ABSTRACT

Aims: As a single-case study, this paper describes brucellosis spondylodiscitis with a paravertebral abscess at the C6/C7 cervical spine segment. Methodology: Qualitative research method was used as it was deemed appropriate for this type of research analysis. Diagnostic procedures used in the research include laboratory tests, microbiological analysis, MRI scans of the cervical spine, MRI scans of the thoracic spine, and L/S spine. Results: MRI scans of the cervical spine revealed completely visible MR signs of spondylodiscitis at C6/C7 vertebrae, with minor epidural collection in the back part, more to the right. MRI scans of the thoracic spine indicated intermittent Schmorl hernia in individual thoracic vertebrae. The results of MRI scans of the L/S spine indicated flattened physiological lordosis and moderate degenerative changes of the L/S spine, defined as spondylisis and facet arthrosis. It also includes disc hernia in the described levels with no relevant manifestations of dural sac compression. They are the same at L2/L3 and L3/L4 and directed intraforaminal left (especially at L3/L4 level), consequently resulting in radiculopathy. Conclusions: This represents the severe form of chronic brucellosis with Spondylodiscitis of the cervical spine and paravertebral abscess resulting from brucellosis and Q fever. Keeping in mind that the patient abandoned the hospital ward upon his request, he was not properly treated.

KEYWORDS Spondylodiscitis, Brucellosis, Infection, Cervical spine, Magnetic resonance imaging
process usually involving two (neighbouring) vertebrae and the intervertebral disc causing the space for disc between vertebrae to be narrowed down. In more than 50% of the cases in Europe, the cause of this infection is usually the case of monobacterial infection by Staphylococcus aureus, whereas in 11 to 25% of the cases, gram-negative pathogens like Escherichia coli (Kehr, M. et al., 2014).

Spondylodiscitis mainly involves hematogenous spread (Lucas E.M. et al., 2009). Infection may be primary or secondary, mainly following surgical procedures on the spinal column or other surgical or neurosurgery interventions. The course of primary infections is mainly more difficult and has a greater mortality rate of 12.5% compared to only 1.8% of infections following surgical procedures (Tschugg A. et al., 2017).

Being the cause of 46% of spondylodiscitis occurrences, tuberculosis is the main cause of spondylodiscitis worldwide (Colmenero, J.D. et al., 2004). The cause of this type of spondylodiscitis is also the most frequent pathogen globally, Mycobacterium tuberculosis.

Brucellosis spondylodiscitis results from brucellosis, which belongs to zoonosis, primarily a disease of domestic and wild animals. Statistical data indicate that the most frequent causes of human brucellosis are Brucella melitensis, Brucella abortus and Brucella suis.

According to many definitions, Brucellosis is a highly contagious zoonosis caused by ingestion of unpasteurized milk or undercooked meat from infected animals or close contact with their secretions. It is also known as undulant fever, Malta fever, and Mediterranean fever (Di Pierdomenico A. et al., 2011).

According to the data from WHO (World Health Organization), the occurrences of brucellosis are registered in 62 countries worldwide, whilst Australia remained as a single uninfect ed continent. In years, around 500,000 people got infected, and in 2007, complications (meningoencephalitis, meningitis) resulting in a high mortality rate were also recorded in Central Asia (Murić Šabić I. et al., 2014). Although magnetic resonance imaging is considered a golden standard for radiological representation and interpretation of this disease due to its 92% sensitivity and 96% specificity, there are also many other diagnostic procedures, including radiological, laboratory and microbiological, which should be implemented in order to obtain the complete image and the confirmation of the disease itself (Doutchi, M. et al., 2015).

Case report

Patient M.B born in 1962 in Travnik, was sent to hospital by an infectologist, feeling sick for two months with continuous high temperature, particularly in the evening. About a month ago, the patient had surgical removal of both herniae. He had both testicles swollen ten days before, with greater swelling in the left one. In the past fifteen days, he experienced severe pain in the scapulae and numbness in the left arm. He got suspicious of brucellosis and did some tests resulting in a general practitioner sending him to an infectologist in Travnik. He was further sent to the Department for Unknown and febrile illnesses at Cantonal hospital in Zenica.

Family history suggests that his sister suffered from brucellosis six years ago. He lives in Travnik’s wider area with a wife and a son who deny feeling symptoms. He owns two cows and about a hundred sheep. He did not confirm any medication allergy.

Upon reception, the patient is afebrile, mobile, conscious, and aware of the surrounding, making an impression of a medium diseased patient—head position straight, white sclera. Clear skin, no signs of meningitis. Bronchiectis findings in the lungs. Rhythmic heart activity, no humming. BP 120/80. Saturation 97, P 86 Mingazzini negative. No neurological issues. No swellings or weakened joints movement.

In laboratory tests of interest, the following values are obtained: SE 15/45, WBC 7.92x10^9/L, Neutrophiles 2,32x10^9/L, Lymphocytes 4,41x10^9/L, Monocytes 0,73x10^9/L, Eosinophils 0,40x10^9/L, Basophils 0,06x10^9/L, CRP: 4,22(<) mg/L.

The following values are obtained in laboratory tests of interest: ELISA for Brucellosis IgM 2.260 - positive, IgG 12.458 - positive, and HK negative. Posterior and anterior projection on scintigram shows a whole-body skeleton in which radioisotopes are bound inhomogeneously. The radioisotopes mentioned above are bound with the same intensity at the spine and joints. However, binding in the left hip acetabulum is more intense than in the right hip joint. Therefore, the left hip joint change should be compared to the CT scan for evaluation. MRI scans of cervical, thoracic and lumbosacral parts of the spine column are performed during the stay at the Cantonal hospital in Zenica.

MRI scan of the cervical spine - conclusion: Tomograms of T1W sagittal, T2W sagittal, TIRM coronal and T2W axial cervical segments were prepared, including a biplane post-contrast study (FS). MR indicates spondylodiscitis at the C6/C7 vertebrae level with minor arch-shaped epidural collection at the backside, to the right. This causes compressive manifestations, with insignificant spinal canal stenosis and extension to the foramen. Described changes are following the initial diagnosis.

MRI scan of the thoracic spine - conclusion: Tomograms of T1W sagittal, T2W sagittal, TIRM coronal and T2W axial thoracic segments were prepared, including a biplane post-contrast study (FS). MR indicates spondylodiscitis at the C6/C7 vertebrae level with minor arch-shaped epidural collection at the backside, to the right. This causes compressive manifestations, with insignificant spinal canal stenosis and extension to the foramen. Described changes are following the initial diagnosis.

MRI scan of the lumbosacral spine - conclusion: Tomograms of L/S sagittal, T2W sagittal, TIRM coronal and T2W axial lumbosacral segments were prepared, including a biplane post-contrast study (FS). Results of MRI scans of the L/S spine indicate flattened physiological lordosis and moderate degenerative changes of the L/S spine, defined as spondylodiscitis and facet arthrosis. It also includes disc hernia in the described levels with no relevant manifestations of dural sac compression. They are the same at levels L2/L3 and L3/L4 and directed intraforaminal left (especially at L3/L4 level), consequently resulting in radiculopathy. There are no indications of MRI signs of any changes related to referral diagnosis. A neurosurgeon consultation is suggested.

This represents the severe medium form of chronic brucellosis with spondylodiscitis of the cervical spine with paravertebral abscess resulting from brucellosis and Q fever.

The recovery period in the hospital department was going slowly but without further complications. Initial treatment included triple antibrucellosis therapy and subsequently dual—no further complications.

Laboratory tests indicate improvement. A follow-up MRI scan of the cervical spine is recommended in 4 months. A follow-up examination in a month, including laboratory and microbiological tests and obtained opinion from the vertebrolo-
gist. Upon his request, the patient left the hospital department without being completely taken care of medically.

Fig. 1. Sagittal MRI scan of the cervical spine on hospital admission. (T1 fast spin-echo technique) showing an abnormal signal intensity at the level of the C6–C7 vertebral bodies.

Fig. 2. Sagittal MRI scan of the cervical spine on hospital admission. (T1 fast spin-echo technique with fat saturation) showing an abnormal signal intensity at the level of the C6–C7 vertebral bodies (contrast series).

Discussion
The research was conducted in the Cantonal hospital in Zenica from 1/1/2015 to 1/1/2020 at the Department for Infectious diseases and the Department for Radiology diagnostics. The project included 307 confirmed cases of patients with brucellosis. Out of the total number, spondylodiscitis was confirmed in 88 patients: One case on the cervical spine, 7 cases on the thoracic, and 80 cases on the L/S part of the spine column.

Research conducted from 1992 to 2000 at Aarhus university hospital in Austria included 163 patients with diagnosed spondylodiscitis. Locations in relation to the individual parts of the spine included: In 13 cases, infection was located in the cervical spine or 8% of a total number of infections; in 62 patients, the infection occurred in the thoracic part of the spine column, and in 78 cases the infection was located at L/S part of the spine (Efthimios J. Karadimas et al., 2008). In comparison to our research, there is a significantly higher percentage of infections cases located in the spine column’s cervical part. In the case study of spondylodiscitis at the cervical part of the spinal column in 2016, the patient was from China. This study dealt with a man aged 36. If compared to our case, there are some differences. It includes bacterial infection caused by Staphylococcus aureus localized at C4/C6 segment.

Our case includes brucellosis spondylodiscitis caused by brucellosis, located at the C6/C7 segment of the cervical part of the spinal column. Common features in both cases include neurological deficiency in upper limbs, increased sedimentation values, C-reactive protein, antibiotic therapy and magnetic resonance imaging of the cervical part of the spinal column (using a contrasting agent) which confirmed diagnosis, alongside other laboratory and microbiological tests.

Treatment with antibiotics in the first case (China) lasted for three weeks, while in the second case, after six weeks, the patient self-willingly abandoned treatment (Jiangjun Z. et al., 2016). Follow-up MRI in the first case indicated that the abscess was completely absorbed without recurrence. However, there are no data about follow-up MRI examination in the second case.

A rare case of spontaneous spondylodiscitis in the cervical part of the spinal column was recorded in Korea in 2008. Male, aged 45, experienced severe neck pains with neck movement limitations. The neurological examination determined paresthesia of the upper extremities, which indicated magnetic resonance imaging of a cervical part of the spinal column.

As in our case, in the T1 sequence, vertebrae bodies indicated hyposignal, and after a contrastive agent was applied, significant hypersignal. However, there is a difference in localization. In this case, the epidural abscess is located at level C5/C6 (in our case, level C6/C7, and the cause of infection is completely different, bacteria Klebsiella pneumonia (Min-Seok Kim et al., 2008).

Conclusion:
As the discussion suggests, although the causes of infections are different, there are a series of common characteristics related to spondylodiscitis at the cervical part of the spinal column. All the cases are mostly characterized by neck pain and often with paresthesia of the upper extremities. In addition, the infection, as mentioned above, is characterized by increased results of laboratory tests, from sedimentation to CRP.

Diagnosis is confirmed by MRI, a digital radiological procedure based on electromagnetic radio waves using a powerful...
magnetic field to depict various anatomic regions of the human organism (Lam P., 2018). The procedure mentioned above is a golden standard for radiological representation and interpretation of the diseases with 92% sensitivity and 96% specificity. Naturally, it requires the obligatory use of contrastive agents.

Even though, statistically, tuberculosis is the most frequent cause of spondylodiscitis around the world since it represents 46% of all cases of spondylodiscitis, the highest percentage of spondylodiscitis in our research is caused by brucellosis, including the rare occurrence of spondylodiscitis with a paravertebral abscess on cervical part of the spinal column. These data are based on the fact that many persons are employed in animal husbandry in two cantons, in particular, Zenica-Dobo and Central Bosnia Canton. Therefore, this area gravitates towards the Cantonal hospital in Zenica, which is responsible for treating patients from these cantons.

**Funding**

This work did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Conflict of interest**

There are no conflicts of interest to declare by any of the authors of this study.

**References**


