

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case report

Bilateral shoulder arthritis in COVID-19 patient after prolonged mechanical ventilation assist: a case report ^{☆,☆☆}

Teresa Resende Neves, MD^{a,b,*}, Ana Luísa Lourenço, MD^c, Pedro Alves, MD^d, Carlos Teiga, MD^e, António Proença Caetano, MD^{a,b}

^a Radiology Department, Hospital Curry Cabral, Centro Hospitalar Universitário de Lisboa Central (CHULC), 1069-166, Lisbon, Portugal

^b Nova Medical School, Faculdade de Ciências Médicas, Universidade Nova de Lisboa, Lisbon, Portugal

^c Radiology Department, Hospital de Santo António dos Capuchos, Centro Hospitalar Universitário de Lisboa Central (CHULC), 1069-166, Lisbon, Portugal

^d Radiology Department, Hospital de Dona Estefânia, Centro Hospitalar Universitário de Lisboa Central (CHULC), 1069-166, Lisbon, Portugal

^e Radiology Department, Hospital de Curry Cabral, Centro Hospitalar Universitário de Lisboa Central (CHULC), 1069-166, Lisbon, Portugal

ARTICLE INFO

Article history:

Received 18 June 2021

Revised 27 June 2021

Accepted 29 June 2021

Keywords:

Covid-19

SARS-CoV2

arthritis

immobilization

mechanical ventilation

musculoskeletal

ABSTRACT

Prolonged immobilization and, in particular, mechanical ventilation, have been linked to muscle atrophy. Anecdotal reports in the literature describe rhabdomyolysis as a potential late complication of COVID-19 infection which, in severe cases, may coexist with fluid collections. We report a case of a 28-year-old patient that had been recently hospitalized with SARS-CoV-2 pneumonia, with need for invasive ventilation support. Days after being discharged, the patient presents with retrosternal thoracalgia irradiating to the left upper limb. On physical examination, abduction and external rotation were limited due to pain complaints and there was soft tissue swelling of the corresponding shoulder and arm. Imaging evaluation was essential to establish the underlying condition, revealing bilateral arthritis communicating with large rotator cuff collections, which was considered of septic nature.

© 2021 Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

[☆] Acknowledgments: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

^{☆☆} Competing interests: The authors declare that there is no conflict of interest.

* Corresponding author.

E-mail address: teresaneves92@gmail.com (T.R. Neves).

<https://doi.org/10.1016/j.radcr.2021.06.085>

1930-0433/© 2021 Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Coronavirus disease-2019 (COVID-19), an atypical pneumonia caused by severe acute respiratory virus 2 (SARS-CoV-2), has emerged in 2019. Clinical findings in COVID-19 pneumonia go beyond the respiratory tract, which can be explained by the ubiquitous nature of its major entry receptor, angiotensin-converting enzyme 2 (ACE-2). ACE-2 is found in the endothelium of small vessels, bowel, smooth muscle, skeletal muscle and synovial tissue [1].

COVID-19 is mostly known for causing pulmonary manifestations, but can also result in multiple extra-pulmonary conditions [2,3]. Several reports in the literature have reported on cardiac, neurologic, abdominal, dermatological, ocular and, less commonly, musculoskeletal manifestations. Current musculoskeletal complications reported in patients with COVID-19 infection, however, are anecdotal.

Case report

A 28-year-old male patient, otherwise healthy, attended a health center with symptoms of fatigue, anosmia and dyspnea for progressively shorter efforts. SpO₂ levels were 55%, which improved to 75% with nasal cannula oxygen therapy.

The patient was hospitalized and evaluated at an emergency department. A chest radiography was ordered which revealed bilateral lung infiltrates. RT-PCR swab tested positive for SARS-CoV-2 infection and the patient was admitted in a COVID-19 infirmary unit.

Non-invasive ventilation support was unsuccessful and there was need for intubation and invasive mechanical ventilation with ventral *decubitus* positioning. Two days after admission, *Escherichia coli* and methicillin-sensitive *Staphylococcus aureus* were detected on sputum culture and confirmed superinfection, which led to prescription of an 8-day regimen of amoxicillin. Blood culture also revealed methicillin-resistant *Staphylococcus aureus*, which was dismissed.

There was steady clinical improvement in the subsequent days and the patient was extubated and eventually discharged.

Seven days later, however, the patient attended the emergency department of our hospital with complaints of retrosternal thoracalgia irradiating to the left upper limb, which had reportedly started shortly after transfer from the intensive care unit to the infirmary in the previous hospital.

On physical examination, abduction and external rotation were limited due to pain complaints. There was soft tissue swelling of the shoulder and arm, fever, and increased levels of C-reactive protein. Hemoculture and urine culture proved negative. A chest radiograph and thoracic CT were performed which showed typical changes compatible with sequelae of Covid-19 pneumonia (Fig. 1).

Due to poor progression of the condition, he was admitted for further investigation and treatment planning. Taking into account the previous blood culture that had been dismissed, gentamicin was prescribed and administered throughout the whole length of hospital stay.

Thoracic CT with intravenous contrast administration performed 9 days after admission revealed scapulohumeral synovitis, with multiple intra-muscular collections that showed continuity with the glenohumeral joint. On the right shoulder, there was also scapulohumeral synovitis and less pronounced joint fluid (Fig. 2).

Bilateral shoulder magnetic resonance imaging (MRI) with intravenous contrast administration was performed, due to persistent shoulder pain and weakness. Findings included infrapinatus fossa and subscapular fossa collections on the left shoulder, extending and communicating with the glenohumeral joint, with capsular thickening and increased signal intensity post-gadolinium administration (Fig. 3); the right shoulder showed similar changes but they were less pronounced. These features were suggestive of septic arthritis and rotator cuff collections, possibly associated with myonecrosis.

Aspiration of the infrapinatus fossa collection was performed and 20 cc of seropurulent fluid was sent for analysis. An 8,5 Fr drainage catheter was left on the left infrapinatus collection, but was removed the day after due to patient complaints of discomfort. Evaluation of the aspirate included both direct and culture tests for *Mycobacterium tuberculosis*, anaerobic and aerobic bacteria, which were negative.

There was some improvement of left shoulder range of motion, after physical rehabilitation exercises. Patient was eventually transferred to another hospital with indication to continue physical therapy and rehabilitation exercises.

Discussion

Prolonged immobilization and, in particular, mechanical ventilation, have been linked to muscle atrophy and considered a risk factor for development of heterotopic ossification around the shoulder [4,5,6].

Patients who survive after prolonged mechanical ventilation are prone to develop delirium, lung damage, muscle atrophy and weakness. Even after resolution of the pulmonary symptoms, reconstitution of normal cognitive and physical aptitude requires a long-term rehabilitation process, where physical and occupational therapists play a fundamental role [2].

A potential late complication of COVID-19 infection is rhabdomyolysis [7,8], a life-threatening condition with a diagnosis that is mainly clinical, manifesting as myalgia, fatigue, pigmenturia and acute renal failure [9]. Imaging findings include enlargement of the affected muscles, which may be heterogeneous and hypodense on CT.

MRI is the best modality to depict extent and severity of injury, with hyperintense signal on fluid-sensitive sequences and heterogeneous enhancement following intravenous contrast administration [10]. An alternative presentation may show rim enhancement. In severe cases, myonecrosis may coexist in the form of small heterogeneous muscle foci with hyperintense signal on fluid-sensitive sequences with rim enhancement.

Aside from rhabdomyolysis, a few cases of arthritis associated with COVID-19 infection have been reported

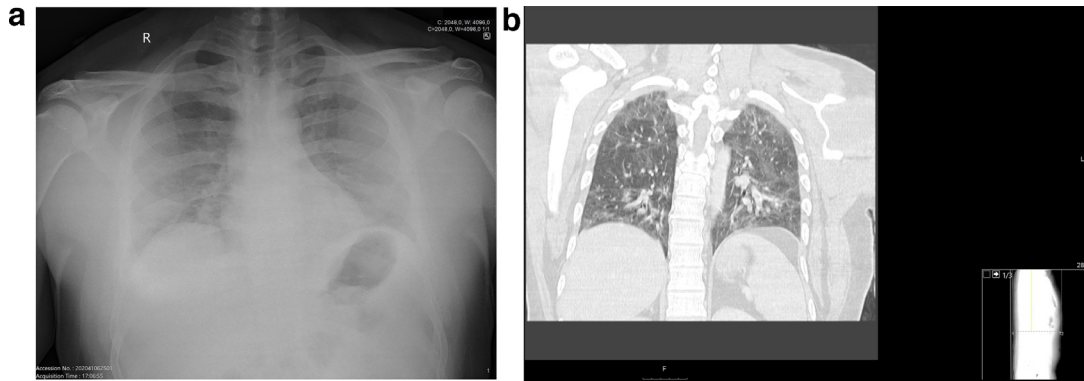


Fig. 1 – Chest x-ray (A) and thoracic CT (B) performed at admission at our hospital show typical findings of COVID-19 pneumonia, namely bilateral peripheral ground glass opacities with greater involvement of the lower lobes.

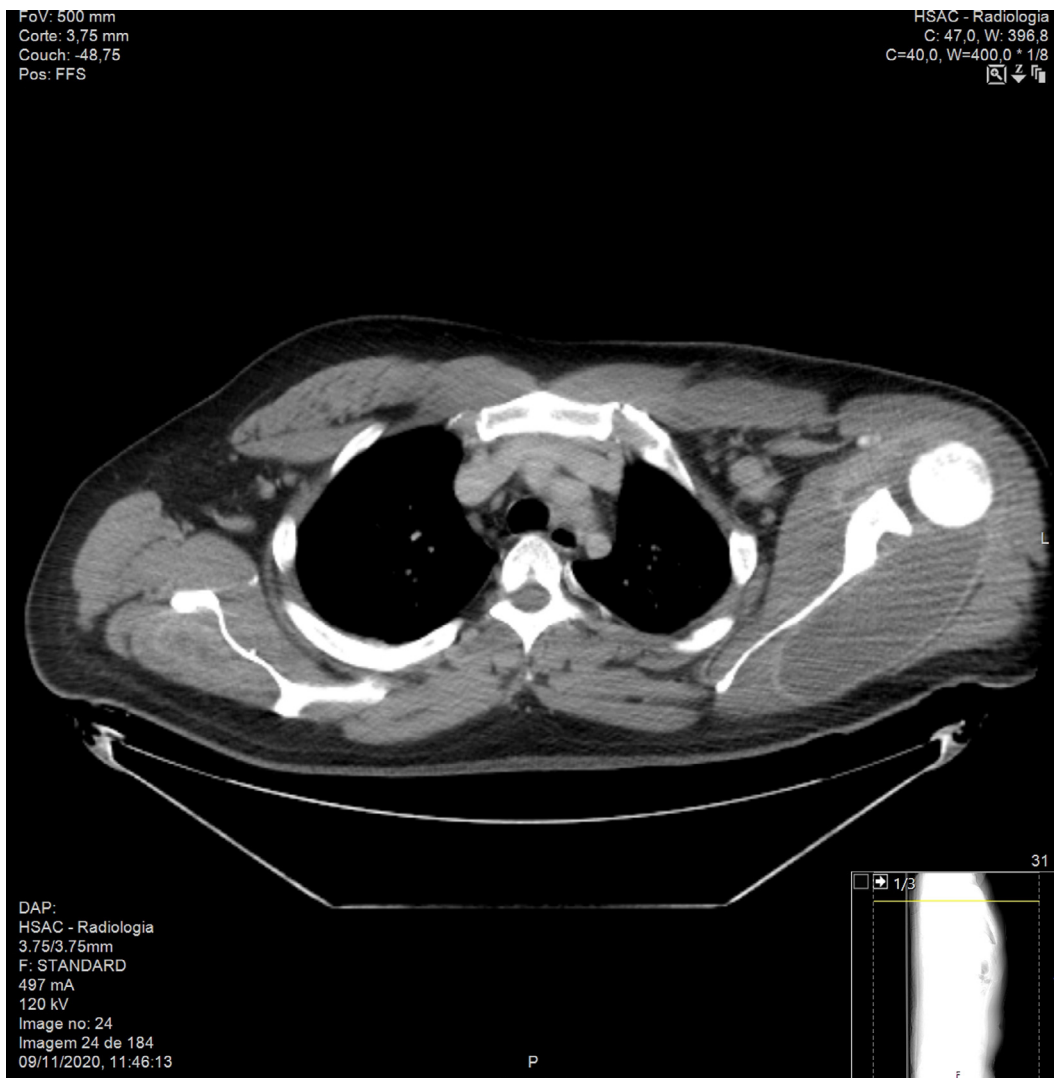


Fig. 2 – Post-contrast Thoracic CT (axial view) performed 9 d after admission at our hospital reveals rotator cuff collections and glenohumeral joint fluid with capsule enhancement on the left shoulder. There is some heterogeneity and enhancement of the right infraspinatus muscle.

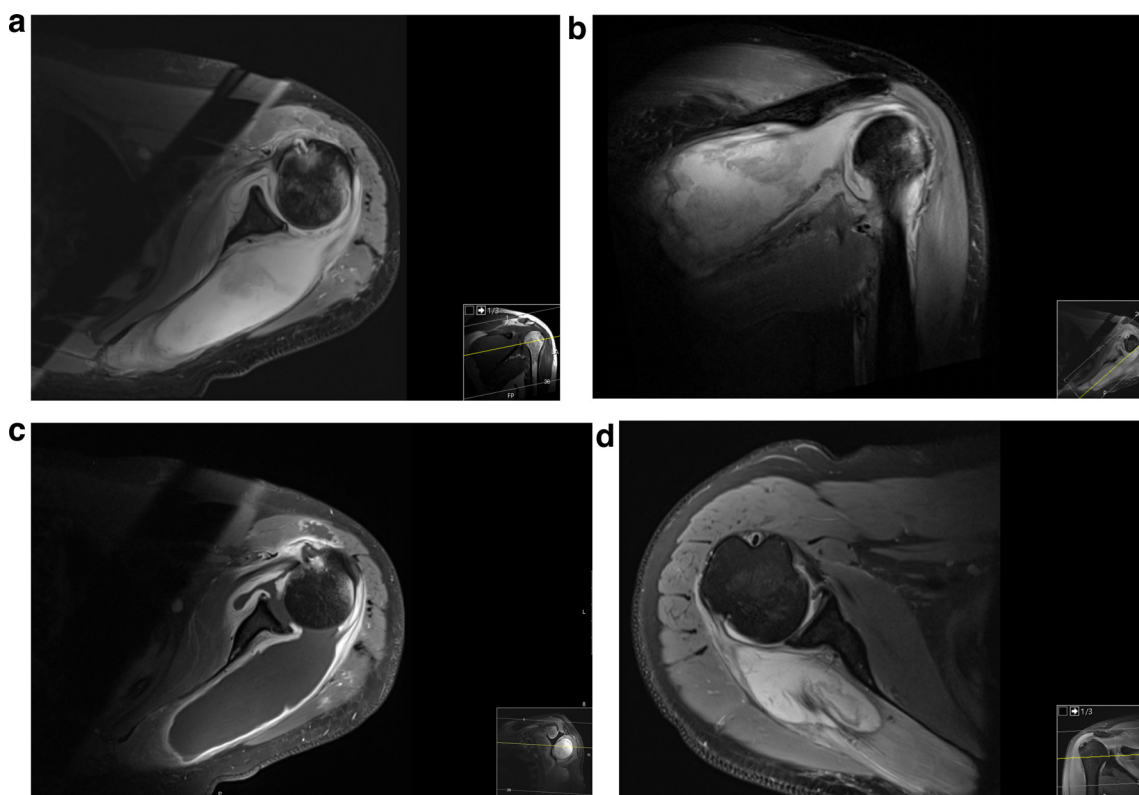


Fig. 3 – Axial (A), coronal (B) fat-saturated PD and axialpost-contrast fat-saturated T1-weighted (C) MRI performed 12 days after admission to our hospital shows a large left shoulder rotator cuff collection communicating with the glenohumeral joint, which is distended with fluid and demonstrates capsule hyperenhancement compatible with synovitis. Axial fat-saturated PD MRI of the right shoulder (D) demonstrates similar but less pronounced findings on the left shoulder.

[11–16]. Indeed, a systematic review of rheumatologic findings in COVID-19 patients concludes that muscle pain and fatigue are present in 19% and 32% of patients as an initial presentation, with an overall prevalence of 16% and 36% throughout the course of the disease, respectively [17]. Recent reports claim that arthralgia is present in about 2,5% of patients affected by this disease. [18] Furthermore, there have been some reports regarding triggering of chronic rheumatologic diseases by COVID-19 infection, which will have features that are characteristic of the underlying condition, in the majority of cases [18]. Serological and joint fluid tests help to exclude other causes of arthropathy [18], since, to the best of our knowledge, there is no characteristic imaging feature of COVID-19 induced arthralgia.

Regarding our case, the patient had no known arthropathy, there were no previous shoulder problems or episodes of arthritis reported. No causative agent was detected, but he was under an antibiotic regimen, which may have affected lab results. Ultimately, the cause of bilateral shoulder arthritis remained unknown, but was presumed of septic nature and treated accordingly.

Patient consent

Written informed consent was obtained from the patient.

REFERENCES

- [1] Li MY, Li L, Zhang Y, Wang XS. Expression of the SARS-CoV-2 cell receptor gene ACE2 in a wide variety of human tissues. *Infect Dis Poverty* 2020;9(1):45.
- [2] Revzin MV, Raza S, Srivastava NC, Warshawsky R, D'Agostino C, Malhotra A, et al. Multisystem imaging manifestations of COVID-19, Part 2: from cardiac complications to pediatric manifestations. *Radiographics* 2020;40:1866–92.
- [3] Wang T, Du Z, Zhu F, et al. Comorbidities and multiorgan injuries in the treatment of COVID-19. *Lancet* 2020;395(10228):e52.
- [4] Van Lotten ML, Schreinemakers JR, van Noort A, Rademakers MV. Bilateral scapulohumeral ankylosis after prolonged mechanical ventilation. *Clin Orthop Surg* 2016;8:339–44.
- [5] Christakou A, Alimatiri M, Kouvarakos A, et al. Heterotopic ossification in critical ill patients: a review. *Int J Physiother Res* 2013;1(4):188–95.
- [6] Nauth A, Giles E, Potter BK, et al. Heterotopic ossification in orthopaedic trauma. *J Orthop Trauma* 2012;26(12):684–8.
- [7] Suwanwongse K, Shabarek N. Rhabdomyolysis as a presentation of 2019 novel coronavirus disease. *Cureus* 2020;12(4):e7561.
- [8] Jin M, Tong Q. Rhabdomyolysis as potential late complication associated with COVID-19. *Emerg Infect Dis* 2020;26(7):1618–20.
- [9] Ashraf O, Young M, Malik KJ, Cheema T. Systemic

- complications of COVID-19. *Crit Care Nurs Q* 2020;43(4):390–9.
- [10] Moratalla MB, Braun P, Fornas GM. Importance of MRI in the diagnosis and treatment of rhabdomyolysis. *Eur J Radiol* 2008;65(2):311–15.
- [11] Novelli L, Motta F, Ceribelli A, Guidelli GM, Luciano N, Isailovic N, et al. A case of psoriatic arthritis triggered by SARS-CoV-2 infection. *Rheumatology* 2020;60(1):e21–3.
- [12] Saricaoglu EM, Hasanoglu I, Guner R. The first reactive arthritis case associated with COVID-19. *J Med Virol* 2020 (in press).
- [13] De Stefano L, Rossi S, Montecucco C, Bugatti S. Transient monoarthritis and psoriatic skin lesions following COVID-19. *Ann Rheum Dis* 2020 (in press).
- [14] Talarico R, Stagnaro C, Ferro F, Carli L, Mosca M. Symmetric peripheral polyarthritis developed during SARS-CoV-2 infection. *Lancet Rheumatol* 2020;2:e518–19.
- [15] Alivernini S, Cingolani A, Gessi M, Paglionico A, Pasciuto G, Tolusso B, et al. Comparative analysis of synovial inflammation after SARS-CoV-2 infection. *Ann Rheum Dis* 2020 (in press).
- [16] Ono K, Kishimoto M, Shimasaki T, et al. Reactive arthritis after COVID-19 infection. *RMD Open* 2020;6(2):1–4 e001350.
- [17] Ciaffi J, Meliconi R, Ruscitti P, Berardicurti O, Giacomelli R, Ursini F. Rheumatic manifestations of COVID-19: a systematic review and meta-analysis. *BMC Rheumatology* 2020;4:65.
- [18] Ramani S, Samet J, Franz C, Hsieh C, Nguyen C, Horbinski C, et al. Musculoskeletal involvement of COVID-19: review of imaging. *Skelet Radiol* 2021;1:1–11.