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Case Report

Rehabilitation in acute post COVID-19 symptoms with intracranial space occupying lesion: a case report

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ABSTRACT

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease or cancer is more likely to develop serious illness. Acute post COVID-19 patients will get a variety of problems with normal functioning. Rehabilitation could be an effective method for decreasing COVID-19's effects on patient health and function. A 20 years old, female was diagnosed with COVID-19 5 weeks ago, it had been reported shortness of breath, difficult clearing phlegm, headache, nausea and vomiting. The patient had a history of intracranial space occupying lesion (SOL), cerebello pontine angle (CPA) tumor 3 years ago, craniotomy resection of 4th ventricular tumour one year ago and a second craniotomy scheduled for 2021. Several exercises were scheduled for patients including prone position, respiratory muscle training, controlled breathing techniques, bronchial hygiene-airway clearance techniques, aerobic exercise, three times a week, exercises were scheduled. After having completed the exercise program for four weeks, exercise improved shortness of breath, phlegm expenditure, muscle strength, improve lung recoil, vital capacity, range of motion, patient balance and the patient's ability to maximize activity.

Keywords: Acute post COVID-19, Intracranial space occupying lesion, Pulmonary rehabilitation, Patient balance

INTRODUCTION

COVID-19 is an infectious disease caused by the SARS-CoV-2. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease or cancer are more likely to develop serious illness.[1]

Post COVID-19 many patients will experience a variety of problems with normal functioning. There is many symptoms after COVID-19, acute post COVID-19 (symptoms from week 5 to week 12), long post COVID-19 (symptoms from week 12 to week 24) and persistent post COVID-19 (symptoms lasting more than 24 weeks).[2] Dyspnea or increased respiratory effort, fatigue, post exertional malaise and/or poor endurance, cognitive impairment, cough, chest pain, headache, palpitations and/or tachycardia, arthralgia, myalgia, paresthesia, abdominal pain, diarrhea, insomnia and other sleep difficulties, fever, lightheadedness, impaired daily function and mobility, pain, rash, mood changes, anosmia, menstrual cycle irregularities are some of the symptoms.[2-4]

Rehabilitation could be a key strategy for limiting the effects of COVID-19 on patient health and function. The aim of pulmonary rehabilitation was to increase functional capacity and quality of life, even while managing the symptoms.[5] Body temperature >38 ºC, initial symptom onset 7 days, early onset of dyspnea, worsening of chest radiographic findings within 24 hours to 48 hours >50%, SpO_2 95%, blood pressure 90/60 mmHg or >140/90 mmHg were almost all contraindications to the rehabilitation program for acute post COVID-19 patients.[5-8] Respiratory muscle training, breathing strategies, aerobic/endurance, strengthening/resistance were all types of rehabilitation programs that can be provided.[5-7,9]

CASE REPORT

A 20 years old, female patient and a student was diagnosed with COVID-19 5 weeks ago, when diagnosed with COVID-19, the patient was hospitalised for one week and was treated for dizziness, cough and shortness of breath and continue to isolate at home. And now she had been reported shortness of breath, difficult clearing phlegm, headache, nausea and vomiting. The patient has a history of intracranial SOL, CPA tumour 3 years ago, craniotomy resection of 4th ventricular tumour one year ago and a second craniotomy scheduled for 2021. The patient had not been as active as normally in the last three years and she was lying down more frequently due to extremity weakness. When standing and walking, the patient had been unable to move his arms and needed support from his family. Limitations on flexion, extension and adduction of the patient's right arm and shoulder abduction. There was a tremor in the muscles of the lower extremities when lifting one leg and the patient used her hands to propel herself from sitting to standing.

Table 1: Rehabilitation program.

Duration	4 weeks of supervised exercise sessions
Frequency	3 times a week
Intensity	60-80 minutes per session
Type	Respiratory muscle training: expiratory muscle training
	Breathing strategies Controlled breathing techniques: pursed lip breathing diaphragmatic breathing (abdominal breathing)
	Bronchial hygiene-airway clearance techniques: forced expiration techniques controlled cough maneuver, huffing; postural drainage, percussion, vibration; active cycle of breathing techniques (ACBT); cough increasing techniques
	Aerobic/endurance: non-assisted walking training
	Strengthening/resistance
	Others: upper extremity and shoulder girdle exercises; balance training

The patient was found to be compos mentis, with blood pressure of 125/80 mmHg, pulse of 80 beats/minute, respiration rate 36 times/minute and oxygen saturation of 66% without oxygen, weight 65 kg, height 150 cm, with a body mass index of 28.9 kg/m^2 (obesity 1). The patient was given oxygen non rebreathing mask 6 litres/minute, and oxygen saturation went up to 93% and 96% after two hours. Auscultation the lung was detected in both vesicular and rhonchi especially in the right lung. The Romberg test, during which the patient fell to one side, the finger to nose test and the finger-to-finger test, in which the patient had difficulty moving his right hand due to weakness in the right hand and the heel to knee test, in which the patient had difficulty moving her heel to the knee.

Table 2: Outcome measures.

Outcome measures	Pre-intervention	Post-intervention
MMT	Upper extremity 3/5 Lower extremity 4/5	Upper extremity 4/5 Lower extremity 5/5
Walking test	3 meters for 30 seconds	10 meters for 30 seconds
Sit to stand test	7 times for 30 seconds	14 times for 30 seconds
Barthel index	35	65
Chest expansion (cm)	<2 cm	>2 cm
Chalder fatique score	15	6
MET)	<3	3-6
Berg balance scale (in points)	22	44
SPO_2 (during exertion) (%)	96	100

Manual muscle testing (MMT) superior extremity 3/5, lower extremity 4/5, walking test 3 meters for 30 seconds, sit to stand test 7 times for 30 seconds, Barthel index 35, chest expansion <2 cm, Chalder fatique score 15, metabolic equivalent of task (MET) <3, Berg balance scale 22 points hematologic; haemoglobin 9.5 g/dl, negative polymerase chain reaction (PCR), chest radiology anteroposterior projection indicating right pneumonia, computerized tomography (CT) scan of right sided IV periventricular mass, enlarged right cerebellum with a diameter of 3.4×2.27×2.53 cm have been the findings of the analysis. At the anterior horn, the ventricular system was dilated, with a diameter of 4.64 cm. When compared with the results of a CT scan three months ago, the tumor size and ventricular dilatation both were increasing.

Several exercises were scheduled for patients including prone position, respiratory muscle training, controlled breathing techniques, bronchial hygiene-airway clearance

techniques, chest physiotherapy, aerobic exercise, approximation and stimulation, movement facilitation exercise, hand coordination exercise and posture correction. Three times a week, exercises were scheduled. Patient was also given recommendations of daily physical activity and home exercise programs.

After having completed the exercise program for four weeks, every change in the patient was evaluated including blood pressure of 120/80 mmHg, pulse of 76 beats/minute, respiration rate of 22 beats/minute, oxygen saturation of 100%, auscultation of both vesicular chests and the patient's ability to move her hands and legs. Shoulder flexion 0-150º, shoulder extension 0-45º, shoulder abduction 0-100º and shoulder adduction 0-70º with a strength of 4. Hip flexion 0-110º, hip extension 0-20º, hip adduction 0-20º and hip abduction 0-30º with a strength of 5. Dan evaluated the following walking 10 meters in 30 seconds, sit to stand 14 times in 30 seconds, Barthel index 65, chest expansion >2 cm, Chalder fatique score 6, MET 3-6, Berg balance scale 44 points.

DISCUSSION

COVID-19 was thought of as a disease that affected primarily the pulmonary system. Soon after, it had been understood that it was a multisystem disease with complications affecting the cardiac, renal, gastrointestinal, nervous, endocrine and musculoskeletal systems. However, pulmonary involvement still remained significant.[4,5] The patient already had comorbidity intracranial SOL since three years ago, she was more often in bed and limited her activities weakness or paralysis in her extremities and there had been an expanded tumor and increased ventricular dilatation in the last three months. The patient was diagnosed with COVID-19 and was reporting mild symptoms. Immobilization (often made worse by motor weakness) can result in a markedly impaired ability to clear secretions. Secretions then accumulated in the lower parts of the bronchial three, blocking airways and eventually causing atelectasis and hypostatic pneumonia.[10,11] However, after the patient was reported cured, she was currently experiencing some symptoms. While the definition of the post-acute COVID-19 timeline was evolving, it had been suggested to include persistence of symptoms or development of sequelae beyond 5 weeks from the onset of acute symptoms of COVID-19. Rehabilitation was important for clinical recovery. The Chinese association of rehabilitation specialists released clinical evidence that identified the importance of pulmonary rehabilitation for post-COVID-19 patients. Pulmonary rehabilitation was recommended for post COVID-19 patients, especially after hospitalization, to increase lung function, exercise tolerance and reduce fatigue during physical activities.[5,6,12,13]

Respiratory muscle training, for example, was a type of exercise that aimed to strengthen the inspiratory muscles (voluntary isocapnic hyperpnea or normocapnic hyperventilation, inspiratory resistive loading, inspiratory threshold loading, tapered threshold loading) and expiratory muscles. Forced expiration techniques (controlled cough maneuver, huffing), incentive spirometry (sustained maximal inspiration-SMI), flutter breathing (devices applying vibrations to the inside of mouth), postural drainage, percussion, vibration, positive expiratory pressure (PEP), active cycle of breathing techniques (ACBT), autogenic drainage, mechanical insufflator-exsufflator (MI-E), intrapulmonary percussive ventilation (IPV), high frequency chest wall oscillation (HFCWO), cough increasing techniques; maximum insufflation capacity maneuver (MIC), glossopharyngeal breathing, manually assisted cough (MAC), MI-E and IPV, taking into account the patient's fluid balance, which can impact the viscosity of sputum.[8] Sitting or standing position can increase activity diaphragm, improve ventilation/pulmonary perfusion, increase tidal volume and improve the peak cough flow rate in patients with shortness of breath, cough and other symptoms. The doctor indicated the position of the postural drainage depended on the patient's clinical and chest X-ray. Breathing exercises aimed to improve breathing control and diaphragmatic breathing improved the work of breathing significantly.[5]

Exercise therapy can help to increase cardiorespiratory functional capacity, lessen the effects of long periods of immobilization and indirectly help to improve the overall organ system. It consisted of aerobic exercise (endurance), muscle strength training, balance training and coordination exercises, with the intensity, frequency, duration and type of exercise already being taken into consideration. Other exercises such as upper extremity and shoulder girdle exercises, exercises in water, balance training, neuromuscular electrical stimulation (NMES): (the diaphragm, abdominal muscles and extremity muscles), nonlinear exercise training, whole body vibration, yoga training, tai chi.[8] There were several conditions to stop rehabilitation programs such as fatigue with a Borg dyspnea scale <3 out of 10 that did not decrease even when the person was at rest down; two, breathlessness, suffocation, dizziness, headache, blurred vision, palpitations, excessive sweating and inability to maintain balance.[8,5]

The patient was exposed to a range of exercises designed to resolve acute post COVID-19 symptoms.[5] The exercise was carried out for four weeks, with several evaluations conducted to assess changes in the patient's condition during exercise using a variety of parameters such as clinical evaluation: physical examination, imaging, lung function; evaluation of exercise and respiratory function: joint range of motion (ROM) measurement, balance function evaluation: Berg balance scale, aerobic exercise capacity: 6 minute walk test (6MWT); assessment of daily living ability: assessment of activities of daily living (Barthel index). Exercise improved shortness of breath, phlegm expenditure, muscle strength, improved lung

recoil, vital capacity, range of motion, patient balance and the patient's ability to maximize activity.[6,14]

CONCLUSION

This case study concludes that rehabilitation is effective in improving lung functions, range of motion, patient balance and the patient's ability to maximize activity.

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