Osteoarticular Manifestations of Brucellosis

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INTRODUCTION: Osteoarticular manifestations of human brucellosis occur in 20-40% of patients while spondylodiscitis is the most severe form of the bone and joint structures involvement. AIM: The aim of this paper is to show clinical and radiological characteristics of osteoarticular forms of brucellosis, with special reference to spondylodiscitis. MATERIAL AND METHODS: The medical histories of 120 hospitalized patients at the Clinic for Infectious Diseases, Clinical Center of Sarajevo University, diagnosed with brucellosis, were analyzed. RESULTS: Osteoarticular manifestations had sixty-nine patients, representing 78.4% of all localized forms of the disease. Spondylodiscitis represents 40.6% of all osteoarticular manifestations of the disease. Nine patients (32.1%) had paravertebral and paraspinal abscess. Median diagnostic interval for spondylodiscitis (116±160 days) was almost twice prolonged compared to the arthritis and sacroilitis (p<0.05). The most common radiological manifestations were erosions of the vertebral surface (67.8%). Computerized tomography confirmed inflammation in 85.2% of the patients, while magnetic resonance imaging (MRI) showed radiological alterations in all patients (100%). DISCUSSION AND CONCLUSION: Osteoarticular manifestations are the most common localized forms of brucellosis. The frequency of spondylodiscitis is in relation to duration of the diagnostic time. MRI shows a high degree of sensitivity to inflammatory changes of spine and „Pedro Pons’ sign” is patognomic radiological alteration. KEY WORDS: brucellosis, osteoarticular manifestations, spondylodiscitis.

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1. INTRODUCTION

Human brucellosis is a systemic infection with affinity for all organs and organ systems. It is presented as a generic form, with a variety of symptoms of infectious syndrome, or as a localized form with dysfunctional symptoms of affected organs (1). The most common localization of the disease are on the osteoarticular system (20-40% of patients). Chronic spondylodiscitis is one of the most serious manifestations because it leaves a high percentage of sequel, in spite of therapy (2). Since 2000, when the first 16 patients are treated (3), brucellosis in the Federation of Bosnia and Herzegovina (B&H) has got an epidemic character. By 2011, according to the Institute for Public Health Federation of B&H, 2328 patients are reported and by 2008 the rate of incidence has increased from 0.69 to 33.43 patients per 100 000 inhabitants. Some regions have become endemic foci.

2. OBJECTIVE

To investigate the clinical and radiological characteristics of osteoarticular forms of brucellosis, with an emphasis on possible predictors of disease.

3. PATIENTS AND METHODS

The study included 120 subjects of both genders, all ages, from different regions of the Federation B&H who were treated at the Clinic for Infectious Diseases, Clinical Center University of Sarajevo, as a proved brucella infection. Criteria for inclusion in the study was the etiological confirmation of diagnosis based on isolation of bacteria or positive results relevant serological tests, qualitative Rose Bengali (RB) and quantitative enzyme linked immunosorbent assay (ELISA). In order to assess morphological changes in the osteoarticular system conventional radiological methods are used (standard radiography–X-ray, computerized tomography–CT and magnetic resonance imaging–MRI). The study was retrospective-prospective, clinical, descriptive and analytical. Data were analyzed in the statistical program SPSS version 13.0 (Statistical Package for the Social Sciences). Significant differences are considered to be at the level of significance p<0.05, or in the reliability interval of 95%.

4. RESULTS

In the total sample, the men suffered more often (3:1). The youngest ex-
aminee had 4 and the oldest 71 years. Temperature (100 or 83.3%), sweating (76 or 63.3%) and pain in the lumbar spine area, called “lumbago” (54 or 45%), represented “brucellosis triad of symptoms” that manifested itself in great number of patients. Patients with localized brucellosis numerically dominated (88 or 73.4%) when compared to examinees with generic infection (32 or 26.6%). Osteoarticular manifestations were the most common forms of localized disease, which affected 69 patients. This represented more than 3/4 of all localized form (78.4%), or more than half of all examinees in the sample (57.5%). In defining the possible predictors of osteoarticular localization in relation to the generic form of the disease, we examined the influence of sex and age structure, length of diagnostic time, the frequency of temperature (> 38 °C) and bacteremia. Statistically, none of the analyzed variables has shown predictive value at the level of significance of differences p<0.05. The largest number of examinees with the osteoarticular localization had peripheral arthritis (33 or 47.8%), followed by spondylodiscitis (28 or 40.6%) and sacroilitis (18 or 26.1%). Apart from the individual, some examinees (18 or 26.1%) also had manifestation on two segments of bone-joint system. Most often these were a combination of several inflammatory altered peripheral joints (8 patients) or spondylodiscitis with sacroilitis (5 patients). We have compared the gender and age structure, average diagnostic time and the appearance of bacteremia in the various manifestations of osteoarticular brucellosis. Patients with spondylodiscitis and sacroilitis were older than patients with peripheral arthritis. It was necessary to have nearly twice longer time for defining the diagnosis of spondylodiscitis, in relation to arthritis and sacroilitis (Table 1). Statistically speaking, the length of diagnostic time is predisposed factor for the occurrence of brucellar spondylodiscitis (p<0.05).

About 28 examinees had spondylodiscitis, that is 40.6% of patients with osteoarticular manifestations. They were presented as isolated in 22, or in combination with other bone and joint localization, usually with sacroilitis (5 patients). 9 examinees (32.1%) had complications in the form of paravertebral or paraspinal abscesses. More than half of the inflammatory changes were located in the region of the lumbar spine (53.5%), while almost a third in the lumbosacral region of the transition (28.6%). One patient had spondylodiscitis of the cervical spine and four (14.3%) patients had spondylodiscitis of thoracic spine. Also statistically, lumbar spine was the dominant region in relation to the localization of the inflammatory process (p<0.05).

Most patients (78.6%) had changes in two vertebrae, while the largest number of affected vertebrae was four. The continuous way of spreading inflammation was dominated from vertebra to vertebra, except for two patients. Standard radiography of the spine was positive in only 29.6% of examinees. The results of computerized tomography confirmed inflammation in 85.2% of analyzed samples. Magnetic resonance imaging defined the inflammatory changes in all examined subjects (7/7 or 100%). The most common radiological manifestations were erosions on the anterior and lateral surfaces of the cover (67.8%), marginal sclerosis (57.1%) and narrowed intervertebral spaces (53.6%). Other changes were observed in a small number of patients: paravertebral or paraspinal abscesses (32.1%), bone dilution within the vertebrae (28.6%), “bulging” disc (25%). Just few patients of acute brucellosis had vertebra abscess, collapse of vertebra, osteofite without signs of bridging.

5. DISCUSSION

The proportion of patients with osteoarticular manifestations among our examinees was 57.5%, identical to the results of research conducted by Bosilkovski and associates in Macedonia, which reported 59.2% patients (4). Spondylitis were the second in a series of bone-joint manifestations, which accounts for 40.5%. According to literature data, their presence is variable, in a wide range of 2% -58% (8, 9). The disease is more common among persons aged 40-60 years (6), which fits in the average age of examinees (45±13.9). Predisposing factor of spondylodiscitis in a study was, in relation to other osteoarticular manifestation, the length of diagnostic time. The same was confirmed by Solera in his study, with the empha-

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**Table 1. Osteoarticular manifestations of brucellosis in relation to gender, age, diagnostic time and a positive blood culture.**

<table>
<thead>
<tr>
<th>Gender M / F</th>
<th>Arthritis</th>
<th>p</th>
<th>Spondylodiscitis</th>
<th>p</th>
<th>Sacroilitis</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 : 1</td>
<td>0.862</td>
<td>6 : 1</td>
<td>0.652</td>
<td>3.5 : 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age SV ± SD</td>
<td>32.6 ± 15.8</td>
<td>45 ± 13.9</td>
<td>0.084</td>
<td>45.4 ± 16.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of illness before entering treatment in days</td>
<td>55.8 ± 52.7</td>
<td>116 ± 160</td>
<td>0.001</td>
<td>63.2 ± 86.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacteremia</td>
<td>54.5%</td>
<td>0.315</td>
<td>46.4%</td>
<td>0.352</td>
<td>38.9%</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1. CT imaging Brucellar Spondylodiscitis**

**Figure 2. CT imaging Brucella Spondylodiscitis Pons’ sign.**
sis on the importance of age and pre-existing diseases of patients (10). The most common inflammatory changes were located in the region of the lumbar spine (53.5%) and lumbosacral transition (28.6%), which is in accordance with findings of numerous authors that the lumbar spine is a pre-elective place of Brucella spondylitis, with a prevalence of 44% - 76% (11), followed by thoracic (19%) and cervical (12%) (12). Two patients (7.1%) had multilocular, discontinuous inflammatory changes. In one of them infection spread itself on four distant vertebrae, and two discs of lumbar and sacral spine. Multilocular changes, especially the ones at different levels of the spine are rare, with the frequency of 3% - 14% (12, 13). Around 32.1% examinees had epidural or paravertebral abscess, which is relatively high percentage (4, 10, 12, 13). In the research of authors with similar results, the frequency is explained by using a highly sensitive magnetic resonance imaging, which in the early stage of the disease provides excellent definition of paravertebral and epidural mass changes (6, 12, 14). Magnetic resonance imaging was absolutely sensitive method in this study (100%), similar to the results of other authors (10, 14, 15, 16). Standard radiography showed low level of sensitivity (29.6%), particularly in the acute phase, due to inability of differentiation of inflammatory and degenerative changes. The results of radiological evaluation have shown that most patients had focal erosions of the anterior and lateral edge of the upper surface of cover, known as Pons’ sign (17), subchondral sclerosis, and narrowed, uneven intervertebral space, which are typical radiological signs of brucellar spondylodiscitis (Figure 1, 2), (10, 12, 13, 14, 15). We explained with the age the surprising occurrence of vertebral collapse of a 71-year old patient with thoracic spine spondylodiscitis. Specifically, in the course of Brucella infection collapse, extensive destruction of the vertebrae or large paraspinal masses is extremely rare. Brucellosis inflammation is characterized by a long-preserved spine architectonics. That is the main difference between brucellosis and tuberculous spondylodiscitis (10, 12, 14, 18). All patients were treated conservatively, with “triple” antibrucellosis therapy, including patients who suffer from abscess collections. Antibiotic selection implied streptomycin, doxycycline and rifampicin, which are, due to the pharmacological properties and synergistic effects, marked as brucellosis antibiotics of the first order. It is known that abscesses respond favorably to medical treatment and that surgical treatment is indicated only in case of compressive effects on the spinal cord and spinal roots (4, 10, 12). Percutaneous drainage and aspiration were a good alternative to conventional operative approach in one patient with a psoas abscess (10).

6. CONCLUSION

Osteoarticular manifestations are the most common localized forms of brucellosis in the region of FB&H. The frequency of spondylodiscitis is in relation to duration of diagnostic time. Magnetic resonance imaging shows a high degree of sensitivity to inflammatory changes in the spine, and the frequency of ‘Pedro Pons’ sign shows its patognomonity. Sequels, the type of deforming spondylodiscitis and spondylarthrosis, which permanently impair the functional integrity of the spine, leave the dilemma in which stage of recovery the brucella spondylodiscitis is possible?

REFERENCES