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PHYSIOTHERAPY IN PATIENTS WITH COVID-19 IN THE ACUTE PHASE

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Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes coronavirus disease 2019 (COVID-19), a new coronavirus that emerged in China in December 2019. The number of people infected with coronavirus is increasing all over the world. In 5% of coronavirus cases, acute respiratory distress syndrome (ARDS), septic shock, and/or multi-organ dysfunction/insufficiency, which require mechanical ventilation support, develop. The available information shows that physiotherapy practices should be performed on an individual basis based on the results of the multidisciplinary evaluation in the acute phase of the disease. Accordingly, the main methods of physiotherapy in the acute phase are positioning and mobilization. Some physiotherapy methods (e.g., diaphragmatic breathing, pursed-lip breathing techniques, positive expiratory pressure, and exercise training) are not recommended as they increase respiratory distress and respiratory work in the acute phase. It is essential to apply regular contact and droplet infection protection methods and to use personal protective equipment with high protection during physiotherapy methods that will be performed when clinically necessary.

Key Words: Coronavirus, Mobilization, Physiotherapy

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COVID-19 HASTALARINDA AKUT FAZDA FİZYOTERAPİ

Öz

Aralık 2019'da Çin'de ortaya çıkan şiddetli akut solunum sendromu koronavirüs 2 (SARS-CoV-2), koronavirüs hastalığına 2019 (COVID-19) neden olur. Koronavirüs bulaşmış insan sayısı tüm dünyada artmaktadır. Koronavirüs vakalarının % 5'inde mekanik ventilasyon desteği gerektiren akut solunum sıkıntısı sendromu (ARDS), septik şok ve / veya çoklu organ disfonksiyon / yetmezlik gelişir. Mevcut bilgiler, fizyoterapi uygulamalarının, hastalığın akut fazındaki multidisipliner değerlendirme sonuçlarına göre bireysel olarak yapılması gerektiğini göstermektedir. Buna göre, akut dönemde fizyoterapinin ana yöntemleri pozisyonlama ve mobilizasyondur. Akut dönemde solunum sıkıntısını ve solunum iş yükünü artırdığı için bazı fizyoterapi yöntemleri (örn. diyafragmatik solunum, pursed-lip solunumu, pozitif ekspiratuar basınç ve egzersiz eğitimi) önerilmemektedir. Standart temas ve damlacık enfeksiyonu koruma yöntemlerini uygulamak ve klinik olarak gerekli olduğunda uygulanacak fizyoterapi yöntemleri sırasında yüksek korumalı kişisel koruyucu ekipman kullanmak çok önemlidir.

Anahtar Kelimeler: Koronavirüs, Mobilizasyon, Fizyoterapi

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes coronavirus disease 2019 (COVID-19), a new coronavirus that emerged in China in December 2019. SARS-CoV-2 has been all over the world (Lai et al., 2020). As of July 20, 2020, the number of people infected with coronavirus in the world has exceeded 14 million, and the number of these people is increasing all over the world. It has also been reported that healthcare workers also experience COVID-19 infections. The whole negative picture imposes a considerable burden on the health systems of the countries (Vellingiri et al., 2020).

The disease is mild in most patients with COVID-19 infection, and all of these patients recover. Approximately 81% of cases confirmed to have COVID-19 infection in the laboratory develop mild to moderate disease without viral pneumonia. Severe disease occurs in 14% of viral pneumonia cases. Dyspnea, tachypnea (respiratory frequency ≥ 30 breaths / minute), oxygenation disorder (oxygen saturation $< 93\%$, PaO_2 / FiO_2 ratio < 300) and / or infiltration of half the lung area may occur in individuals with severe COVID-19 infection. In 5% of cases, acute respiratory distress syndrome (ARDS), septic shock, and / or multi-organ dysfunction / insufficiency, which require mechanical ventilation support, develop. At least 5% of the case should be monitored in the intensive care unit (ICU) (WHO, 2020).

Methods of physiotherapy in patients with COVID-19 in the acute phase

COVID-19 disease is transmitted rapidly by droplet and contact. COVID-19 infection also affects health personnel. Physiotherapists are generally in close contact with patients and may be directly exposed to patients' respiratory droplets. Thus, it is essential to apply standard contact and droplet infection protection methods and use personal protective equipment with high protection during physiotherapy methods that will be performed when clinically necessary (Thomas et al., 2020). The available information shows that physiotherapy practices should be performed on an individual basis based on the results of the multidisciplinary evaluation in the acute phase of the disease. Accordingly, the main

methods of physiotherapy in the acute phase are positioning and mobilization (İnal İnce et al., 2020; Thomas et al., 2020).

Positioning

In positioning, the body-gravity relationship is changed to improve the functional residual capacity, ventilation-perfusion compliance, and correction of the diaphragmatic length-tension relationship. Other indications for positioning are management of soft tissue contracture, protection of joints, and prevention of nerve pinching. Significant physiological changes can occur rapidly by changing the position of the body. Thus, it is imperative to evaluate vital signs before, during, and after positioning carefully (Krishnagopalan et al., 2002).

To prevent ventilator-associated pneumonia, the bed elevated at an angle of 30 to 45 degrees is preferred. This position can be used safely as it does not significantly affect respiratory status and hemodynamics (Lazzeri et al., 2020).

Patients with COVID-19-associated ARDS are rapidly increasing all over the world. The effects of prone position in COVID-19 patients have not yet been published. The use of prone positioning in these patients results from the positive effects that have been determined in patients with ARDS (Ghelichkhani & Esmaeili, 2020; Scholten et al., 2017). Physiotherapists may have a role in the implementation of prone positioning in the ICU. This may include leadership within ICU 'prone teams', providing staff education on prone positioning, or assisting in turns as part of the ICU team (Thomas et al., 2020). The prone position is used in the presence of irreversible hypoxemia despite mechanical ventilation application to correct oxygenation in COVID-19 patients with severe viral pneumonia and ARDS (Lazzeri et al., 2020; Scholten et al., 2017).

Mobilization

Mobilization has been established as a principal, feasible, and safe method to reduce the incidence of ICU- acquired weakness, increase functional capacity, and reduce hospital and ICU stay (Arias-Fernández et al., 2018). Mobilization is a step by step process from rolling to independently walking to improve recovery and outcomes. Mobilization usually involves sitting on the edge of the bed, standing

at the bedside, sitting in a chair, and walking a short distance. It is vital to assess the maximum mobility level of functional status in ICU survivors before mobilization (Miranda Rocha et al., 2017; Parry et al., 2015).

It has been established safety criteria for mobilization for patients in ICU. There are five essential criteria for mobilization: myocardial stability, oxygenation stability, vasopressor use, engages to voice, and neuro stability (Table 1). It should not be forgotten that these criteria should be met before mobilization (Adler & Malone, 2012; Conceição et al., 2017).

Table 1. Safety criteria of mobilization for patients in intensive care unit

Myocardial stability	- No active myocardial ischemia within past 12-24 hours - No dysrhythmia requiring new antidysrhythmic agent within past 12-24 hours
Oxygenation stability	- $FiO_2 < 0.06$ - $PEEP < 10 \text{ cm H}_2\text{O}$
Vasopressor use	- No new or increase of any vasopressor within the past 2 hours
Engages to voice	- Response to verbal stimulation
Neuro Stability	- $ICP < 15$ - No acute or uncontrolled intracranial event
Abbreviations: FiO_2 : the fraction of inspired oxygen, PEEP: positive end-expiratory pressure, ICP: intracranial pressure	

The other physiotherapy methods

In the presence of acute respiratory failure, a decrease in lung compliance, increased respiratory work, impaired blood oxygenation, and rapid and superficial respiratory pattern. In this case, minimizing inspiratory effort and maximizing the mechanical effectiveness of breathing is usually the most critical approach of treatment. It is essential that the treatments and applications used by physiotherapists do

not cause more strain on the respiratory work and do not expose the patient to the risk of respiratory distress. The physiotherapy methods listed in Table 2 are not recommended as they increase respiratory distress and respiratory work in patients with COVID-19 infection in the acute phase, causing rapid superficial breathing pattern and disruption in blood gases (Lazzeri et al., 2020).

Table 2. The physiotherapy methods which are not recommended in patients with COVID-19 infection in the acute phase

Methods which are not recommended	<ul style="list-style-type: none">- Diaphragmatic breathing/deep breathing exercises- Pursed-lip breathing techniques- Airway clearance techniques (positive expiratory pressure [PEP]) and oscillatory PEP devices, coughing, huffing, active cycle of breathing technique, autogenic drainage)- Incentive spirometer- Respiratory muscle training- Manual mobilization- Exercise training
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CONCLUSION

The number of people infected with coronavirus in the world has exceeded 14 million, and the number of these people is increasing worldwide. In 5% of cases of coronavirus; ARDS, septic shock, and / or multi-organ dysfunction / insufficiency, which require mechanical ventilation support, develop. Physiotherapists should perform their methods in coordination with other health professionals in patients with COVID-19 in the acute phase. The main methods of physiotherapy in the acute phase are positioning and mobilization. It is crucial to apply standard contact and droplet infection protection methods and to use personal protective equipment with high protection during physiotherapy methods that will be performed when clinically necessary.

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