

Physiotherapy for a patient with COVID-19: from intensive care to rehabilitation. A case report

Fisioterapia na assistência ao paciente com COVID-19: da terapia intensiva à reabilitação.
Relato de caso

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Abstract

Introduction: The COVID-19 pandemic required resources and efforts from health professionals to improve care for affected patients. Physical therapy has gained prominence in reducing the progression of the disease in respiratory symptoms and in maintaining functional and physical capacity. **Objective:** To report one of the cases of physiotherapy care of a patient with COVID-19, from admission to the intensive care unit (ICU) to outpatient rehabilitation and the resources used, in order to demonstrate the benefit of physiotherapy throughout the course of the patient until discharge. **Case report:** A 53-year-old man was admitted due to clinical worsening, complaint of dyspnea at rest associated with fever, dry cough, agenesis and hypoxemia. Admitted to ICU with 50% involvement of the lung parenchyma on computed tomography, he received oxygen at 10 L/min to achieve peripheral oxygen saturation (SpO_2) at 99% and arterial oxygen partial pressure ratio (PaO_2/FiO_2) at 95. During nine days of hospitalization, he received physiotherapy care four times a day, with non-invasive ventilation, prone position, sitting, early ambulation and resources for increasing physical demand, progressively adjusted according to the assessment and therapeutic objective. At hospital discharge, with remission of important symptoms, without oxygen and SpO_2 96%, PaO_2/FiO_2 to 302, he was referred for cardiopulmonary rehabilitation and, after 38 sessions, he recovered functional capacity and was discharged from the service with a six-walk test minutes with appropriate values for age and sex. **Conclusion:** In this case of

COVID19, the therapeutic objectives of physiotherapy were achieved from hospitalization to rehabilitation, using resources known by the specialty and prioritizing continuous care and personalized therapy.

Keywords: COVID-19, Physical therapy modalities, Noninvasive ventilation, Prone position, Early ambulation

Resumo

Introdução: A pandemia da COVID-19 exigiu recursos e esforços de diversos profissionais de saúde para melhorar a assistência aos pacientes acometidos. A fisioterapia ganhou destaque na redução da progressão da doença em sintomas respiratórios e na manutenção da capacidade funcional e física. **Objetivo:** Apresentar um dos casos de assistência fisioterapêutica de um paciente com COVID-19, da internação na unidade de terapia intensiva (UTI) à reabilitação ambulatorial e os recursos utilizados, de forma a demonstrar o benefício da fisioterapia ao longo de todo o percurso do paciente até a alta. **Relato do caso:** Homem de 53 anos foi internado devido a piora clínica, queixa de dispneia em repouso associada a febre, tosse seca, agenésia e hipoxemia. Admitido à UTI com acometimento de 50% do parênquima pulmonar em tomografia computadorizada, recebeu oxigênio a 10 L/min, para atingir saturação periférica de oxigênio (SpO_2) a 99% e relação de pressão parcial de oxigênio arterial (PaO_2/FiO_2) a 95. Durante nove dias de internação, recebeu atendimento de fisioterapia quatro vezes ao dia, com recursos de ventilação não invasiva, prona ativa, sedestação, deambulação precoce e recursos de aumento de demanda física ajustada progressivamente de acordo com a avaliação e objetivo terapêutico. Na alta hospitalar, com remissão dos sintomas importantes, sem oxigênio e SpO_2 a 96%, PaO_2/FiO_2 a 302, foi encaminhado para reabilitação cardiopulmonar e, após 38 sessões, recuperou a capacidade funcional e recebeu alta do serviço com teste de caminhada de seis minutos com valores adequados para a idade e sexo. **Conclusão:** Neste caso de COVID19, os objetivos terapêuticos da fisioterapia foram alcançados desde a internação até a reabilitação, com utilização de recursos conhecidos

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pela especialidade e priorizando os cuidados contínuos e a personalização da terapia.

Palavras chave: COVID-19, Modalidades de fisioterapia, Ventilação não invasiva, Decúbito ventral, Deambulação precoce

Introduction

Survival in intensive care units (ICU) has increased in recent years, as a consequence of the improvement of therapeutic and technological resources in health-care in general, but also associated with the presence of a specialized multidisciplinary team⁽¹⁾. One of the active professionals currently with prominence during the COVID-19 pandemic is the physical therapist. This professional, in Brazil, has skills that range from care in bronchial hygiene, positioning and application of ventilatory support resources (oxygen therapy, invasive and non-invasive mechanical ventilation), in addition to obtaining and/or maintaining physical and functional capacity, with the objective of achieving functional independence after hospital discharge⁽²⁾.

The infection has behaved in different ways in individuals with COVID-19, when symptomatic, patients may need hospital assistance⁽³⁾. Hypoxemia is common in this viral infection, requiring oxygen supplementation and the use of different types of mechanical ventilation, from non-invasive to invasive modes. Non-invasive ventilation can be applied through several interfaces, such as high-flow nasal catheters, intermittent positive pressure breathing (IPPB), continuous positive airway pressure (CPAP), or even bi-level positive airway pressure (BIPAP) on specific or general ventilators⁽²⁾. The clinical status when the invasive mode is used is the most serious and presents many complications for survivors and high mortality⁽⁴⁾.

However, there is always the question, among the professionals involved in the assistance to this specific population, about how the physiotherapist can work in extremely severe cases of patients under hypoxemia. Thus, this case report aims to describe the physical therapy assistance of a patient with COVID-19, from admission to the ICU to outpatient rehabilitation and the resources used.

This study was approved by the institutional review board of Irmandade da Santa Casa de Misericórdia de São Paulo (protocol number CAAE 44458821.2.0000.5479). It is reported according to the reporting guideline recommended by the EQUATOR Network for this type of study, CARE (Checklist of information to include when writing a case report, <https://www.care-statement.org>).

Case report

A 53-year-old man was admitted to the COVID-19 Emergency Room at Santa Casa de Misericórdia in São Paulo on July 14, 2020 complaining of dyspnea during medium exertion for four days, with progressive worsening of dyspnea at rest, associated with fever (38°C), dry cough, agenesia and hypoxemia. During the initial medical evaluation, the patient had a heart rate (HR) of 102 bpm, a respiratory rate (RR) of 32 rpm and peripheral oxygen saturation (SpO₂) of 72% in room air with signs of respiratory distress. Pulmonary auscultation showed vesicular murmur with diffuse crackling rattling sounds. The patient was then admitted to with suspected COVID-19 infection.

First, oxygen therapy was started at 10 L/min in a non-rebreathing mask (MNR), with improvement in the breathing pattern and reaching SpO₂ of 99% and arterial oxygen partial pressure ratio (PaO₂/FiO₂) of 95. Chest tomography was performed on the same day (07/14/2021) and the report described ground-glass opacities, more evident in the right lung, with involvement greater than 50% of the lung parenchyma.

On the first day of hospitalization, the physiotherapy team assisted the patient in an active prone position (prone position performed by the patient to improve oxygenation), with an initial duration of two hours. The team also started bronchial hygiene with techniques for accelerating the expiratory flow and assisted coughing. IPPB was implemented to improve alveolar ventilation and gas exchange, as the patient had difficulty staying on CPAP. The approach is aimed at promoting pulmonary expansion and improving the respiratory condition. CPAP was gradually increased according to patient acceptance, and especially on the second day of hospitalization, when the respiratory condition became more accentuated and the test for COVID-19 revealed positive. At that time, the SpO₂ had dropped to 91% with MNR at 10 L/min, with a PaO₂/FiO₂ ratio of 190, and the patient suffered from mild tachypnea (23 rpm), despite denying dyspnea (Figure 1). As he was collaborative, the period in the prone position was increased, totaling six hours per day. In addition to the IPPB, the patient remained on CPAP with 10 cmH₂O and 60% FiO₂ for 40 minutes.

There was improvement. The SpO₂ rose to 93%, at 8 L/min using the MNR, with 18 rpm of respiratory frequency (RF) on the third day. The approach was maintained. On that day, light exercises (20 movements per body section without load) were started in bed and in a sitting position, with no increase in demand (until heart rate, HR, up to 20 bpm from baseline). The patient was monitored using the Borg Scale to assess perceived exertion. The exercises were applied in such a way as to never let the Borg score

(which ranges from 0 to 10) exceed 7 (which identifies fatigue).

On the fourth day, without the use of vasoactive drugs, and with response to clinical and drug treatment, the physiotherapy team maintained the following procedures: prone position; non-invasive ventilation (CPAP), with continuous adaptation of therapy and respiratory kinesiotherapy exercises (inspiratory patterns and labial frenum); light exercise three times a day, aiming to gain lung volume and capacity and physical and functional capacity; bronchial hygiene.

On the fifth day of CPAP use, up to three cumulative hours a day, according to the patient's tolerance, it was possible to reduce the oxygen supply to 5 L/min through a nasal catheter, reaching 2 L/min on the sixth day. The team also increased the time sitting in an armchair for four hours (this was the first day of an extended armchair), with the alternation of decubitus and with less assistance from the physiotherapist in these procedures, to increase functional capacity.

On the seventh day in the ICU, the patient was hemodynamically stable, and collaborative. Together with medication and physical therapy support, the oxygen supply was withdrawn, with SpO₂ of 90-92%, RR at 16 rpm, without signs of discomfort. However, oxygen supply was increased during exercises and when there was change in position or greater physical demand. Despite the visible clinical improvement, the prone position was maintained for at least four hours and CPAP for two hours a day, with sitting in

an armchair associated with kinesiotherapy continued according to the patient's tolerance. The patient also started walking on the seventh day.

Hospital discharge happened on the July 23rd, 2020, the ninth day of hospitalization. The patient had SpO₂ 96% in ambient air and PaO₂/FiO₂ 301. He was eupneic (RR of 18 rpm), with no signs of respiratory distress. In the six-minute walk test (6MWT), performed before discharge, he walked 450 meters (Figure 2).

After hospital discharge, on July 23rd 2020, the patient was referred to the cardiopulmonary physiotherapy clinic at Santa Casa de Misericórdia in São Paulo, to start the cardiopulmonary rehabilitation program between July 28 and 30 (38 sessions, three times a week). The program started with a maximum repetition test (1RM), aerobic training using a lower limb cycle ergometer, treadmill or circuit for approximately 30 minutes, and then resistance training with the use of external load or free load for approximately 20 minutes. The program followed the protocol published by the group for post-COVID-19 cardiopulmonary rehabilitation.⁽⁵⁾ The 6MWT that had been performed on July 23rd (right after hospital discharge) resulted in a distance of 450 meters walked, but after three months, on October 30, it reached 588 meters and in the last assessment, on January 1st 2021, the patient could walk 602 meters (33% increase in the distance covered). He was then discharged from rehabilitation, after a case discussion with pulmonology, with test values within normal limits.⁽⁵⁾

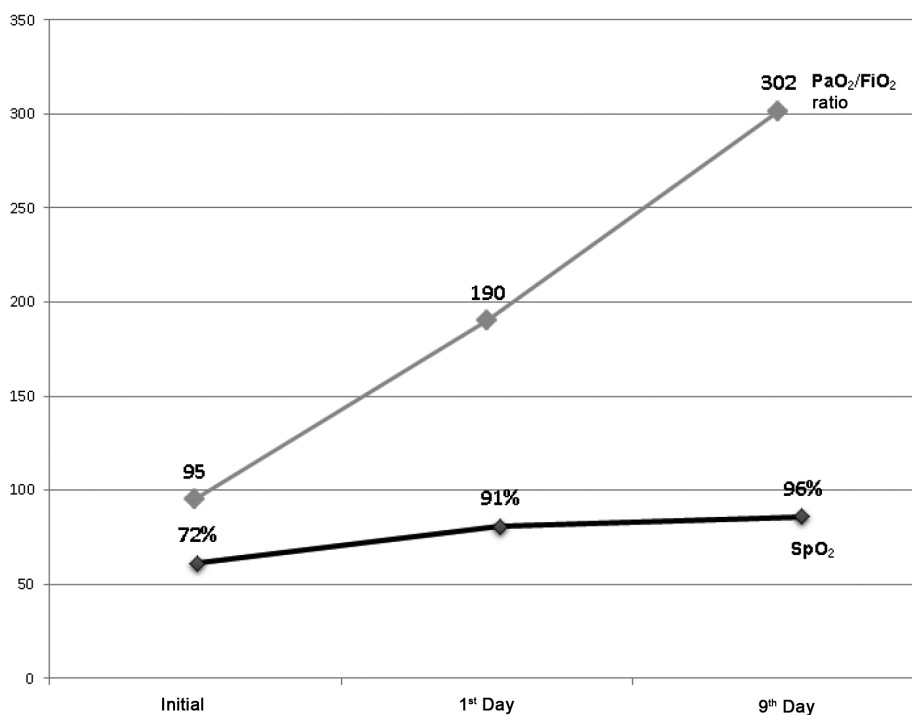


Figure 1 - Evolution of the mean Oxygen saturation (SpO₂) and arterial oxygen partial pressure ratio (PaO₂/FiO₂) during hospitalization

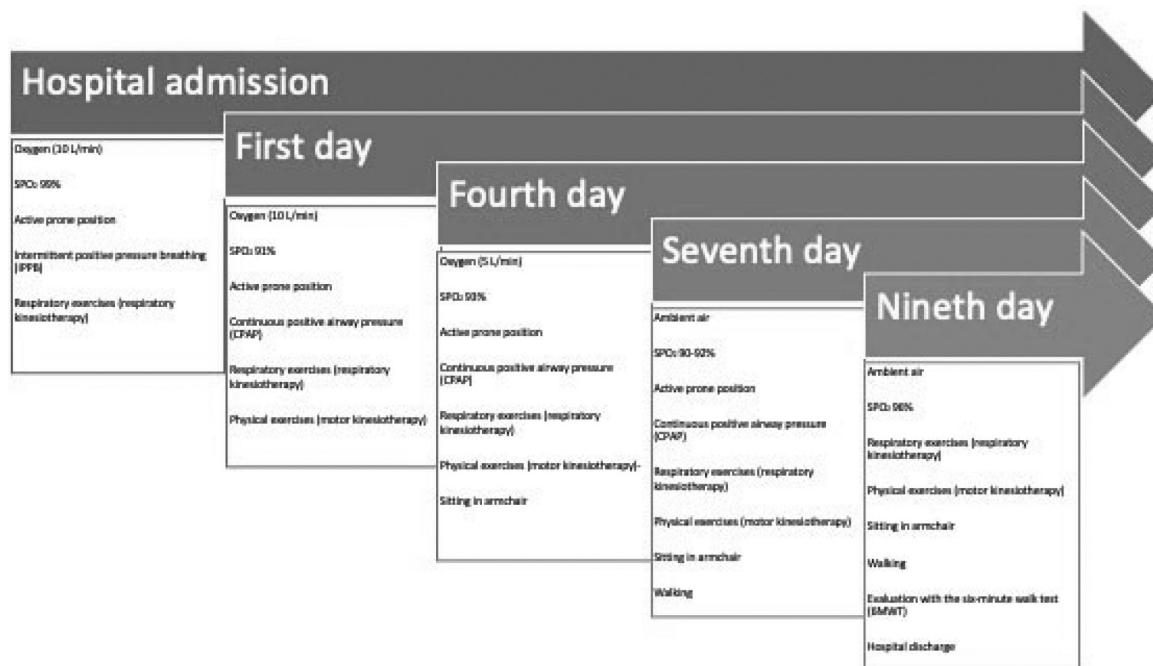


Figure 2 - Flowchart of the physical therapy care provided to the patient with COVID-19.

Discussion

The role of Physiotherapy has grown both during and in the post-infection period by COVID-19.⁽⁵⁻⁶⁾ The type of physiotherapy care provided varies, starting with the emergency service and continuing with intensive care, hospitalization and outpatient care. The therapeutic objective is set according to severity, functional limitations and the support needed to maintain life.

The choice of resources also depends on local availability and the patient's clinical status. Clinical and therapeutic knowledge is essential to assess and choose the most applicable.

COVID-19 still requires studies and understanding of disease evolution so that scientifically based approaches can be proposed.⁽⁶⁾ The active prone position and the use of non-invasive ventilatory support have been promising resources,⁽⁷⁾ however, they require continuous assessment, including the care of not delaying the advancement of therapies and thus increasing risk of death.⁽⁸⁾ Active or spontaneous prone is favorable in increasing oxygenation and improving spontaneous ventilation. However, it can still be associated with non-invasive modalities of mechanical ventilation, so that there is the recruitment of ventilatory units with less breathing work, shunt and with improvement in gas exchange, reducing hypoxemia, which is so evident in cases of COVID-19.⁽⁷⁻⁹⁾ The case report presented shows the effective use of CPAP associated with the active prone position. However,

it is important to emphasize that this is expected for cases with pulmonary involvement less than or equal to 50% with ground-glass lesions on tomography. The effectiveness of this strategy could be seen throughout the evolution of oxygenation during hospitalization (Figure 1) and is in agreement with reporting the association of resources.

Early mobilization in the ICU is another recommendation for patients with COVID-19.⁽¹⁰⁻¹¹⁾ However, it is difficult to quantify the demand imposed on patients with hypoxemia. Assessing the exertion and imposed demand according to the perceived exertion with the Borg scale (considering that it should not exceed a score of 7 from 10) allows the physiotherapist to identify the ideal load, together with RR, HR, SpO₂ and other clinical variables.

Sitting at the bedside and outside the bed is recommended. Walking should be the therapeutic objective, as it enables functional independence and physical capacity. Noninvasive ventilatory support or increased oxygen can be used to adjust the demand to the patient's capacity during exercise, always respecting signs and symptoms.^(5,10-11)

Last but not least, the continued engagement in a rehabilitation protocol after discharge showed improvement in the 6MWT after 38 rehabilitation sessions. At the end of three months of the protocol, the distance walked increased by 33% (450 m initially to 602 m). Improvement in prognosis is defined when the patient reaches the value predicted by age, sex and height (for this particular patient, calculated as 587 m).⁽⁵⁾

Conclusion

The analysis of this report of a moderate case of COVID-19 shows that the therapeutic objectives of Physiotherapy were achieved from hospitalization to rehabilitation. Resources already known by the specialty were used, prioritizing continuous care and the customization of therapy to the patient and clinical status.

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