DIAGNOSTIC DIFFICULTIES IN BACTERIAL SPONDYLODISCITIS

DIFICULDADES DIAGNÓSTICAS NA ESPONDILODISCITE BACTERIANA

DIFICULTADES DE DIAGNÓSTICO EN ESPONDILODISCITIS BACTERIANA

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ABSTRACT

Objective: To analyze aspects related to the diagnostic difficulty in patients with bacterial spondylodiscitis. Methods: Cross-sectional observational study with retrospective data collected in the period from March 2004 to January 2014.Twenty-one patients diagnosed with bacterial spondylodiscitis were analyzed. Results: Women were the most affected, as well as older individuals. Pain in the affected region was the initial symptom in 52% of patients, and 45.5% of the patients had low back pain, and those with dorsal discitis had back pain as the main complaint; the patients with thoracolumbar discitis had pain in that region, and only one patient had sacroiliac discitis. The average time between onset of symptoms and treatment was five months. The lumbar segment was the most affected with 11 cases (52%), followed by thoracolumbar in 24%, dorsal in 19% of cases and a case in the sacroiliac segment. Only seven patients had fever. Pain in the affected level was coincidentally the most common symptom. Conclusions: Early diagnosis of bacterial spondylodiscitis remains a challenge due to the nonspecific signs and symptoms reported by the patient and the wide variability of laboratory results and imaging. The basis for early diagnosis remains the clinical suspicion at the time of initial treatment.

Keywords: Discitis; Spine; Intervertebral disc; Infection.

RESUMO

Objetivo: Analisar os aspectos relacionados com as dificuldades diagnósticas de pacientes portadores de espondilodiscite bacteriana. Métodos: Estudo observacional transversal com coleta retrospectiva de dados no período de março de 2004 a janeiro de 2014. Foram analisados 21 pacientes com diagnóstico de espondilodiscite bacteriana. Resultados: O sexo feminino foi o mais acometido, assim como indivíduos mais velhos. A dor na região comprometida foi o sintoma inicial em 52% dos pacientes, sendo que 45,5% dos pacientes apresentavam lombalgia, os pacientes com discite dorsal tiveram como queixa principal dorsalgia, e os com discite toracolombar apresentaram dor nessa região, sendo que apenas um paciente apresentou discite sacroilíaca. O tempo médio entre o início dos sintomas e o tratamento foi de cinco meses. O segmento lombar foi o mais acometido com 11 casos (52%), seguido pelo toracolombar 24%, pelo dorsal com 19% dos casos e um caso no segmento sacroilíaco. Apenas sete pacientes apresentaram febre. A dor no nível comprometido foi, coincidentemente, o sintoma mais comum. Conclusões: O diagnóstico precoce da espondilodiscite bacteriana continua sendo um desafio devido à inespecificidade de sinais e sintomas referidos pelo paciente e à grande variabilidade dos resultados laboratoriais e de imagem. A base para o diagnóstico precoce continua sendo a suspeita clínica no momento do atendimento inicial.

Descritores: Discite; Coluna vertebral; Disco intervertebral; Infecção.

RESUMEN

Objetivo: Analizar los aspectos relacionados con las dificultades de diagnóstico en pacientes con espondilodiscitis bacteriana. Métodos: Estudio observacional transversal con datos retrospectivos recopilados en el período comprendido entre marzo de 2004 y enero de 2014. Se analizaron 21 pacientes diagnosticados de espondilodiscitis bacteriana. Resultados: Las mujeres fueron las más afectadas, así como las personas de mayor edad. Dolor en la región afectada fue el síntoma inicial en el 52% de los pacientes, el 45,5% de los pacientes tenían dolor lumbar, los pacientes con discitis dorsal tenían dolor dorsal como la principal queja y las con discitis toracolumbar tenían dolor en esa zona, y sólo un paciente tuvo discitis sacroilíaca. El tiempo promedio entre el inicio de los síntomas y el tratamiento fue de cinco meses. El segmento lumbar fue lo más afectado, con 11 casos (52%), seguido por el 24% toracolumbar, dorsal con 19% de los casos y un caso en el segmento sacroilíaco. Sólo siete pacientes tenían fiebre. El dolor en el nivel afectado fue, por coincidencia, el síntoma más común. Conclusiones: El diagnóstico temprano de espondilodiscitis bacteriana sigue siendo un desafío debido a los signos y síntomas inespecíficos reportados por el paciente y la amplia variabilidad de los resultados de laboratorio y de imágenes. La base para el diagnóstico precoz sigue siendo la sospecha clínica en el momento del tratamiento inicial.

Descriptores: Discitis; Columna vertebral; Disco intervertebral; Infección.

INTRODUCTION

Infectious diseases of the spine are conditions with high morbidity and, if the diagnosis is delayed, they can have a high number of complications. Infectious or septic discitis is an infection of the intervertebral disc, and its physiopathology often compromises the contiguous vertebral bodies, causing osteomyelitis, also known as infectious disease of the spine or spondylodiscitis.[1] Infectious pathology of the spinal column is a challenge for the physician, and consequently for its treatment. This pathology involves diffuse, vague, oligosymptomatic pain, usually without fever or indications of infection, making diagnosis difficult and increasing the number of comorbidities and complications.[1,2]

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In most cases, spondylodiscitis is diagnosed in advanced phases because of the nonspecifity of its signs and symptoms.[1-3] Paradoxically, complementary research with laboratory tests is of little value, with the exception of the Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP) tests that can signal the presence of this infection. Among the imaging exams, magnetic resonance imaging (MRI) is the most sensitive for early detection. Radiographic studies and even computed tomography do not usually reveal the diagnosis in the first weeks of evolution of this disease. An accurate early diagnosis and the early start of treatment are decisive factors for a favorable outcome and for warding off surgical intervention and sequelae.[3,4]

The incidence of infectious spondylodiscitis has been growing, which could be a reflection of the increasing elderly immunocompromised population and of the increase in invasive spinal procedures. In the urogynecological region, the venous return of the pelvis and retroperitoneum, through the valveless Batson venous plexus[5] that communicates with the venous return of the spine, favors the spread of germ. The greater accessibility to the spine of MRI, which is the most sensitive diagnostic method for this type of disorder, also has contributed to the increase in diagnoses.[6] The main pathogens involved are *Staphylococcus aureus*, identified in more than 50% of the cases, and also the enteric *Gram-negative enteric bacilli*, *Candida spp*, *Pseudomonas aeruginosa*, *Streptococcus* Groups B and C, and *Mycobacterium tuberculosis*, the latter with high prevalence in our environment.[7]

The objective of this study was to analyze the factors that complicate the diagnosis of bacterial spondylodiscitis.

MATERIAL AND METHODS

A cross-sectional observational study was conducted using retrospective data collected from the period from March 2004 to January 2014. The standards and decisions of the Institutional Review Board were followed. The data was collected from the medical records of our institution and from data warehoused in computerized archives with the assistance of the pathology manager of the Brazilian Spine Society [Sociedade Brasileira de Coluna (SBC)]. The patient data and identification information were protected by a confidentiality agreement.

As regards changes noted in the physical neuro-orthopedic exam, the following aspects were considered to be of value: pain of the spinous apophyses to touch, antalgic posture (kyphotic or scoliotic), focal kyphosis, and deformity, as well as an altered neurological exam and changes in gait.

We analyzed the medical records of all patients with spondylodiscitis during the period from March 2004 to January 2014. All patients diagnosed with bacterial spondylodiscitis and with complete data records for the referenced period were included. Patients without complete documentation, and with confirmed diagnoses of spondylodiscitis of fungal or tubercular (TBC) etiologies, were excluded.

Patients with previous contact with TBC, with high Mantoux test readings, or with anatomical physiological signs suggestive of tuberculosis were also excluded.

The data collected took into account the evolution time of the symptoms in months. We also collected data related to the primary and secondary sites of pain, the presence of systemic signs (weight loss, chills, weakness, loss of appetite, fever, night sweats, and difficulty walking), changes in physical exams, and compromised vertebral segments (dorsal, lumbar, thoracolumbar transition, and sacroiliac).

Information referencing the confirmation of the bacteriological diagnosis via needle puncture biopsy, blood culture, or culture of postoperative secretions was also considered. Other data relative to hematological manifestations was also collected (hemogram, ESR, and CRP). The imaging exams to which patients were subjected were also analyzed, to identify which one or ones were most suggestive of the diagnosis (radiography, computed tomography, MRI, and scintigraphy).

Statistical analysis

The data were analyzed in SPSS version 18. The quantitative data were described by their averages and standard deviation and the qualitative data by their frequencies. The difference of age between the sexes was analyzed by the ANOVA test. The difference in the evolution time of symptoms between the sexes was analyzed using the Mann-Whitney test. The presence of a difference in distribution of the affected level between the sexes was analyzed by the Gamma test.

RESULTS

We reviewed the medical files of 66 patients with spondylodiscitis of various etiologies. Twenty-one patients met the inclusion criteria, having been diagnosed with bacterial spondylodiscitis and with complete documentation.

The characteristics of the group studied are described in Table 1. The average evolution time of the symptoms until diagnosis was five months, with no statistical difference noted for symptom evolution time between the sexes ($p=0.75$). The average patient age was 48 ± 25.3 years (average $\pm$ standard deviation), males at 52.8 ± 27.9 years of age and females at 40 ± 26 years of age, also with no statistical difference found between the sexes ($p=0.295$). The distribution of the population studied by sex was equal, with 52% females and 48% males.

Regarding the level of the spine affected, the lumbar segment was the most commonly involved (52% of the cases), followed by the thoracolumbar (24%), the dorsal (19%), with only one patient (5%) with sacroiliac involvement. There was a statistical difference between the sexes for the level affected, with the women having a greater preponderance in the thoracolumbar segment and the men in the dorsal segment ($p\leq0.001$). (Table 2)

Table 3 shows the clinical characteristics of the patients with bacterial spondylodiscitis in the study.

Regarding the symptoms, the most common complaint was lower back pain in 11 of the 21 patients (52%), followed by 7 pa-

Table 1. Characteristics of the patients with bacterial spondylodiscitis.

Characteristic	(n = 21)
Age in years	
Average ± SD	48.3±25.3
(Minimum to maximum)	(1.7 to 8.3)
Females, no. (%)	11 (52)
Time of evolution, months	5 (1 to 16)
Compromised segment	
Dorsal	4 (19)
Thoracolumbar	5 (24)
Lumbar	11 (52)
Sacroiliac	1 (5)

The data are presented as counts (percentages) unless otherwise specified. SD: standard deviation.

Table 2. Level of spine involvement by sex.

Sex	Sacroiliac	Lumbar	Thoracolumbar	Dorsal
Female	1	8	2	0
Male	0	3	3	4
Total	1	11	5	4

Gamma Test ($p\leq0.001$)

tients with pain radiating to the flanks and buttocks (33%). Five patients had pain in the abdominal and lower abdominal regions (24%) and four patients (19%) presented pain in the posterior pelvis. Only one patient had pain in the lower limbs (5%) and one patient (5%) had pain in the dorsal region.

In terms of systemic signs, nine patients (48%) presented weight loss with associated weakness, nine patients (43%) had chills, 33% had manifestations of fever (37.8º) and difficulty walking. Five patients (24%) complained of loss of appetite and only three patients (14%) had isolated night sweating.

In terms of changes in the physical exam, the predominant clinical manifestations were pain to the touch of the spinous apophyses present in 15 patients (71%), antalgic posture in 9 patients (43%), followed by changes in gait present in five patients (25%), and both changes in the neurological exam and focal kyphosis in four patients (19%). These changes were observed by the senior surgeon who developed the diagnostic hypothesis in his first visit during the evolution of the disease. (Table 4)

Analyzing the subgroup of patients with infectious lumbar compromise (n=11), only 5 (45%) mentioned lower back pain as their main complaint. (Table 5)

In the subgroup of patients with compromise of the dorsal spine (n=4), only one patient (25%) located their main complaint in that region, and in the subgroup of patients with compromise in the thoracolumbar transition region (n=5) only two patients (40%) located their main complaint in that region. (Table 6)

The first imaging exam performed was a radiographic study in 4 patients (19%). The first exam to suggest the diagnosis was computed tomography in five patients (24%), MRI in eight patients (38%), and bone scintigraphy in 4 patients (19%). Four patients had undergone previous radiographic investigation, but this did not enable a diagnosis to be reached, or even suggested. This was made possible later, with the assistance of the other methods described above. (Table 7)

Table 3. Clinical characteristics of patients with bacterial spondylodiscitis.

Characteristic	**(n = 21)**
Pain	**nº (%)**
Lumbar	11 (52)
Flanks	7 (33)
Buttocks	7 (33)
Costal	5 (24)
Abdominal	5 (24)
Lower abdominal	5 (24)
Anterior thorax	4 (19)
Posterior pelvis	4 (19)
Dorsal	1 (5)
Lower limbs	1 (5)
Systemic signs	**nº (%)**
Weight loss	10 (48)
Weakness	10 (48)
Chills	9 (43)
Fever	7 (33)
Difficulty walking	7 (33)
Loss of appetite	5 (24)
Night sweats	3 (14)

The data are presented as counts (percentages) unless otherwise specified.

Table 4. Characteristics of the physical exam.

Characteristic	**(n = 21)**
Physical Exam	**nº (%)**
Pain of the spinous apophyses to the touch	15 (71)
Antalgic kyphotic-scoliotic posture	9 (43)
Focal kyphosis - deformity	4 (19)
Altered neurological exam	4 (19)
Changes in gait	5 (24)

The data are presented as counts (percentages) unless otherwise specified.

Table 5. Primary and secondary complaints of the location of the pain by the level of the spine compromised.

Lumbar Discitis	**(n = 11)**
Primary complaint	**nº (%)**
Lower back pain	5 (45)
Secondary complaint	
Pain in the flanks	3(27)
Pain in other regions*	3(27)

*abdomen, lower abdomen, buttocks, and posterior pelvis.

Table 6. Primary and secondary complaints of the location of the pain by the level of the spine compromised.

Dorsal Discitis	**(n = 4)**
Primary complaint	**nº (%)**
Upper back pain	1(25)
Secondary complaint	
Rib pain	1(25)
Anterior thoracic pain	1(25)
Thoracolumbar Discitis	(n=5)
Primary complaint	
Flank pain	2(40)
Secondary complaint	
Lower back pain	2(40)
Pain in other locations	1(20)

Table 7. First exam to enable the diagnosis, no. (%).

MRI	**8 (38)**
CT	5 (24)
Radiography	4 (19)
Scintigraphy	4 (19)

MRI: Magnetic Resonance Imaging; CT: Computed Tomography.

Proof of the etiological agent was obtained in 15 patients (71%). Of these 15, the evidence was obtained via needle puncture biopsy in 12 and by means of serial blood cultures in 3 patients. Puncture biopsy with culturing was performed in 19 patients of whom 12 (63%)

tested positive. Blood cultures were performed for thirteen patients and in three it was possible to identify the bacterial agent, being the same three who presented hyperthermia. (Table 8)

Ten patients (48%) presented moderate leukocytosis (9000 total leukocytes), while the others presented no changes. In the laboratory analysis of the markers of inflammatory activity, 20 (95%) of the 21 patients had altered CRP and all 21 patients (100%) had altered ESR. The average ESR 68.5mm/h ranging from 5 to 120mm/h and the average CRP was 5.1mg/dl ranging from 1.5 and 7.2mg/dl. (Table 9)

DISCUSSION

In this study, we confirmed that infectious lesions of the spine do not produce a large number of characteristic clinical signs and symptoms, generally evolving with few symptoms that indicate the diagnosis (nonspecific pain is the predominant complaint), which agrees with the findings of other authors.[8-12]

In our study, the main complaint of pain coincided with actual location of infected level in only five (45%) of the patients with lumbar discitis, one (25%) of the patients with dorsal discitis, and two (40%) of the patients with thoracolumbar discitis.

According to Skaf et al.,[3] Citak et al.,[4] and Zarghooni et al.,[1] clinical suspicion is the basis for a diagnosis of bacterial spondylodiscitis, but the patient is often asymptomatic and the physical exam is usually poor. Studies show that approximately 50% of patients present symptoms around 3 months before a definitive diagnosis and the most common presentation is pain (90%), which is generally exacerbated by movement and radiates to the abdomen, hips, thighs, genitals, and perineum. Fever is not common but in some series, was documented in up to 52% of the cases. These aspects agree with our findings and are represented by primary and secondary complaints in Tables 5 and 6.

Complementary research is also nonspecific. In most cases, the hemogram shows no changes like significant leukocyte count or left shift. Rarely, leukocytosis with total leukocytes higher than 12000 is observed. The ESR and CRP tests, while nonspecific, were paradoxically the most valuable in signaling the possibility of an infection. The ESR often presents very high counts greater than 40mm/h. These aspects also agreed with our results, where we observed significant changes in the ESR and the CRP.

Blood cultures also should be requested, and are positive in around 50% of patients, a situation that becomes relevant when choosing the appropriate treatment.[3,13] Our research showed that in the subgroup of patients with hyperthermia (33%), three had positive blood cultures.

Complementary research through laboratory tests and imaging exams is key and MRI is the most sensitive imaging method for the identification of infectious diseases of the spine. Needle puncture biopsy is the most important exam for obtaining a definitive diagnosis, although the results are often negative, in up to between 30% and 50% of the cases.[2,14] These percentages are lower than those of our study, in which the senior author achieved 63% diagnosis guided by computed tomography or radioscopy. Pathological anatomy also has a high rate of failure, and should be reserved for cases where there are doubts about septic or tuberculous etiology, or malignancies.[2,3,9]

Cultures of material collected from the infected discs via needle puncture biopsies are definitive, but the results can be negative even under ideal conditions. Similarly, any imaging or laboratory study can be inconclusive depending on the moment at which they are done in relation to the initial infection.

In imaging research, the radiographic study is also frequently normal, not revealing acute phase changes. These aspects are in agreement with our research, in which five patients (24% of the cases) had normal x-rays during the evolution of the disease. Radiographic changes become apparent from between four weeks and three months after the start of the infectious profile.[12]

Magnetic resonance and scintigraphy are the tests that provide the earliest diagnosis of spondylodiscitis, and are therefore the most important. CT complements radiographic exams with additional findings, revealing the degree of impairment of the vertebral bodies.[12]

A definitive diagnosis of spondylodiscitis is established when patients present the clinical profile and typical imaging exams, and the blood culture or the focal culture obtained via puncture biopsy test positive for pathogens.[2] In this study, six patients (28%) were diagnosed with bacterial spondylodiscitis and were treated with antibiotics based on the context of the clinical situation, images, and laboratory exams, even though there was no etiological evidence. All responded with a marked decrease in inflammatory markers in the fourth and sixth weeks, and were considered asymptomatic and cured in the sixth month of treatment. None of them presented changes suggestive of Pott's disease.

In some situations, such as the progression of the disease in spite of the therapy established, surgical treatment is indicated and the material obtained should be sent for microbiological study and pathological anatomy in an effort to increase our chances of identifying the germ since the puncture and blood cultures were normal.

According to Howard et al.,[21] predisposing factors for infection should be researched and considered of value in developing the diagnostic hypothesis. In the series of patients in our study, we identified histories of diabetes mellitus, chronic urinary tract infection, corticosteroid therapy, prior surgical procedures in the urogynecological area, lumbar discectomy, immunodeficiency, and drug addiction in 12 (57%) of the 21 cases studied.

Accurate early diagnosis and early institution of therapy are decisive factors for a favorable outcome and to ward off surgical intervention and sequelae.[8]

CONCLUSION

The early diagnosis of bacterial spondylodiscitis continues to be a challenge due to the nonspecificity of signs and symptoms reported by the patient. The basis for diagnosis is clinical suspicion at the time of the first consultation. Bacterial spondylodiscitis should always be suspected in a differential diagnosis of lower back pain, fever of unknown origin, and patients with signs and symptoms of constitutional impairment, especially when accompanied by changes in the laboratory inflammatory markers.

Table 8. Proof of the etiological diagnosis.

No. of Patients	Technique	Positivity (%)
19	Puncture biopsy	12*(63)
13	Blood culture	3**(23)

* One patient - transoperative material. ** Patients who presented fever.

Table 9. Changed laboratory exams.

Hemogram	
Leukocytosis	10 (48)
Anemia	5 (24)
ESR mm/h	
Mean (minimum to maximum)	68.5 (5 to 120)
CRP mg/dl	
Mean (minimum to maximum)	5.1 (1.5 to 7.2)

The data are presented as counts (percentages) unless otherwise specified. ESR: Erythrocyte Sedimentation Rate, CRP: C-reactive protein.

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

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