INFECTIOUS SPONDYLODISCITIS: HAS THERE BEEN ANY EVOLUTION IN THE DIAGNOSTIC AND TREATMENT OUTCOMES?

ESPONDILODISCITE INFECCIOSA: HOUVE EVOLUÇÃO NOS RESULTADOS DO DIAGNÓSTICO E TRATAMENTO?

¿ESPONDILODISCITIS INFECCIOSA: HUBO EVOLUCIÓN EN LOS RESULTADOS DEL DIAGNÓSTICO Y TRATAMIENTO?

Carlos Fernando Pereira da Silva Herrero[1], Anderson Luís do Nascimento[1], Rafael Pinheiro Cunha[1], João Paço Vaz de Souza[1], Marcelo Henrique Nogueira-Barbosa, Helton Luiz Aparecido Defino[1].

ABSTRACT

Objective: To evaluate the clinical and radiological results of treatment of patients with spondylodiscitis. Methods: Imaging exams used in this study were plain radiographs and magnetic resonance imaging of the spine. Results: Data from 33 patients, 10 (30.3%) females and 23 (69.7%) males were evaluated. The average time to diagnosis was four months and 28 days (SD ± 1 month and 28 days) and 19 patients (57.5%) presented neurological deficit. Surgical treatment was performed in 22 patients (66.6%) and three patients (9.1%) had complications from the surgery. Conclusions: Despite technological advances in complementary exams, early diagnosis of spondylodiscitis remains a challenge. However, drug treatment associated with surgery shows good results.

Keywords: Discitis; Spine; Spinal fusion; Diagnosis; Neurologic manifestations.

RESUMO

Objetivo: Avaliar os resultados clínicos e radiológicos do tratamento de pacientes portadores de espondilodiscite. Métodos: Os exames de imagem utilizados neste estudo foram radiografias simples e ressonância magnética da coluna vertebral. Resultados: Foram avaliados os dados de 33 pacientes, sendo 10 (30,3%) do sexo feminino e 23 (69,7%) do sexo masculino. O tempo médio gasto para o diagnóstico foi de 4 meses e 28 dias (DP ± 1 mês e 28 dias) e 19 pacientes (57,5%) apresentavam déficit neurológico. O tratamento cirúrgico foi realizado em 22 pacientes (66,6%) e três pacientes (9,1%) apresentaram complicações decorrentes do tratamento cirúrgico. Conclusões: Apesar do avanço tecnológico nos exames complementares, o diagnóstico precoce da espondilodiscite continua sendo um desafio. No entanto, o tratamento medicamentoso associado ao procedimento cirúrgico apresenta bons resultados.

Descritores: Discite; Coluna vertebral; Fusão vertebral; Diagnóstico; Manifestações neurológicas.

RESUMEN

Objetivo: Evaluar los resultados clínicos y radiológicos de tratamiento de pacientes con espondilodiscitis. Métodos: Las pruebas de imagen utilizadas en este estudio fueron las radiografías simples y resonancia magnética de la columna vertebral. Resultados: Los datos de 33 pacientes, 10 (30,3 %) del sexo femenino y 23 (69,7%) del sexo masculino fueron evaluados. El tiempo medio hasta el diagnóstico fue de 4 meses y 28 días (DE ± 1 mes y 28 días) y 19 pacientes (57,5%) tuvieron déficit neurológico. El tratamiento quirúrgico se realizó en 22 (66,6%) pacientes y 3 (9,1%) tuvieron complicaciones de la cirugía. Conclusiones: A pesar de los avances tecnológicos en los exámenes complementares, el diagnóstico precoz de espondilodiscitis sigue siendo un desafío. Sin embargo, el tratamiento farmacológico asociado con la cirugía presenta buenos resultados.

Descriptores: Discitis; Columna vertebral; Fusión vertebral; Diagnóstico; Déficits neurológicos.

INTRODUCTION

Spondylodiscitis is the term used to describe an infection that affects the intervertebral disc, vertebral body, or posterior arch of the vertebra. It is a disease with insidious onset and slow evolution, and with the presentation of vague symptoms (pain and fever), making early diagnosis difficult.[1] Treatment involves the administration of medications and surgical intervention by stabilization of the spine and removal of the infected tissue.[1]

The annual incidence of spondylodiscitis varies from 0.5 to 2.5 cases per 100,000 people and, despite its uncommon occurrence, there has been an increase as a result of improved diagnostic techniques,[2] the use of intravenous drugs, and invasive spinal procedures.[3] Advances in diagnostic and surgical techniques, combined with the evolution of antibiotic therapy, are responsible for reductions in the morbidity and mortality of the disease.[1] However, early diagnosis and determination of the ideal treatment are still challenges.

The objective of this article is to evaluate the clinical and radiological presentation, pathogens, treatment, and complications associated with pyogenic infections of the spine.

MATERIAL AND METHODS

This is a retrospective observational study of patients diagnosed with pyogenic infection of the spine treated by the spine surgery team of the Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto during the period from 1984 to 2013. Following approval by the local Research Ethics Committee, the study was conducted

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by means of a review of the medical histories and imaging exams of the Medical Archives Service (SAME) of the same hospital.

The patients were included if they had an illness compatible with vertebral infection and evidence of its involvement, in simple radiographs or magnetic resonance. The diagnosis was considered definitive when the organism was isolated from material from the affected vertebra, the intervertebral disc space, or an epidural abscess; when the blood culture results were positive; or when the image exams presented no doubt after evaluation by an expert radiologist. Patients who did not meet any of the above criteria, and any patients with infections following spine surgery, were excluded from the study.

The clinical evaluation included patient age, sex, signs and symptoms at initial presentation, time elapsed from the initial symptoms to the first consultation in our hospital, the presence of associated comorbidities, laboratory exams before and after treatment, the type of treatment administered, and complications resulting from the infection and the treatment.

The imaging exams used in this study were simple radiographs and/or magnetic resonance of the spine.

As this is a retrospective study, the follow-up considered in the evaluation of the outcome was the last patient consultation recorded in the medical records in our service. The outcome was classified as follows:

• Excellent: survival and disappearance of all signs and symptoms of infection, without the presence of dysfunction;

• Good: survival and disappearance of all signs and symptoms of infection, but with mild residual dysfunction that does not prevent the patient from performing normal daily tasks;

• Fair: survival and disappearance of all signs and symptoms of infection, but with residual dysfunction that prevents the patient from performing normal daily activities;

• Poor: in cases of persistent infection or death.

The data were entered into a spreadsheet and the results were presented as percentages. Statistical analysis was performed using the software SAS JMP®.

RESULTS

The data from 33 patients, 10 females (30.3%) and 23 males (69.7%) were evaluated. The age at presentation ranged from 11 to 82 years, with an average age of 52 years and 11 months (SD+/-5.45). All cases were diagnosed as spondylodiscitis. The first symptom was chronic low back pain in 13 patients (39%), low back pain and sciatica in seven patients (21%), back pain in six patients (18%), and neck pain in only two patients (6%), i.e., 28 patients (85%) presented pain in the affected spinal region as the initial sign. Other initial symptoms were reported by only five patients (15%). (Figure 1)
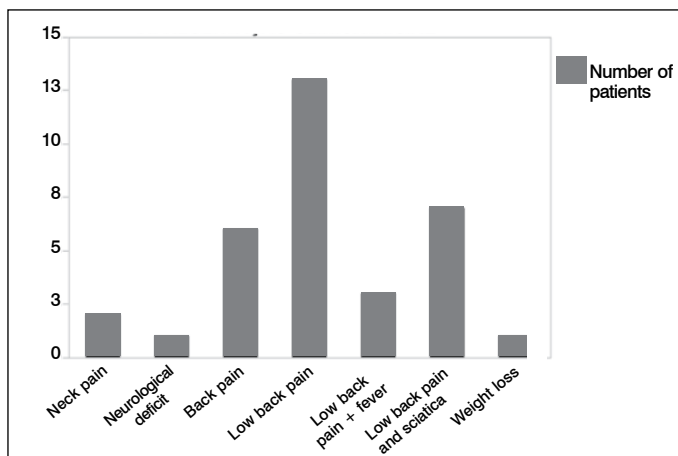
Only nine (27.2%) of the cases of spondylodiscitis were diagnosed within the first 2 months following the onset of symptoms. The time between the onset of symptoms and the first visit to our service ranged from 7 days to 24 months, with an average of 4 months and 28 days. (Figure 2)

At the time of the first visit, 19 patients (57.5%) presented neurological deficit caused by compression of the spinal cord, with paraplegia in three (15.7% of the patients with deficit), cauda equina in two (10.5% of the patients with deficit), and by isolated compression of the roots in 14 (73.6% of the patients with deficit). The frequency of neurological changes was higher in patients with infection of the thoracic spine with 7 patients (21.2%), followed in descending order by the lumbar spine (18.1%), the lumbosacral transition (6%), the cervical transition (6%), the thoracolumbar and sacral spine (6.1% each).

Regarding comorbidities, nine patients had diabetes *mellitus*, the most frequent concomitant disease. Six patients (18.1%) were chronic alcoholics. Approximately 67% of the patients presented two or more comorbidities, but only 9.1% had previously been diagnosed with neoplasia.

None of the patients in our study acquired the infection in the hospital, i.e., they did not develop the infection following a surgical procedure such as discography, epidural catheterization, or blocks for the treatment of pain. In 24 of the patients with discitis, the focus of the infection was apparently hematogenic. The most common sites of entry were the urinary tract (33.3%), the skin (24.2%), the gastrointestinal tract (21.2%), lung infection (15.1%), and endocarditis (3%) of the patients with infection in other foci.

The locations of the lesions by segment and level are shown in Figures 3 and 4, respectively. The infection generally involved two or more contiguous vertebral bodies and the intervening intervertebral disc space. The involvement of non-contiguous vertebrae occurred in one case. In 12 cases (36.3%), the infection affected only one segment. In six cases (18.1%), the infection affected more than one adjacent segment. In two patients (6%), the infection affected a single vertebra, with collapse of the vertebral body, similar to that caused by compression fractures.

Cultures of specimens obtained by percutaneous CT or biopsy of the spine, intervertebral disc, or paravertebral abscess were positive, and specimens of bacteria were identified in 24 (72.7%) of the patients. (Figure 5) The most commonly encountered pathogen was *Staphylococcus aureus*. (Figure 4)

The leukocyte count was determined for all patients, while the erythrocyte sedimentation rate (ESR) was determined for 31 (93.9%) of the patients, with a higher than normal value (10) in all patients. The C-reactive protein (CRP) value was determined for 21 patients (63.6%), with a higher than normal value in 19 (90.4% of the patients with exam results). Only 12 (36.3%) of the 31 patients had high leukocyte counts.

Definitive drug therapy was used in 25 (75.7%) of the patients. We define definitive antibiotic therapy as medication administered according to the results of a sensitivity profile of the etiological agent to specific drugs. Surgical treatment was performed in 22 patients (66.6%), debridement and anterior arthrodesis with autologous graft, in combination with posterior fixation, being the technique of choice
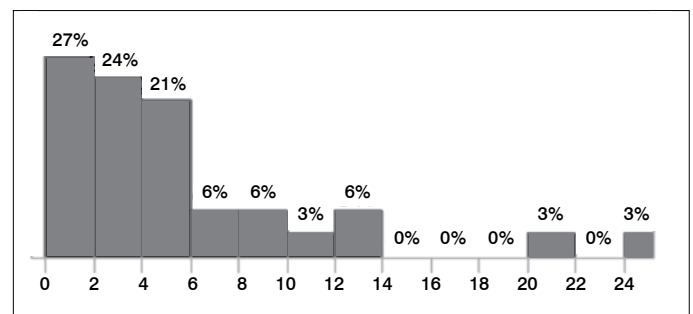

Figure 1. Initial clinical presentation.

Figure 2. Distribution of time of first visit with percentage of visits *vs.* months.

used. Removal of the infected tissue was performed using a combined anterior and posterior approach in 11 patients. In nine patients only the posterolateral approach was used and in two patients, only drainage of the abscess was performed.

Surgical complications occurred in only three patients, which were cases of worsening symptoms of an already weakened clinical profile, one of which resulted in death, making a total of 9.1% with complications.
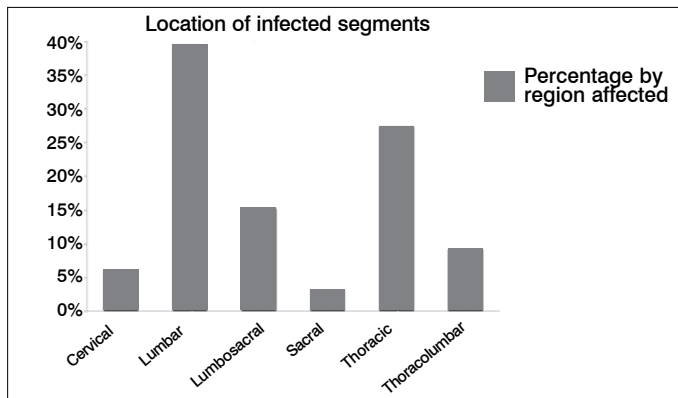

Figure 3. Distribution of percentages of cases by region of the spine affected.
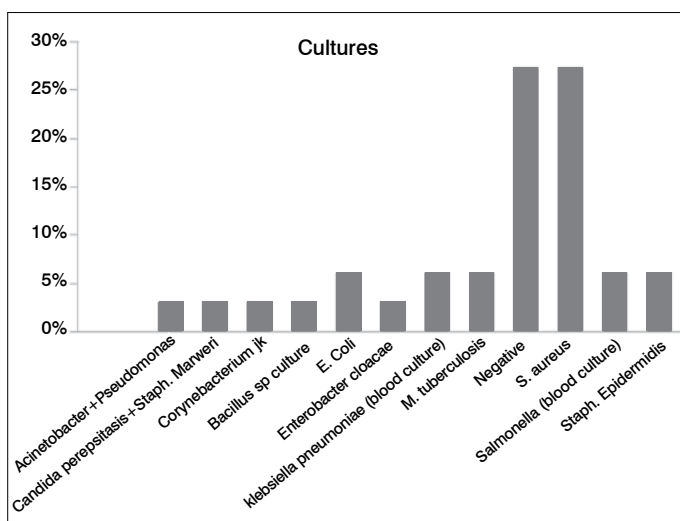

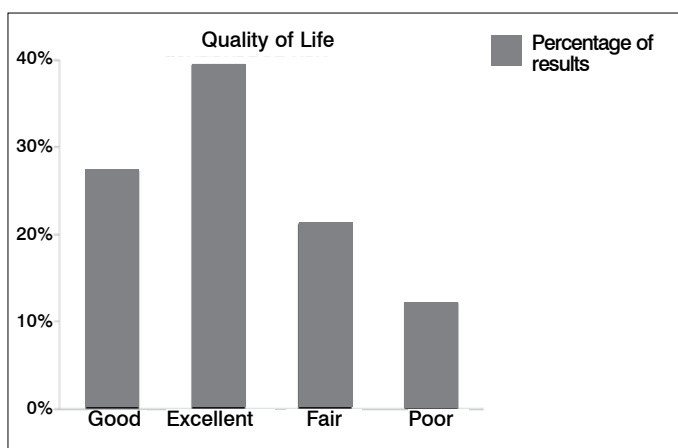**Figure 4.** Distribution of the results of the cultures and bacterial agents isolated in the cases studied.

Figure 5. Distribution of post-treatment quality of life in the cases studied expressed as percentages.

DISCUSSION

Although retrospective, our study allowed the evaluation and adequate follow-up of the patients, with the careful description of medical data from the valuable Medical Archives Service (SAME) database. It therefore enabled significant conclusions to be drawn.

Although rare, spondylodiscitis is the primary manifestation of hematogenic osteomyelitis in patients aged over 50[4,5] and accounts for 3% to 5% of all cases of osteomyelitis. In our series, 66.6% of the patients were over 50 years of age, with an average age of 52 years and 11 months. The predominance in males in this case series (72.7%) is in line with the results found in the literature. Other studies report incidences ranging from 51% to 81%.[6,7]

Despite the significant technological advances in diagnostic tests, the major challenge of pyogenic infection of the spine continues to be early diagnosis. This was evidenced by the average of 4 months and 28 days elapsed from the onset of symptoms to a diagnosis and the beginning of treatment. In other studies, the period was 1 month and 24 days.[8] Based on the initial findings, the most frequently present symptom was pain, in 31 patients (94%), followed by neurological deficit in 19 patients (57.5%). The proportion of patients with neurological deficit was 32% higher than that reported in previous studies.[8]

Blood cultures were positive in 24 patients (72.7%), similar to the results reported by other studies.[9-12] There is evidence that the rate of positive tests can be increased if cultures are collected during the peak temperature increase, or following percutaneous biopsy of the infected disc.[13-15] In our study, the most commonly isolated etiological agent was *Staphylococcus aureus* (27%), while in the literature the predominance of this bacteria reached between 42% and 84%.[16] The pathogen can infect the spine in three ways: hematogenically, via direct inoculation, or from contiguous tissue. The bloodstream is predominant, enabling infection from distant foci. Twenty-four of our cases (72.7%) had spondylodiscitis concomitant with an infection in another organ, supporting the hematogenic hypothesis. Intravenous drug abuse is also considered to be a predisposing factor,[16] though we found no such case in our study.

In this study, laboratory tests such as leukocyte counts were apparently not sensitive in the diagnosis of spondylodiscitis, as they were high in only nine patients (27.2%). However, the erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) values were high in 31 (100% of those who were tested) and 19 patients (90.4% of those who were tested), respectively, demonstrating heightened sensitivity. Leukocytes are not typically elevated in spinal infections.[8] According to the literature, the increase in leukocyte count varies from 13% to 60% (14 to 21). ESR levels in other studies are elevated, ranging from 73% to 100%,[16-24] which is compatible with the results published in this article.

As reported previously in other studies,[9,25,26] MRI is the most sensitive (93% to 96%) and most specific (92% to 97%) test modality for the early detection of spondylodiscitis. In addition, it enables not only differentiation between pyogenic discitis, neoplasia, and tuberculosis, providing better definition of the paravertebral and epidural spaces, but also assessment of the compression of neural elements.[27,28] In our study, 24 patients (72.7%) underwent MRI, leading to a correct diagnosis.

The association between comorbidities and the presence of infectious spondylodiscitis is well-documented in the literature.[8] In our study, all the patients had at least one comorbidity, with 11 patients (33.4%) presenting one and 22 patients (66.6%) presenting two comorbidities. Diabetes and high blood pressure (HBP) were the most common comorbidities present among patients with spondylodiscitis in our experience. HBP was the most common disease, occurring in 14 patients (42.4%), followed by diabetes in nine patients (27.2%). Other case series have demonstrated the role of diabetes *mellitus* as a risk factor for developing spine infections.[29-31]

The most common location for spondylodiscitis was the lumbar spine (39%), followed by the thoracic spine (27%), the lumbosacral transition (15%), the thoracolumbar transition (9%), the cervical spine (9%), and the sacrum (3%).

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The distribution of neurological deficit by affected segment was seven patients (21.2%) with infections of the thoracic spine, followed by the lumbar spine in six patients (18.1%), and the cervical spine with two patients (6.1%). The risk of neurological deficit was evaluated for each segment of the spine affected as a group, and was greatest in the cervical and sacral spines (100%), but as the number of patients was small, this value does not have statistical significance, while the thoracic spine presented 77% of patients at risk, and the lumbar spine 46%. These findings are consistent with previous reports that more cephalic infections present a greater likelihood of paraplegia.[31] One item that caught our attention was the absence of primary abscesses in our study, which differed greatly from the other findings in the literature.[2,32-36]

The main treatment for spondylodiscitis is the intravenous administration of antibiotics followed by oral antibiotics, together with immobilization of the spine. However, there is a great debate in the literature regarding the duration of the therapy, and a duration of less than 4 weeks is associated with a 25% recurrence rate.[20,37] Thus, the treatment of choice preferred by the authors was four to six weeks of intravenous antibiotics, complemented by 6 additional weeks of oral medication. There were no reports of recurrence in our study.

Our approach was to reserve surgical debridement for patients requiring drainage of the abscess, decompression of the spinal canal, and stabilization of the spine. The procedure of choice, in agreement with other authors,[19,31] is anterior decompression and arthrodesis with an autologous bone graft, followed by posterior fixation. The goal of reconstruction is to maintain alignment, preventing deformity, to achieve arthrodesis, and to decompress the spinal canal.[19,24,38] As in other series,[16,19,38,39] the rate of complications with this procedure was low in our study. One patient had DVT and pneumonia, one patient developed clinical complications and died after 13 days, and the implant in one patient broke after 3 years, making a total of 9.1% complications.

According to the quality of life classification presented earlier, our study had 13 patients rated as excellent (39.3%), nine as good (27.2%), seven as fair (21.2%), and only four as poor (12.1%). (Figure 5)

CONCLUSION

According to the results of our study, early diagnosis of spondylodiscitis continues to be a challenge, despite the technological advances in complementary tests. However, even when there is a delay in the definitive diagnosis and isolation of the specific etiological agent, treatment with medication in combination with surgery has good results.

All authors declare no potential conflict of interest concerning this article.

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