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# Association between SARS-CoV-2 infection and spondylodiscitis: case report and literature review

## *Asociación entre infección por SARS-CoV-2 y espondilodiscitis: reporte de caso y revisión de la literatura*

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spondylodiscitis, infection, COVID, bacteriaemia, bacteria.

### Palabras clave:

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### ABSTRACT

SARS-CoV-2 infection has taken on global relevance as a result of the past pandemic, due to its high prevalence and its importance as a public health problem, a way has been sought to carry out actions aimed at this problem, therefore, measures have been taken. Found multiple associations of this disease with other pathologies, as well as complications associated with the same disease, in this case, we present the association between a 63-year-old male patient who was in hospital with SARS-CoV-2 infection and spondylodiscitis. According to the pathophysiology of spondylodiscitis, it has been related to multiple infectious agents, already known to cause said disease; however, until now, finding an association with the SARS-CoV-2 virus is not a frequent situation, which is why it is this is considered important in order to, as we mentioned previously, being a public health problem, making it necessary to find new treatments and new management to reduce the morbidity and mortality caused by these diseases, which we hope will have an impact significant in the new management.

### RESUMEN

*La infección por SARS-CoV-2 ha tomado relevancia mundial a raíz de la pasada pandemia; debido a su alta prevalencia y su importancia como problema de salud pública, se ha buscado la manera de realizar acciones dirigidas a este problema, por lo que se han tomado medidas. En múltiples estudios se han encontrado asociaciones de esta enfermedad con otras patologías, así como complicaciones asociadas a la misma enfermedad, en este caso presentamos la asociación entre un paciente masculino de 63 años que se encontraba hospitalizado con infección por SARS-CoV-2 y espondilodiscitis. Según la fisiopatología de la espondilodiscitis, se ha relacionado con múltiples agentes infecciosos ya conocidos; sin embargo, hasta el momento, encontrar esta asociación con el virus SARS-CoV-2 no es una situación frecuente, por lo que se considera importante continuar con investigaciones a futuro de espondilodiscitis asociada a SARS-CoV-2, y con esto encontrar nuevos tratamientos y una nueva gestión para reducir la morbilidad causada por estas enfermedades.*

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## INTRODUCTION

Spondylodiscitis is a rare infection of the spine, affecting the vertebrae and intervertebral discs.<sup>1</sup> Its incidence has been increasing due to the increase in spinal surgical procedures. It presents a non-specific clinical picture, which causes delays in diagnosis and therapy. Treatment consists of long periods of broad-spectrum intravenous antibiotic therapy.<sup>2</sup> Among the predisposing diseases are diabetes mellitus, immunosuppressive diseases, and neoplasms.<sup>3,4</sup> Various etiologies have been described: hematogenous, post-surgical, and post-traumatic, due to contiguity, with the most commonly isolated microorganism being *Staphylococcus aureus*.<sup>5</sup>

The bacteria reach the space between two adjacent vertebrae, where the initial focus is established, which subsequently extends to the intervertebral disc and the epidural or paravertebral spaces. It is more frequent in the lumbar spine, followed by the thoracic and cervical.<sup>3,4</sup>

The coronavirus disease (COVID-19) pandemic has had a devastating global impact in recent years. It has been associated with a large number of symptoms, even weeks after acute infection.<sup>6,7</sup> Post-acute COVID-19 sequelae syndrome has been reported, as well as post-COVID-19 secondary infections, which may be different from multi-organ bacterial infections.<sup>8</sup>

It is estimated that between 10 and 20% of patients who tested positive for SARS-CoV-2 continue with

symptoms for more than three weeks and some even for 5% months.<sup>6</sup>

## CASE PRESENTATION

Male, 63 years old, 3 vaccines against SARS-CoV-2, without chronic degenerative diseases.

The condition began in July 2023 with chills, unquantified fever, myalgias, and arthralgias. Two days after the onset, low back pain was added with an intensity of 7/10 VAS, progressive, without irradiation, until difficulty standing, adding paresthesias in the left pelvic limb and increase in low back pain up to 9/10 VAS.

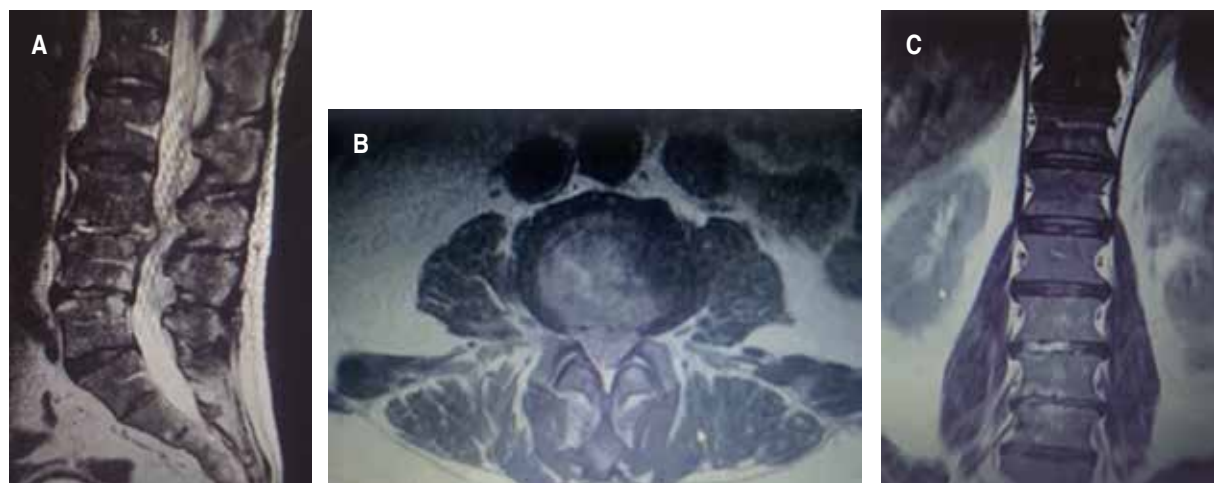
Targeted EF: BP: 130/70 mmHg, HR: 86' RR: 16'. Preserved muscle strength 5/5 in all 4 extremities, muscle stretch reflexes ++, no neurological deficits. Preserved sensitivity in all its modalities, no signs of meningeal irritation, and sphincter control.

Laboratory hematic biometry with Hb: 14, Leu: 17.66, ESR: 50, CRP: 23.64

T2-weighted lumbar spine magnetic resonance imaging (MRI) is performed (*Figure 1*).

It was decided to perform a percutaneous biopsy (*Figure 2*). A negative result is no bacterial growth. Empirical treatment with vancomycin was initiated by the infectious diseases service.

Evolving with quantified febrile peaks of 38.8 °C, with myalgias and arthralgias, increased values of acute phase reactants, ESR: 57, CRP: 83.6, re-evaluated by



**Figure 1:** **A)** Sagittal: hyperintense image at L3-L4 and posterior protrusion towards the spinal canal. **B)** Axial: disc with heterogeneous characteristics with hyperintensity, iso- and hypointensities, and facet synovitis. **C)** Coronal: L3-L4 intervertebral disc with right anterior hyperintensity. Psoas bilaterally without alterations.

infectology, establishing diagnosis with SARS-CoV-2 antigen and antibodies.

He is isolated with respiratory safety measures and continues with a regimen of broad-spectrum empirical antibiotics aimed at spondylodiscitis, analgesics, and neuromodulators.

Presenting poor evolution, and persistence of symptoms, without progression of motor or sensory deficit, we requested a new control lumbar spine MRI (8 days after admission) (Figure 3).

Broad-spectrum antibiotic therapy, meropenem and linezolid, was escalated, and vancomycin was suspended. Progressing satisfactorily, pain decreased, walking. A new control lumbar spine MRI is requested at the end of the antibiotic regimen (Figure 4).

With clinical and imaging improvement, vital signs BP: 120/75 mmHg, HR: 78', RR: 14', it was decided to discharge him with oral antibiotics (Linezolid 14 days) indicated by the Infectious Diseases Service.

## DISCUSSION

Spondylodiscitis can be caused by a wide variety of microorganisms, with *S. aureus* being the most common bacteria, responsible for 40-65% of cases, followed by *E. coli*, *Proteus sp*, and *Pseudomonas*. The clinical course is usually nonspecific, with general symptoms, which causes delays in diagnosis and treatment. It usually has a subacute course, characterized by constant, non-specific low back pain, fever is rare, and neurological deficits may occur, radiculopathies if the nerve roots are affected, decreased mobility, urinary retention, and paresis.<sup>4,9</sup>

Most patients present elevated acute phase reactants (ESR, CRP, procalcitonin), presenting with or without leukocytosis.<sup>10</sup> Nuclear magnetic resonance is the imaging study with the most sensitivity and specificity for this pathology, being able to find as an imaging finding hypo intensity in the vertebral body and intervertebral disc (T1 weighting), hyperintensity in the vertebral body and intervertebral disc (T2 weighting), enhancement to the application of gadolinium in the vertebral body and intervertebral disc, loss of definition of the platforms of the affected vertebral body, enhancement in affected soft tissues.<sup>11</sup>

A blood culture should be performed on all patients with suspected spondylodiscitis, with only 25-70% of these being positive.<sup>12</sup> If negative, a percutaneous biopsy of the vertebral tissue is indicated, reserving the taking of an open biopsy if it cannot be performed. percutaneous.<sup>13</sup>

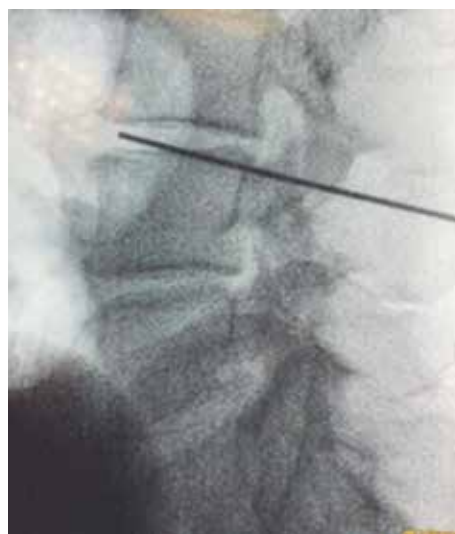


Figure 2: Sagittal view: transpedicular percutaneous fluoroscopy.

Antimicrobials have little penetration into bone tissue, due to the physiology of osteomyelitis (inflammation, ischemia, necrosis, bone sequestration), so treatment at high doses with broad-spectrum antibiotics is necessary, initially being empirical treatment while obtaining crop results. Once the etiological diagnosis is established, the antimicrobial regimen must be modified based on the antibiogram.<sup>14</sup> Most studies recommend a duration of antibiotic treatment for a period of 4-6 weeks, which can be taken up to 8 weeks in cases of bone destruction or abscesses.<sup>15,16</sup>

Surgical treatment is reserved for cases in which it is necessary to debride soft tissues, to improve tissue perfusion and ensure the stability of the spine. Rest is usually necessary due to the intense pain that patients experience when moving, requiring anti-inflammatory management and even opiates for 1 or 2 weeks.

The prognosis is usually variable, most patients present chronic pain, with a high rate of relapses, especially in the face of abscesses, as well as in the association with SARS-CoV-2.<sup>17</sup>

Spondylodiscitis should be considered among the comorbidities of patients with COVID-19 who present low back pain among their symptoms.<sup>18</sup>

The possible predisposing condition that increased the risk of acquiring Spondylodiscitis was SARS-CoV-2 infection, which occurred before the onset of musculoskeletal signs and symptoms (Figure 5).<sup>19</sup> In the medical literature, knowledge about the association between SARS-CoV-2 infection and spondylodiscitis is limited,<sup>20</sup> although there are studies that report data

on patients with coinfection or with COVID-19 and a history of spondylodiscitis.<sup>21</sup>

We present the case of a patient in whom both infections were associated simultaneously. Secondary bacterial infections associated with respiratory viral infections are well described and are known to cause increased morbidity and mortality. Specifically, among patients infected with a respiratory viral infection, bacteremia has been associated with a mortality close

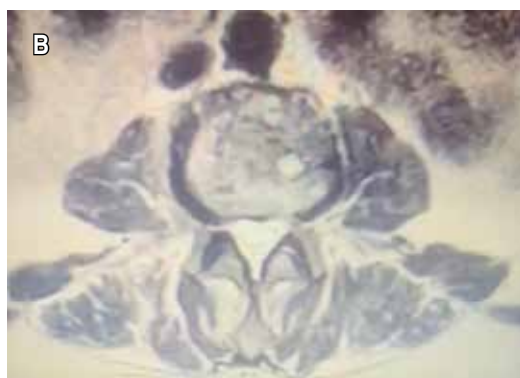
to 50%, compared to 1.4% in patients with a viral infection without bacteremia.<sup>22,23</sup>

The bacterial species mainly associated with viral infections are *Mycoplasma pneumoniae*, *Staphylococcus aureus*, *Legionella pneumophila*, *Streptococcus pneumoniae*, *Haemophilus* and *Klebsiella*.<sup>24,25</sup> In our case, there was no bacterial development, however, with elevation of acute phase reactants, image compatible with spondylodiscitis by

**Figure 3:**

Magnetic resonance imaging control. **A)** Sagittal T2: hyperintense image at L3-L4.

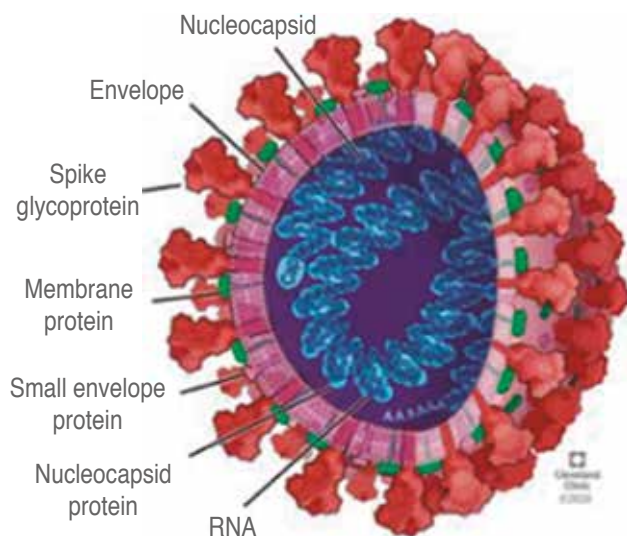
**B)** Axial T2: heterogeneous image, with hypo and hyperintensity at the level of the L3-L4 intervertebral disc and increased right posterolateral volume.



**Figure 4:**

Magnetic resonance imaging control. **A)** Sagittal T2: improvement of hyperintensity in L3-L4. **B)** Axial T2: resolution of the posterolateral volume increases towards the spinal canal.





**Figure 5:** SARS-CoV-2 structure.<sup>26</sup>

RNA = Ribonucleic acid.

magnetic resonance, as well as response to broad-spectrum antibiotic therapy, secondary bacterial infection was determined.<sup>27</sup>

Epidemiological studies are currently being carried out on bacterial infections in patients with COVID-19, especially bacteremias.<sup>28</sup>

In addition, an increasing incidence of these coinfections is being observed in patients with COVID-19 who have been admitted to intensive care units, as well as higher rates of infection by multidrug-resistant nosocomial bacteria,<sup>29</sup> highlighting the need to pay special attention to the use of broad-spectrum empirical treatments in patients with COVID-19.<sup>30</sup>

## CONCLUSIONS

Post-COVID-19 bacterial superinfections should have important medical consideration, particularly when associated with multiple comorbidities. In patients with chronic nonspecific low back pain without response to medical treatment and with respiratory symptoms and/or fever, testing for COVID-19 should be considered.

Multidisciplinary management is essential for the correct diagnostic and therapeutic approach in this type of pathology.

The association between COVID-19 and spondylodiscitis is uncertain, however, it presents potential mechanisms, such as elevation of acute phase reactants, symptoms due to chronic periods, and non-specific symptoms. More correlation studies

between spondylodiscitis and SARS-CoV-2 are necessary to determine a correct association between both entities.

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