

Case Report

Addition of the combination of Sims technique and semi-fowler positioning to cardiorespiratory exercises in patients with myasthenia gravis: case report

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ABSTRACT

Myasthenia gravis (MG) is an autoimmune disorder characterized by fluctuating muscle fatigue, worsening with increased activity, and improving at rest. Physiotherapy plays a role in reducing symptoms such as shortness of breath, respiratory muscle weakness, and airway obstruction due to decrease the sputum in the lung lobes and prevent of the exacerbation. Respiratory training and postural drainage techniques are part of intervention that given by physiotherapy for patients diagnosed with MG and had symptoms hospital acquired pneumonia (HAP). A male, 28 years old patient diagnosed with HAP and had history of MG hospitalized a month with dyspnoea and disable to do activity daily living. Physiotherapy treatment that given to the patient from 18th July 2018 till 28th July 2018 are respiratory training included breathing exercise, cough exercise, shoulder expansion, Active Range of motion (ROM) exercise, stretching of respiratory muscle and home program exercise that helped by nurse and caregiver. Patient had medical treatment from all medical team by pulmonologist, neurologist and nurse too. Combined this new technique postural drainage and all physiotherapy programs showed significant in patient such as dyspnoea decreased.

Keywords: MG, Sims, Semi-fowler position, Cardiorespiratory exercise

INTRODUCTION

MG is an autoimmune disease that is mediated by autoantibodies to molecules in neuromuscular junction (NMJ), such as anti-acetylcholine receptor antibody (AChR-Ab) or anti-muscle-specific receptor tyrosine kinase antibody (MuSK-Ab).¹ MG is characterized by weakness and fluctuating skeletal muscle fatigue.² MG is an autoimmune disorder that affects 515 people per 100,000 people.³ About 60% of positive AChR antibodies in MG patients have enlarged thymus, and 10% have thymomas-tumors in the epithelial cells of the thymus.²

MG is an autoimmune disease with a fairly high variability of symptoms.⁴ It is characterized by a

weakening of muscle strength; a special characteristic of this disease is drooping of the eyelids due to weakness of the eyelid muscles. Skeletal muscle weakness also occurs in this disease, increasing muscle weakness occurs during the day and tends to be normal in the morning. Muscle weakness can be localized or generalized, and usually tends to be top rather than bottom.⁵ Muscle weakness causes common symptoms of MG which include: fatigue, difficulty breathing, ptosis, diplopia, hypomimia, chewing and swallowing problems, and dysarthria.^{6,7}

The presence of muscle weakness causes patients with MG to often feel fatigue during activities, especially simple daily activities.⁸ In survey of MG fatigue, two-thirds of respondents indicated that fatigue limits

participation in activities, even with well-controlled disease severity.⁹ Thus, a rehabilitation program especially physiotherapy is needed in MG patients with the aim of restoring the lost function or if it is not possible-to limit disability. Physiotherapy programs for patients with MG should be individually tailored to the patient's needs.⁸

Weakening of the muscles, including the respiratory muscles, can lead to respiratory failure. Therefore, it is important to introduce breathing exercises in the physiotherapy program such as inspiratory and expiratory muscle training, respiratory membrane training or endurance exercises. All forms of physiotherapy exercise performed can provide beneficial health effects for patients, confirming that respiratory muscle training is an important and effective element of therapy.¹⁰⁻¹²

Physiotherapy plays a role in the handling of this case, ideally aiming to reduce the symptoms of dyspnoea, decrease the stiffness of the respiratory muscle (upper trapezius muscle and scalene), and the main goal of physical treatment is cleaning the airway including cleaning sputum. Treatment provided by physiotherapy also given to prevent worsening of symptoms and maintain the stability of one's abilities. One of the methods used to reduce respiratory symptoms is postural drainage, which is a combination of the Sims position and semi-fowler position for airway clearance and chest physiotherapy for sputum clearance. Little known about the benefits of this technique and rare to apply.

CASE REPORT

Case history

A male patient, 28 years old diagnosed with a MG 2 years ago. He had treatment since then with pleural effusion and doctor said that he had hospitalized acquired pneumonia (HAP) for a month. Patient have been treated with thymectomy surgery, and hospitalized for 2 weeks at Sanglah hospital (Mawar room) 3 months ago. After that, patient hospitalized again because he suffered from dyspnoea and weakness. For this month, the patient had complained with chest tightness, cough which production sputum, and dyspnoea.

Vital sign examination that always monitored by nurse, but before the physical therapy's sessions we did it and here the result one: 1) Oxygen saturation: 93-94%, 2) Blood pressure:110/70-120/80 mmHg, 3) Respiration rate (RR):18-20x/minute, 4) Heart rate (HR):79x/minute and 5) Temperature: 36.5⁰.

The auscultation examination at the patient's chest found the crackles in the left lower lobe and right upper lung lobe. Dyspnoea was confirmed by measuring the circumference of the thorax, the following results were obtained at Table 1. Manual muscle test was measured for assessed the muscle strength of patient at Table 2.

Table 1: The circumference of the thorax.

Variables	Inspiration (cm)	Expiration (cm)	Differences (cm)
Sternum	88	87	1
Nippel	86.5	86	0.5
Proc. xipoides	82.5	81	1.5

Table 2: Manual muscle test of limb.

Variables	Upper limb	Lower limb
Right side	3+	4
Left Side	4	4

The patient felt uncomforted and stiffness when breathing. Position of patient always sit with slouch or fowler position. ROM of neck and shoulder were checked to know any tightness at accessory muscle of respiration like stern cleidomastoideus, scalene, pectoralis major and upper trapezius. The examination of ROM shoulder and cervical (measure by goniometer) at Table 3 and Table 4.

Table 3: ROM cervical.

ROM	Cervical (⁰)
Flexion	Limited (35)
Extension	Limited (60)
Left side flexion	Limited (40)
Right side flexion	Limited (40)
rotation	Limited 70)

Table 4: ROM shoulder.

ROM	Shoulder (⁰)
Flexion	Limited (170)
Extension	Full (45)
Abduction	Full (175)
Adduction	Full (45)

Treatment that given by physiotherapist

Chest physical therapy (included breathing exercise)

Pursed lips breathing: that aim to reduce of dyspnoea and to increase gas exchange in the lungs. This breathing exercise technique was performed with the instruction; deep inspiration and then do a long expiration like blowing something twice or longer than the inspiration. This exercise is done repeatedly or 5-10x repetitions in 1 session.¹³

Cough exercise: that was given to the patient because he has a lot of sputum based on auscultation and doctor stated it. Physiotherapist taught the patient how to cough effectively; patient instructed to take a deep inspiration, hold for 3-4 seconds and then while expiration patient form cough, it repeatedly until production sputum increased.¹⁴

Chest expansion combined with shoulder exercise: patient instructed to move actively rotation shoulder and breath normally. That will help increased thoracic movement and rib cage pumping furthermore the movement of sternocostal joint will improvement.

*Combination of postural drainage and the sims-semi fowler positioning:*¹⁵ Postural drainage aims to increase production sputum and could to prevent of the exacerbation or respiratory failure.⁵ Patient positioned by nurse and his caregiver to lying side with pillow at the waist. That position based on auscultation examination where the lobe of sputum location. We were combined it with sims and semi-fowler position. Patient could have bed position on 15-45°. There is evidence stated that this position will help patient to breathe easier and this is recommended by cardiopulmonary physiotherapist.¹⁵

Recommended Positioning for Respiratory failure

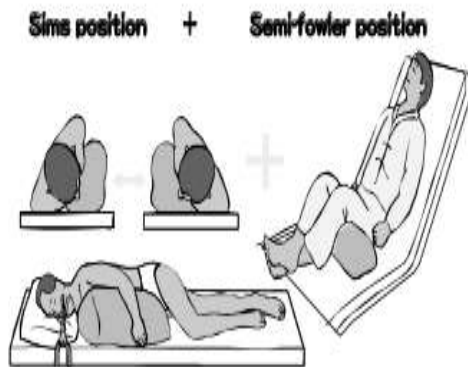


Figure 1: Combination of the recommended sims positioning semi fowler technique.¹⁶

Active ROM exercise, that have been given to the patient for maintain muscle strength and blood circulation while patient immobilized for a long time. AROM exercise that given by physiotherapist are for upper limb and lower limb such as all movement of shoulder, elbow, wrist and knee then ankle. This exercise also educated to nurse and caregiver that will help patient do it.¹⁷

Stretching of respiratory (accessory muscle), due to there were limited of ROM neck that mean any tightness at upper trapezius muscle and any muscle around it such as scalene, SCM. Physiotherapy have been giving the instruction to the patient to do stretching for this muscle and this exercise must to do minimum for once a day. Evidence stated that this is good and help for decreased dyspnoea and prevent to exacerbation of the muscle.¹⁷

Those physiotherapy programs were given four sessions in a month, that mean physiotherapist disclaimer to his caregiver and nurse to continue the exercise home program. While exercise, the medical team always

intended with vital sign changes, furthermore the vital sign always check before and after the treatment.

After doing the physiotherapy program for 4 sessions, we recorded 4 evaluations of the patient's condition:

Date: July 19th, 2018: Post-workout vital sign-a) HR: 100x/minute, b) RR: 23x/minute and c) SpO₂: 99%. Cough with of sputum better that before and the sputum is dark green.

Date: July 20th, 2018: Post-workout vital sign-a) HR: 90x/minute, b) RR: 20x/minute and c) SpO₂: 98%. Coughing up 4 times of sputum, the sputum is dark green and clear. Able to breathe normally without an oxygen mask for±2 minutes. The upper trapezius spasm is reduced and the patient feels more relaxed.

Date: July 23rd, 2018: a) Ronchi (+) build-up of sputum in the left lower lobe of the lung, b) The patient still has difficulty removing the sputum, c) Coughing with sputum only 2 times, the sputum is clear, d) The upper trapezius spasm decrease, the spasm of scalene muscle is still and e) The patient is able to sit on the edge of the bed and stand and walk around the bed.

Date: July 24th, 2018: a) The patient is no longer using nasal cannula, b) Upper trapezius spasm and m. scalene is better.

DISCUSSION

MG is an autoimmune disorder characterized by general or local weakness in skeletal muscles. A coordinated and specific multidisciplinary approach is needed in MG patients because of various deficits (fatigue, dyspnoea, dysphagia, diplopia, etc.). Rehabilitation and medical treatments combined to be done in reducing the complaints or symptoms experienced by patient with MG.²⁰ Increasing of the physical activity (physical and respiratory training) is one of the rehabilitation programs in optimizing the physical condition of MG's patients. It is necessary to patient have some exercises (light intensity), but remember to see the patient's toleration or based on patient's condition.¹⁸⁻²⁰

Patient in this case report had complaints dyspnoea, cough (disable to production of sputum), and weakness. He had hospitalized a month after diagnosed by doctor with hospitalized acquired pneumonia with history of MG. He had been using oxygen mask since then, but he felt uncomforted. His neck and shoulder felt stiffness and examination found that any tightness muscle causing decreased of ROM. Rehabilitation team instructed to help patient increased their functional activity and decreased symptoms such as production of sputum, dyspnoea and their activity daily living. The interventions that were given by physiotherapist aims to increased cardiorespiratory endurance and activate muscle off respiratory, and maintain muscle of his limbs and

increased ROM by decreasing tightness of respiratory muscles.

Respiratory training that was given to MG's patients had the aim to increase endurance of respiratory muscle performance and to reduce complaints related to MG such as dyspnea.²¹ However, the evidence stated that there was no improvement in spirometry measurements when the groups were compared to increase endurance of respiratory.²² The long-term effect of respiratory training was demonstrated by Freitag et al 2018 in patients with mild and moderate MG, modulation of the breathing pattern when rest with long expiration was observed in the study, there was an improvement in MG symptoms, respiratory symptoms, and physical fitness of samples.²³

Postural drainage that given aims to increase the production of sputum because our lung will be in the position and sputum which is flow due to gravity. Evidence stated that if postural drainage combined chest mobilization will increase production of sputum in case HAP.²⁴ The Sims technique that added to postural drainage will help prevent the exacerbation and prevent of breath failure. This position was helpful in the patient post-operative. Professor Ishikawa from Japan stated in his lecture that combination the Sims-position and semi-fowler position will help patient who hospitalized for a long time to prevent failure of respiratory and increased inspiration and expiration way. Another evidence found that there is significant improvement of tidal volume in patient who were given semi-fowler position.²⁵

Based on evidence, this patient who had complain dyspnoea, took a long-time hospitalization, had respiratory problem, cough and sputum (based on auscultation examination). Physiotherapist gave patient's caregiver and nurse to position the patient at semi-fowler and Sims in same time while noon and while sleep. The day after given this position, our team gave the cough exercise to decrease of sputum at lobe of lung. This program given by physiotherapist, nurse and caregiver. The intervention continues with exercise such as shoulder expansion, active ROM exercise, stretching respiratory muscle and the most important is breathing exercise. The programs run well, the patient could breathe without oxygen mask and have good sleep without medication from doctor. He also could mobilization around the bed and ROM of cervical got better. The next program that will give are mobilization while check the Borg scale, cardiorespiratory endurance exercise such as exercise flow the balloon and, or with spirometry. The long goal for this patient is he could do functional activity and maintain muscle strength especially respiratory muscle because MG worsening the muscle.

CONCLUSION

Based on the result and discussion, it can be concluded that the combination of the postural drainage and Sims and semi-fowler positioning added to cardiopulmonary

exercise could increase the lung capacity on the patient with dyspnoea, cough and weakness caused of MG and HAP. We are concern about the limitation of this study is shortness of time study and just assessed just one patient. Furthermore, the case control study was needed.

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