):895-901.
- Kang, S. Y., Lee, J. S., Choi, J. C., Kang, J. H. 2007. Myasthenia Gravis Appearing After Thymectomy: a Case Report and Review of the Literature. *J. Clin. Neurol*, 3(3):158-160.
- Lizarraga, K., Benatar, M., Lizarraga, A. 2016. Getting Rid of Weakness in the ICU: An Updated Approach to the Acute Management of Myasthenia Gravis and Guillain-Barré Syndrome. *Seminars in Neurology*, 36(06):615-624.
- Mantegazza, R., Cavalcante, P. 2019. Diagnosis and treatment of myasthenia gravis. *Current Opinion in Rheumatology*, 31(6):623-633.
- Ries, A. L., Bauldoff, G. S., Carlin, B. W., Casaburi, R., Emery, C. F., Mahler, D. A., Make, B., Rochester, C. L., Zuwallack, R., Herrerias, C. 2007. Pulmonary Rehabilitation: Joint ACCP/AACVPR Evidence-Based Clinical Practice Guidelines. *Chest*, 131:4-42.
- Salci, Y., Karanfil, E., Balkan, A. F., Kütükçü, E. Ç., Ceren, A. N., Ayvat, F., Bekircan-Kurt, C. E., Armutlu, K. 2019. Functional exercise capacity evaluated by timed walk tests in myasthenia gravis. *Muscle & Nerve*, 59(2):208-212.
- Seyfari, B., Fatehi, F., Shojaiefard, A., Jafari, M., Ghorbani-Abdehgah, A., Nasiri, S., Yaghoobi-Notash, A., Molavi, B., Latif, A. H., Eslamian, R., Mir, A., Soroush, A. 2018. Clinical outcome of thymectomy in myasthenia gravis patients: A report from Iran. *Iran. J. Neurol*, 17(1):1-5.
- Tran, C., Bril, V., Katzberg, H. D., Barnett, C. 2018. Fatigue is a relevant outcome in patients with myasthenia gravis. *Muscle & Nerve*, 58(2):197-203.
- Veenhuizen, Y., Cup, E. H., Jonker, M. A., Voet, N. B., van Keulen, B. J., Maas, D. M., Heeren, A., Groothuis, J. T., van Engelen, B. G., Geurts, A. C. 2019. Self-management program improves participation in patients with neuromuscular disease. *Neurology*, 93(18):e1720-e1731.
- Vinge, L., Jakobsen, J., Andersen, H. 2019. Muscle weakness and functional disability in patients with myasthenia gravis. *Muscle & Nerve*, 59(2):218-223.
- Wolfe, G. I., Kaminski, H. J., Aban, I. B., Minisman, G., Kuo, H. C., Marx, A., Ströbel, P., Mazia, C., Oger, J., Cea, J. G., Heckmann, J. M., Evoli, A., Nix, W., Ciafaloni, E., Antonini, G., Witoonpanich, R., King, J. O., Beydoun, S. R., Chalk, C. H., Barboi, A. C., Amato, A. A., Shaibani, A. I., Katirji, B., Lecky, B. R. F., Buckley, C., Vincent, A., Dias-Tosta, E., Yoshikawa, H., Waddington-Cruz, M., Pulley, M. T., Rivner, M. H., Kostera-Pruszczyk, A., Pas-cuzzi, R. M., Jackson, C. E., Ramos, G. S. G., Verschuren, J. J. G. M., Massey, J. M., Kissel, J. T., Werneck, L. C., Benatar, M., Barohn, R. J., Tandan, R., Mozaf-far, T., Conwit, R., Odenkirchen, J., Sonett, J. R., Jaretzki, A., Newsom-Davis, J., Cutter, G. R. 2016. Randomized Trial of Thymectomy in Myasthenia Gravis. *N. Engl. J. Med*, 375:511-522.
- Yang, H., Liu, D., Hong, X., Sun, H., Zheng, Y., Yang, B., Wang, W. 2020. Effectiveness and safety of thymectomy plus prednisone compares with prednisone monotherapy for the treatment of non-thymomatous Myasthenia Gravis: Protocol for a systematic review. *Medicine (Baltimore)*, (25):99-99.