Physiotherapy Care in Oncology Patient with COVID-19

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Cuidados da Fisioterapia no Paciente Oncológico com Covid-19

Cuidados de Fisioterapia en Pacientes de Oncología con Covid-19

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INTRODUCTION

The novel coronavirus appeared in Wuhan, China, in the end of 2019 and became a world pandemic because of its characteristic of dissemination in large scale, through respiratory route and contact with prolonged permanence in contaminated environments, with elevated risk of lethality, mortality and transmissibility among humans[1].

COVID-19, the disease caused by the coronavirus, has been a challenge for health professionals because of clinical manifestations similar to a flu condition, with most common symptoms as fever, cough and myalgia or fatigue[2,3] and dyspnea reported in the beginning of the disease; the less common are production of sputum, headache and dyarrhea[2]. The status can evolve rapidly to severe pneumonia, which can present as the severer form of refractory hypoxemia with severe acute respiratory syndrome (called Sars-CoV-2) and is bringing concern to the world population and to the scientific community[1].

Severer cases of COVID-19 are associated to risk factors as advanced age and comorbidities as tobacco addiction, obesity, cardiopathies and previous respiratory problems[4]. Cancer is a disease with mechanisms and risk factors similar to cardiorespiratory and metabolic diseases and oncologic patients frequently present other associated comorbidities[5]. In addition to this, the side effects associated to the antineoplastic treatment can promote immunosuppression and cardiac toxicity, which makes these patients more susceptible to severer complications of infections and worsening of the COVID-19 status, with more risk of mechanic ventilation and intensive care unit (ICU) or death in comparison with patients without cancer[4,6,7].

DEVELOPMENT

With still little known physiopathology, studies have suggested that the disease develops by the infiltration of viral ribonucleic acid (RNA) in cells of the upper and lower airways cells, which, when infected, increase the production of angiotensin converting enzyme 2 (ECA2) and proteins that inhibit the immune system and release inflammatory cytokines . ECA2, for being more abundant in type II alveolar cells are highly expressed in the lungs[8] but can also evolve to systemic conditions because of the compromise of ganglionary cells that produce ECA2 in other systems as cardiovascular, digestive, renal and hepatic[9].

Within this context of respiratory compromise, two distinct phenotypes are suggested for the coronavirus and determinants in the form how the respiratory disease manifests. The patients with phenotype L (*LOW*), or type 1, would present low elastic resistance and with this, more preserved respiratory mechanic close to normal and predominance of frosted-glass image in computerized tomography. For patients with phenotype H (HIGH), or type 2, the respiratory mechanic is harmed by high elastic resistance and low compliance, which gives them a more rigid lung and larger areas of alveolar consolidation[10].

Approximately 10% of the patients with COVID-19 can need invasive mechanic ventilation[11]. Physiotherapy as an integral part of the care to the patient with COVID-19 has the early detection of these phenotypes for adequacy of ventilatory support as main line of action. Strategies of protective ventilation are recommended with low current volumes (4-6 mL/kg), with inspiratory pressures in order to maintain the plateau pressure <30 cm H_2O

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and the driving pressure (plateau pressure less positive end expiratory pressure (PEEP)) <14 cm H_2O, targeted to minimize the pulmonary pressure induced by ventilation[11] and PEEP titration to avoid atelectrauma and hyper distension. In the patient type 1, benefits of prone are evaluated for better redistribution of the alveolar perfusion and in the patient type 2, it is used alveolar recruitment and pronation to improve the respiratory mechanic[10].

A great concern is being targeted to patients with lung cancer where there are more incidence in aged population, the symptomatology is quite similar to the COVID-19 condition with signs of cough, fatigue, difficult to breathe and their immunosuppression condition after treatment with chemotherapy and increase of inflammatory cytokines after radiotherapy increase the vulnerability for pneumonias conditions[12].

Considering that muscle dysfunction is a predominant phenomenon in the oncologic scenario[13], that can be aggravated by the muscle alterations associated to COVID-19 and due to the remarkable functional decline of these patients, it is recommended that, since the diagnosis of cancer, the oncologic physiotherapy initiates the follow up to minimize the losses and improve the functional status of the patient for tolerance to the treatment[14,15]. During hospitalization, it has been recommended the intensification of the mobilization to accelerate the discharge process[12] and reduce the exposure of the patient in environments where coronavirus infection may occur and routine monitoring for early intervention in case of infection[16].

Furthermore, oncologic patients have elevated hypercoagulability factors that make them more prone to venous thromboembolism[17]. Patients with COVID-19 present elevation of the levels of dimer D, reduction of fibrinogen and condition associated to moderate to severe thrombocytopenia, being commonly associated to thrombosis and ischemic events. It is recommended to evaluate indication of anticoagulation for these patients[18]. In combination with pharmacologic treatment, physiotherapy has an important role, indicating and favoring the mechanic prophylaxis, that contributes to reduce the venous stasis and results in the reduction of risk of deep venous thrombosis. The physiotherapist evaluates and indicates devices of mechanic compression (pneumatic or compressive socks), in addition to functional evaluation and stimulate the early mobilization until ambulation[19,20].

Anemia is a common complication in oncologic patients, it can be due to the neoplasm itself or antineoplastic treatments and influenced by the stage of the disease. It imposes a negative effect to the metabolism and cardiovascular system by lowering the levels of hemoglobin and reducing the tissue oxygenation, which can lead to symptoms as tachycardia, dyspnea, fatigue, weakness, reduction of the physical and cognitive capacity[21]. A new hypothesis about the physiopathology of COVID-19 assumes it is a disease of hematologic origin where viral RNA replication stimulates the production of non-structural proteins that invade the hemoglobin, displacing iron (Fe) and blocking the transportation of oxygen (O^2), leading to a condition of hypoxia of refractory and rapid evolution. In addition to this, Fe free would increase the mitochondrial oxidative stress per lipid peroxidation favoring cellular apoptosis[22].

Therefore, the physiotherapeutic approach must be based in the symptoms for adequacy of the activity, with evaluation for slow progression and monitoring of vital signs, including peripheral saturation of O^2 to preview the tissue perfusion. The value of the hematocrit lower than 15-20% and hemoglobin lower than 5-7 g/dL has been considered as lower inferior limit for mobilization[23]. Because of the symptoms and risks, anemia is many times a limiting factor in the progression of mobility and can increase the time of restriction to bed with impact in the functionality.

CONCLUSION

In this scenario, it is important to reinforce that the oncologic patient presents common physiopathological mechanisms to the condition of COVID-19 that can be exacerbated by the contamination by coronavirus, requiring more attention of the physiotherapists in the early prevention, identification and intervention of the symptoms.

The physiotherapy in the oncologic patient with COVID-19, therefore, should be based in clinical symptoms and limitations for adequacy of the activities, favor the mechanic prophylaxis to reduce the risk of deep venous thrombosis, evaluate the slow progression and monitoring of vital signs, minimize the losses and improve the patient's tolerance to the treatment.

CONTRIBUTIONS

All the authors contributed substantially for the study conception and/or planning, gathering, analysis and/or interpretation of the data as well in the wording and/or critical review and approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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REFERENCES

1. Guo ZD, Wang ZY, Zhang SF, et al. Aerosol and surface distribution of severe acute respiratory syndrome coronavirus 2 in hospital wards, Wuhan, China, 2020. Emerg Infect Dis. 2020 Jul;26(7). doi: https://doi.org/10.3201/eid2607.200885
2. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020 Feb 15;395(10223):497-506. doi: https://doi.org/10.1016/S0140-6736(20)30183-5
3. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA. 2020;323(11):1061-9. doi: https://doi.org/10.1001/jama.2020.1585
4. Liang W, Guan W, Chen R, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. Lancet Oncol. 2020;21(3):335-7. doi: https://doi.org/10.1016/S1470-2045(20)30096-6
5. Thuler LCS, Melo AC. SARS-CoV-2/COVID-19 em pacientes com câncer. Rev Bras Cancerol. 2020;66(2):e-00970. doi: https://doi.org/10.32635/2176-9745.RBC.2020v66n2.970
6. Bergmann A, Fabro EN, Silva BA, et al. Survival of women with spinal compression syndrome due to bone metastasis secondary to breast cancer. Rev Neurocienc. 2014;22(2):195-200. doi: https://doi.org/10.4181/RNC.2014.22.02.923.6p
7. Desai A, Sachdeva S, Parekh T, et al. COVID-19 and cancer: lessons from a pooled meta-analysis. JCO Glob Oncol. 2020 Apr 6;(6):557-9. doi: https://doi.org/10.1200/GO.20.00097
8. Oudit GY, Kassiri Z, Jiang C, et al. SARS-coronavirus modulation of myocardial ACE2 expression and inflammation in patients with SARS. Eur J Clin Invest. 2009 Jul;39(7):618-25. doi: https://doi.org/10.1111/j.1365-2362.2009.02153.x
9. He F, Deng Y, Li W. Coronavirus disease 2019: what we know?. J Med Virol. 2020 Mar 14. doi: https://doi.org/10.1002/jmv.25766 Epub ahead of print. PubMed PMID: 32170865.
10. Gattinoni L, Chiumello D, Rossi S. COVID-19 pneumonia: ARDS or not?. Crit Care. 2020;24:154. doi: https://doi.org/10.1186/s13054-020-02880-z
11. Halaçli B, Kaya A, Topelì A. Critically ill COVID-19 patient. Turk J Med Sci. 2020 Apr 21;50:585-91. doi: https://doi.org/10.3906/sag-2004-122
12. Granger CL. Physiotherapy management of lung cancer. J Physiother. 2016;62(2):60-7. doi: https://doi.org/10.1016/j.jphys.2016.02.010
13. Lee DE, Brown JL, Rosa-Caldwell ME, et al. Cancer cachexia-induced muscle atrophy: evidence for alterations in microRNAs important for muscle size. Physiol Genomics. 2017 May 1;49(5):253-60. doi: https://doi.org/10.1152/physiolgenomics.00006.2017
14. Thomas P, Baldwin C, Bissett B, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. J Physiother. 2020;66(2):73-82. doi: https://doi.org/10.1016/j.jphys.2020.03.011
15. American College of Cardiology [Internet]. Washington, DC: American College of Cardiology; [2018]. Ellahham SH. Exercise before, during, and after cancer therapy; 2019 Dec 4 [cited 2020 May 1]. Available from: https://www.acc.org/latest-in-cardiology/articles/2019/12/04/08/22/exercise-before-during-and-after-cancer-therapy
16. Calabrò L, Peters S, Soria JC, et al. Challenges in lung cancer therapy during the COVID-19 pandemic. Lancet Respir Med. 2020 Apr 9. doi: https://doi.org/10.1016/S2213-2600(20)30170-3 Epub ahead of print. PubMed PMID: 32278368.
17. Marco P, Marco A. Marcadores biomoleculares en la tromboembolia asociada al cáncer. Med Clin (Barc). 2015 Jan 1;144(Suppl 1):21-5. doi: https://doi.org/10.1016/S0025-7753(15)30014-2
18. International Society on Thrombosis and Haemostasis [Internet]. Carrboro, NC: ISTH Academy; c2020. Hunt B, Retter A, McClintock C. Practical guidance for the prevention of thrombosis and management of coagulopathy and disseminated intravascular coagulation of patients infected with COVID-19; 2020 Mar 25 [cited 2020 May 1]. Available from: https://academy.isth.org/isth/2020/covid-19/290533/beverley.hunt.andrew.retter.26.claire.mcclintock.practical.guidance.for.the.html?f=menu%3D8%2Abrowseby%3D8%2Asortby%3D2%2Alabel%3D19794
19. Holwell A, McKenzie JL, Holmes M, et al. Venous thromboembolism prevention in patients undergoing colorectal surgery for cancer. ANZ J Surg. 2014 Apr;84(4):284-8. doi: https://doi.org/10.1111/ans.12296
20. Barber EL, Clarke-Pearson DL. Prevention of venous thromboembolism in gynecologic oncology surgery. Gynecol Oncol. 2017 Feb;144(2):420-7. doi: https://doi.org/10.1016/j.ygyno.2016.11.036
21. Madeddu C, Gramignano G, Astara G, et al. Pathogenesis and treatment options of cancer related anemia: perspective for a targeted mechanism-based approach. Front Physiol. 2018 Sep 20;9:1294. doi: https://doi.org/10.3389/fphys.2018.01294
22. Wenzhong L, Hualan L. COVID-19: attacks the 1-Beta Chain of Hemoglobin and captures the porphyrin to inhibit human heme metabolism. ChemRxiv [Preprint]. 2020 Apr 27. doi: https://doi.org/10.26434/chemrxiv.11938173.v8

23. Academy of Acute Care Physical Therapy. Laboratory Values Interpretation Resource [Internet]. Pittsburgh, PA: APTA; 2017. [cited 2020 May 1]. Available from: https://cdn.ymaws.com/www.acutept.org/resource/resmgr/docs/2017-Lab-Values-Resource.pdf

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