Spondylodiscitis

Spondylodiscitis is a spinal infection, defined as an infection of the intervertebral disc and the adjacent vertebral body.

Vertebral osteomyelitis is often associated with discitis, which may be grouped together under the term spondylodiscitis.

Epidemiology

Although rare, spondylodiscitis is the main manifestation of haematogenous osteomyelitis in patients aged over 50 years \(^1\) and represents 3-5% of all cases of osteomyelitis \(^2\)

Infectious spondylodiscitis has doubled in incidence during the past 10-20 years to approximately six cases per 100,000 person-years in Scandinavia and other regions of the world \(^3\) \(^4\)

In recent years, the incidence of infectious spondylodiscitis has increased due to vast improvements in medical care and prolonged life expectancies. The condition is associated with advanced age, intravenous drug use, immunocompromised status, and significant medical comorbidities \(^5\).

It represents, at the most, 2-4% of osteoarticular infections in children and its clinical presentation is often insidious.

Non-specific spondylodiscitis in children is caused by haematogenous spread of pathogens. Staphylococcus aureus is the most frequently detected bacterium. The clinical signs are unspecific and an Magnetic Resonance Imaging of the spine is the standard radiological procedure to detect spondylodiscitis. In general, the treatment is conservative and includes an antibiotic therapy as well an immobilization of the spine. In endemic areas of the world, specific spondylodiscitis is more common and is caused by Mycobacterium tuberculosis or Brucellae. The treatment is also conservative. For all entities of spondylodiscitis in children, a surgical intervention is only necessary in the case of severe deformities due to the infection or in the case of neurological symptoms.

Elevated infectious laboratory values and back pain or other unspecific symptoms can indicate spondylodiscitis in children. MRI of the spine is necessary to rule out spondylodiscitis \(^6\).

Etiology

Identifying the causative pathogen is the key to treatment. CT guided biopsy and drainage are the standard procedure for identifying causative pathogens. However, the pathogen-identification rate varies among studies \(^7\) \(^8\) \(^9\)

Risk Factors

Clinicians must maintain a high index of suspicion for discitis in patients who undergo discogram.
Diagnosis

see Spondylodiscitis diagnosis.

Classification

Cervical spondylodiscitis
Lumbar spondylodiscitis
Spontaneous spondylodiscitis
Postoperative spondylodiscitis
Brucellar spondylodiscitis
Tuberculous spondylodiscitis

Treatment

see Spondylodiscitis treatment.

Outcome

It is associated with a one-year mortality of 20% and functional impairment among survivors leading to low quality of life\textsuperscript{10,11}.

Kehrer et al., identified all patients aged 18 years or older treated for infectious spondylodiscitis from January 1994 to May 2009 at hospitals in Funen County, Denmark.

Mortality rates among patients were compared with rates among a reference population using Kaplan-Meier plots and mortality rate ratios (MRRs). Short-term mortality was defined as deaths within first year after admission and long-term mortality was deaths thereafter. Factors associated with death were determined.

Among 298 identified patients, 61 (20%) died within the first year. Adjusted MRRs were 16.8 (95% confidence interval: 9.9-28.5) for 0 to 90 days; 4.2 (2.5-7.0) for 91 to 365 days; 2.2 (1.6-2.9) for 1 to 4 years; and 1.7 (1.2-2.5) for 5 to 14 years. Mortality rate ratios stratified on microbiological etiology were 8.8 (3.3-22.1) for 0 to 90 days; 1.4 (0.3-5.8) for 91 to 365 days; 3.2 (2.0-5.1) for 1 to 4 years; and 1.1 (0.5-2.4) for 5 to 14 years for unknown etiology and 24.0 (13.0-44.2) for 0 to 90 days; 6.0 (3.1-11.5) for 91 to 365 days; 1.9 (1.1-3.2) for 1 to 4 years; and 2.7 (1.5-4.7) for 5 to 14 years among Staphylococcus aureus infections. The main factors associated with short-term mortality were severe neurologic deficits at the time of admission, epidural abscess, and comorbidities. Long-term mortality seemed independent of microbiological etiology.

Mortality remained high the first year after admission and thereafter decreased with time to a level close to the reference population. Short-term mortality was especially related to infection with abscess formation and neurologic deficits and long-term mortality was related to alcohol dependency\textsuperscript{12}.

Complications

Spinal epidural abscess.
Case series

2016

Between 2006 and 2013, a total of 211 patients suffering from spondylodiscitis underwent surgical debridement and instrumentation. There were 52 cases where PEEK cages were used. Laboratory and physical examinations were assessed at a 3-month follow-up. Last follow-up was performed with at a minimum of 12 months after surgery via a telephone interview.

Mean age at presentation was 67 years, with 19 (37 %) male patients and 33 (63 %) female. Distribution of the infection was lumbar in 29 (56 %), thoracic in 3 (6 %) and cervical in 11 (21 %) cases. Nine patients (17 %) had concomitant non-contiguous spondylodiscitis.

Spinal epidural abscess was found in 17 patients (33 %); 48 (92%) had pain; neurological deficits were found in 20 patients (38 %). All patients in this series underwent surgical debridement with instrumentation of the spine. Postoperative intravenous antibiotics were administered for 15.4 ± 6.8 days followed by 2.9 ± 0.5 months of oral antibiotics. Complete resolution of the infection was achieved in all cases. Of the 28 patients with neurological deficits, 6 had full recovery and 10 had improved incompletely after surgery. One patient suffered from a pulmonary embolism postoperatively. There were no mortalities.

Use of PEEK cages for interbody fusion is feasible and safe in patients suffering from a pyogenic spinal infection

Eighty five patients with spondylodiscitis were surgically treated. The authors analysed clinical data and image studies for each patient.

They treated 51 male and 34 female patients with an average age of 48 years old (min: 6 - max: 80). The lumbar spine was more often affected and Mycobacterium tuberculosis the most frequent pathogen. The number of cases through the years has been grossly stable, with a slight increase of dyscitis due to Staphylococcus aureus and decrease of the dyscitis without pathogen identification. Paravertebral abscess was identified in 39 patients and 17 had also neurological impairment, mostly located in the thoracic spine and with tuberculous aetheology. Immunosuppression was documented in 10 patients.

In this epidemiologic study they found a tuberculous infection, male gender and young age predominance. Despite a relative constant number of patients operated over the years, pyogenic infections due to Staphylococcus aureus seems to be uprising. Paravertebral abscess and neurological impairment are important dyscitis complications, especially in tuberculous cases.

Spinal infections requiring surgical treatment are still an important clinical condition. Mycobacterium tuberculosis and Staphylococcus aureus represent the main pathogens with a growing incidence for the latest reference.

2015

153 patients with spondylodiscitis treated from 2002 to 2012. The approach included MR imaging of
the infected spine, isolation of the pathogen with blood cultures and/or biopsy, and further conservative or surgical treatment. The mean follow-up was 6 years (range 1-13 years). We evaluated the indications, timing (when), and methods (how) for surgical treatment, and the clinical outcome of these patients.

Orthopedic surgical treatment was necessary for 13 of the 153 patients (8.5 %). These were patients with low access to healthcare systems because of low socioeconomic status, third-country migrants, prisoners or intravenous drug use, patients in whom a bacterial isolate documentation was necessary, and patients with previous spinal operations. The most common pathogen was Mycobacterium tuberculosis. The surgical indications included deterioration of the neurological status (11 patients), need for bacterial isolate (10 patients), septicemia due to no response to antibiotics (five patients), and/or spinal instability (three patients). An anterior vertebral approach was more commonly used. Nine of the 13 patients had spinal instrumentation in the same setting. Improvement or recovery of the neurological status was observed postoperatively in all patients with preoperative neurological deficits. Postoperatively, two patients deceased from pulmonary infection and septicemia, and heart infarction. At the last follow-up, patients who were alive were asymptomatic; ten patients were neurologically intact, and one patient experienced paraparesis. Imaging showed spinal fusion, without evidence of recurrent spondylodiscitis. Complications related to the spinal instrumentation were not observed in the respective patients.

Conservative treatment is the standard for spondylodiscitis. Physicians should be alert for Mycobacterium tuberculosis spondylitis because of the low access to healthcare systems of patients with low social and economic status. Surgical indications include obtaining tissue sample for diagnosis, occurrence or progression of neurological symptoms, failure of conservative treatment, large anterior abscesses, and very extensive disease. Thorough debridement of infected tissue and spinal stability is paramount. The anterior approach provides direct access and improved exposure to the most commonly affected part of the spine. Spinal instrumentation is generally recommended for optimum spinal stability and fusion, without any implant-related complications.

4350 procedures performed in 4037 patients (mean age=53.2 yr). Sixty percent of the patients were male. The majority of procedures were performed in the lumbar spine (98.4%), and the indication was mostly degenerative in nature (96.9%). The databases were then reviewed for any infectious complications.

Postoperative infection was recorded in 4 patients (0.09%). All of them occurred in the lumbar region after discectomy. These patients presented with discitis and underwent revision in the form of open debridement and fusion. The time lapse between the index surgery and revision was 56 days. All 4 patients recovered, with a mean follow-up of 7.5 years.

2014

Of 107 cases, ranging between 17 to 83 years of age, 64 (59.8%) were male. Twenty-seven (25.2%) patients had diabetes mellitus.

Laboratory investigations revealed elevated CRP in 70 (65%) patients, elevated ESR in 65 (61%) patients, and elevated white blood cell (WBC) counts in 41 (38.3%) patients. Thirty-six (33.6%) patients were identified as having brucellar SD, and 5 (4.7%) patients were identified as having tuberculous SD. A total of 66 (61.6%) patients were determined to have pyogenic SD. The most frequently isolated microorganism was Staphylococcus aureus. Antibiotic therapy was given intravenously to all pyogenic SD patients.
The incidence of SD has increased as a result of the higher life expectancy of older patients with chronic debilitating diseases and the increase of spinal surgical procedures. In patients with low back pain, SD should be considered as a diagnosis. For effective treatment, it is important to determine the etiology of the disease.\(^1\)

**Case reports**

**2016**

A 17-year-old male presented with diarrhoea and malaise following his return from Kenya and Tunisia. He was managed as a case of traveller's diarrhoea. Stool cultures were negative for pathogenic bacterial growth. Two weeks later he presented with worsening lower back pain. MRI of lumbosacral spine suggested L1 osteomyelitis. CT-guided spinal aspirate grew no organisms and repeat viral serology and blood cultures (including tuberculosis screening) were negative. He was treated with a 6-week course of ceftriaxone. Back pain did not improve and a repeat MRI scan 8 weeks after his antibiotic course indicated progressive changes in L1 extending to L2 with an intradiscal abscess. Repeat CT-guided spinal aspirate grew Salmonella arizonae sensitive to cotrimoxazole and ceftriaxone. He was treated with intravenous ceftriaxone and cotrimoxazole for 12 weeks. A 4-month follow-up MRI scan showed progressive improvement of the L1/L2 discitis with resolution of intradiscal fluid.\(^18\).

**2015**

A patient with a history of L2 corpectomy and anterior spinal fusion presented with discitis at the L4/5 level and underwent an anterior lumbar interbody fusion (ALIF) supplemented with a locking plate placed anterolaterally for stability. Fifteen months after the ALIF procedure, he returned with a hardware infection. He underwent debridement of the infection site and removal of hardware. Results. Once hardware was exposed, removal of the locking plate screws was only successful in one out of four screws using a reverse thread screw removal device. Three of the reverse thread screw removal devices broke in attempt to remove the subsequent screws. A metal cutting drill was then used to break hoop stresses associated with the locking device and the plate was removed. Conclusion. Anterior locking plates add significant stability to an anterior spinal fusion mass. However, removal of this hardware can be complicated by the inherent properties of the design with significant risk of major vascular injury.\(^20\).

**2014**

A 46 year-old patient who had had lumbar pain for several weeks that irradiated to the right leg, and did not respond to NSAID treatment. The work-up included MRI, biopsy with draining of the collection and a universal PCR followed by 16S rDNA sequencing. The latter was used to make the microbiologic diagnosis, which identified Fusobacterium nucleatum as the causative agent. Final treatment consisted of clindamycin.

Spondylodiscitis due to Fusobacterium spp. is a rare and difficult to diagnose entity, due both to its clinical characteristics and to the difficulty in making the right microbiologic diagnosis.\(^21\).

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\(^{1}\) Jensen AG, Espersen F, Skinhøj P, Rosdahl VT, Frimodt-Møller N. Increasing frequency of vertebral


