A particular form of septic arthritis: Septic arthritis of facet joint

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Abstract

Only about 40 cases of septic arthritis of the facet joints have been reported to date. We report 6 new cases including 2 at the cervical spine, which is rarely involved. Mean age was 61.5 years; there were 5 men and 1 woman. Spinal pain and stiffness, fever, and asthenia were the presenting manifestations. Laboratory tests consistently showed inflammation. Among classical risk factors for infection, only noninsulin-dependent diabetes was noted, in a single patient. Mean time to the diagnosis was 42 days. Discitis, a far more common condition, was considered initially, and early radiographs were of limited diagnostic assistance. Radionuclide bone scans identified the site of the infection and served to look for other foci. Magnetic resonance imaging was effective in confirming the diagnosis at an early stage and in looking for local spread (muscles, epidural space, and disk). L3–L4 was involved in 3 patients, C4–C5 in 2, and L4–L5 in 1. Direct inoculation during mesotherapy sessions was the cause in 1 patient. Cultures of blood and needle biopsy samples were positive in all 6 cases; Staphylococcus aureus was the causative agent in 3 patients. The risk of local and systemic complications governs the prognosis of facet joint infection. Of our 6 patients, 4 experienced complications: there was 1 case each of discitis, epidural infection, endocarditis, and septic arthritis of the acromioclavicular joint. Fatal multiple organ dysfunction occurred in 1 patient. In the other 5 patients, antimicrobial therapy and protection from weight-bearing for 3 months ensured a favorable outcome.

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Keywords: Septic arthritis; Facet joint; Endocarditis; Epidural abscess

1. Introduction

Septic arthritis of the facet joints is uncommon, with only about 40 cases reported to date [1]. We describe 6 new cases, including 2 at the cervical spine, which was involved in only 1 of the previously reported cases. Our objective is to review the features of facet joint infection. Facet joint infection must be considered in febrile patients with spinal symptoms in order to ensure that appropriate investigations are ordered at an early stage.

2. Case reports

We describe 6 cases of septic arthritis of the facet joint (SAFJ) managed at our Rheumatology Department between January 1, 2002, and December 31, 2004. Their main characteristics are reported in Table 1. There were 5 men and 1 woman aged 50–76 years (mean age, 61.5 years). Risk factors for infection were a past history of alcohol abuse in 1 patient (case #3) and noninsulin-dependent diabetes in 1 patient (case #4). The lumbar spine was involved in 4 patients, at L3–L4 (n = 3) or L4–L5 (n = 1). The remaining 2 patients had involvement of C4–C5; C3–C4 was involved also in 1 patient. The arthritis was bilateral in 1 patient, left-sided in 5, and right-sided in 1.
Table 1
Main features in the 6 patients with facet joint septic arthritis

<table>
<thead>
<tr>
<th>Case #</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>50</td>
<td>55</td>
<td>76</td>
<td>69</td>
<td>56</td>
<td>63</td>
</tr>
<tr>
<td>Sex</td>
<td>F</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Joint(s) involved</td>
<td>L3–L4 right</td>
<td>C4–C5 left</td>
<td>C5–C4 and C4–C5, both sides</td>
<td>L3–L4 left</td>
<td>L4–L5 left</td>
<td>L3–L4 left</td>
</tr>
<tr>
<td>Time to diagnosis (days)</td>
<td>21</td>
<td>60</td>
<td>100</td>
<td>30</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Body temperature (°C)</td>
<td>38</td>
<td>37</td>
<td>37.4</td>
<td>39.4</td>
<td>38.5</td>
<td>37.3</td>
</tr>
<tr>
<td>CRP (mg/L)</td>
<td>167</td>
<td>6</td>
<td>49</td>
<td>62</td>
<td>32</td>
<td>100</td>
</tr>
<tr>
<td>ESR (mm)</td>
<td>105</td>
<td>33</td>
<td>127</td>
<td>105</td>
<td>33</td>
<td>120</td>
</tr>
<tr>
<td>Neutrophil count (/mm³)</td>
<td>13,000</td>
<td>5445</td>
<td>5800</td>
<td>10,700</td>
<td>Not available</td>
<td>8100</td>
</tr>
<tr>
<td>Portal of entry</td>
<td>Percutaneous injection</td>
<td>None identified</td>
<td>None identified</td>
<td>Dental infection</td>
<td>Gastrointestinal</td>
<td>None identified</td>
</tr>
<tr>
<td>Dissemination</td>
<td>Direct inoculation</td>
<td>None identified</td>
<td>None identified</td>
<td>Hematogenous</td>
<td>Hematogenous</td>
<td>None identified</td>
</tr>
<tr>
<td>Causative organism</td>
<td>Staphylococcus aureus</td>
<td>Staphylococcus epidermidis</td>
<td>Staphylococcus aureus</td>
<td>Streptococcus viridans</td>
<td>Enterococcus faecalis</td>
<td>Staphylococcus aureus</td>
</tr>
<tr>
<td>Imaging studies obtained</td>
<td>Radiographs, bone scan, MRI</td>
<td>Radiographs, bone scan, CT, MRI</td>
<td>Radiographs, bone scan, MRI</td>
<td>Surgical biopsy</td>
<td>Radiographs, bone scan, CT, MRI</td>
<td>Radiographs, bone scan, CT, MRI</td>
</tr>
<tr>
<td>Specimen(s) positive for the causative organism</td>
<td>Blood cultures</td>
<td>CT-guided percutaneous biopsy</td>
<td>Surgical biopsy</td>
<td>Blood cultures</td>
<td>Blood cultures</td>
<td>CT-guided percutaneous biopsy followed by surgical biopsy</td>
</tr>
<tr>
<td>Complications</td>
<td>C6–C7 discitis</td>
<td>Septic arthritis of the left acromioclavicular joint</td>
<td>Pyomyositis, epidural abscess, spinal cord compression</td>
<td>Endocarditis</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

F, female; M, male; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; CT, computed tomography; and MRI, magnetic resonance imaging.

The time to diagnosis ranged from 21 to 90 days (mean, 42.7 days). Spinal pain and motion-range limitation with a fever and a decline in general health were the presenting symptoms in all 6 patients. Mobility of the affected spinal segment was severely reduced. A portal of entry was identified in 3 patients: direct inoculation occurred during a mesotherapy session in 1 patient and hematogenous dissemination from a distant focus of infection in 2 patients (1 case each of gastrointestinal and dental infection). Laboratory tests consistently showed inflammation: C-reactive protein levels ranged from 33 to 127 mm (mean, 84 mm). The peripheral neutrophil count was high in a single patient (13,000/mm³, case #3).

Routine blood cultures were positive in 3 cases (#1, #4, and #5). Needle aspiration under computed tomography (CT) guidance was performed in 2 patients; 1 of these patients subsequently underwent a surgical biopsy (case #6). In the remaining patient (case #3), specimens were obtained during emergent surgery for tetraparesis. The local specimens allowed recovery of the organism in all 3 cases.

Standard radiographs were considered normal in 5 of the 6 patients. The exception was case #5, in whom radiographs obtained 21 days after the onset of pain showed asymmetry of the L4–L5 facet joint spaces with a wider space and hazy margins on the left (Fig. 1). Radionuclide bone scanning consistently established the site of the infection by showing an oblique hot spot located lateral to the spine and more marked on the posteroanterior than on the anteroposterior view (Figs. 1–3).

In 2 patients, additional hot spots were seen at osteoarticular sites (Figs. 2 and 3) that did not give rise to clinical manifestations. CT (n = 4) revealed destructive lesions seen as widening of the joint space and erosions of the margins; in addition, 3 patients had soft tissue involvement, which was best visualized after contrast injection (Fig. 3). Magnetic resonance imaging (MRI, n = 5) disclosed joint destruction, intraarticular effusion, synovitis, and spread to adjacent muscles with signal enhancement after gadolinium injection (Figs. 2 and 3). An epidural abscess was visible in 1 patient, in whom the anterior disk and vertebral structures were spared. MRI was not feasible in the remaining patient (#4), who had endocarditis requiring emergent valve replacement surgery.

The main complications consisted of focal infections at distant sites: endocarditis, cervical discitis, and arthritis of the acromioclavicular joint. The patient with involvement of 2 cervical levels (#3) required emergent C4–C5 laminectomy to relieve compression with tetraparesis caused by an epidural abscess. Abscesses were also present in the paraspinal muscles in this patient.

The treatment was identical to that used for discitis in our department. Bed rest was maintained for 1 month, after which a lumbar support or cervical collar was used for 2 months. Two antibiotics were given parenterally for 1 month. Antibiotics were selected empirically, taking care to use drugs effective against Staphylococcus aureus. If needed, the antibiotics are changed based on the antibiotic susceptibility test results. For the next 2 months, patients took 2 oral antibiotics. The outcome was favorable in 5 patients. In the
remaining patient (#3), the clinical manifestations and laboratory tests improved noticeably at first. However, *Pseudomonas aeruginosa* urinary tract infection related to an indwelling catheter developed, followed by acute renal failure then by fatal multiple organ dysfunction.

### 3. Discussion

We report 6 cases of SAFJ, all of which were documented using modern imaging techniques and bacteriological studies. Of our 6 cases, 2 were particular unusual, in as much as the cervical spine was involved; we are aware of a single previously reported case of SAFJ of the cervical spine (C1–C2).

Most rheumatologists are unfamiliar with SAFJ. About 40 cases have been reported to date [1,2]. Discitis due to pyogenic organisms or to the tubercle bacillus is far more common. An increase in the annual incidence of septic discitis from 0.40/100,000 population in 1979 to 2/100,000 population in 2001 was found in the UK [3,4]. In France in 2001, the incidence of SAFJ was estimated to be 500 times lower than the
incidence of septic discitis [5]. At the time, however, only 23 cases of SAFJ had been reported, suggesting underdiagnosis or underreporting of this condition [5].

The male-to-female ratio is 1.2, and mean age is 63 years [6]. L4–L5 is predominantly affected [7]. Direct inoculation occurred in 5 previously reported cases [7–11] and, probably, in 1 of our patients (#1). A far more common scenario is hematogenous dissemination from a distant focus of infection, which is usually in the urinary tract [12]. Of 54 previously reported cases of SAFJ, 47 were documented by bacteriological studies. The organism was S. aureus in 33 (70%) cases, a Streptococcus in 7 (16%) cases, a Gram-negative rod in 3 (7%) cases, Enterococcus faecalis in 1 (1%) case, and parvovirus B19 in 1 (1%) case; several organisms were recovered in 2 (4%) cases [1,5,7,8,10,11,13–15,20,24,31]. The predominant organisms [13] were S. aureus (82%), Streptococcus spp. (6%), E. faecalis (3%), and Gram-negative rods (6%). No cases of tuberculosis, mycosis, or parasitic infection were reported, probably because the specific studies needed to detect these organisms were not performed. Pseudomonas pyocyanea was found in 1 patient and chronic facet joint infection with parvovirus B19 in another [15]. The only risk factor identified in previous reports was noninsulin-dependent diabetes mellitus [13,16], which was present in 1 of our patients. The time to diagnosis may range from 3 weeks to several months [13]. A fever and lateral spinal pain with stiffness are the main presenting symptoms, although nerve root pain occurs occasionally [17]. Patients may describe initial mechanical low back pain or a history of low back pain suggesting infection of a joint affected with degenerative disease [5,6]. Although body temperature may be normal, laboratory tests consistently show inflammation and may reveal high leukocyte counts [1,13]. Epidural abscess is the main local complication [16,18–22]. A few patients experience distant complications such as endocarditis [5], discitis [14], and infection of other joints (e.g., the sternoclavicular joint) [17].

Fig. 3. Case #2. (a) Magnetic resonance imaging of the cervical spine, sagittal and axial sections centered on C4–C5, T1-weighted sequence with fat saturation and gadolinium injection: destruction of the left C4–C5 facet joint space with erosions of the margins (black arrows). Enhancement of the paraspinal muscles (black star) and epidural space indicating spread of the infection. (b) Computed tomography of the cervical spine, transverse section centered on C4–C5 with iodinated contrast agent injection and a soft tissue window: lysis of the left C4–C5 facet joint space with narrowing and erosions of the margins, as well as soft tissue enhancement anterior to the facet joint indicating an abscess (black arrow). (c) Tc 99m-labeled bisphosphonate scan: 2 hot spots, one at the left acromioclavicular joint and the other in the left cervical paraspinal area more clearly visible on the posteroanterior view.
According to one hypothesis, SAFJ may be an early manifestation of discitis [23]. In a patient with SAFJ at the lumbar spine, serial CT scans showed progression to discitis at the same vertebral level [14]. In contrast, progression from discitis to SAFJ has not been reported. Blood culture was the best method for identifying the causative organism in earlier cases and was positive in half of our patients [7,13]. Needle aspiration of the facet joint under CT or fluoroscopic guidance, if needed in the operating room, ensures the definite bacteriological diagnosis [14,24,25], as illustrated by the positive results from all local specimens in our case series.

The role for imaging studies, most notably as a means of achieving an early diagnosis, deserves discussion. Standard radiographs may remain normal for up to 1 month after symptom onset [23]. In addition, the changes are not specific: they consist of joint space narrowing or widening, erosions, and/or subchondral geodes. Tc 99m bone scanning is a key investigation that localizes the infection to the facet joint, detects other foci (e.g., discitis), and helps to select further imaging studies (CT or MRI) [26,27]. An oblique, horizontal or, more often, vertical focus of increased uptake is seen lateral to the spine, more clearly on posteroanterior than on anteroposterior radiographs [27]. Radionuclide scanning establishes the site of the infection in 90% of cases. CT, which is 96% sensitive, shows the same abnormalities as radiographs but at an earlier stage; however, visible bone lesions may take up to 2 weeks to develop. Soft tissue involvement may be visible after the first week, most notably after contrast injection [24,28]. CT is useful for guiding needle aspiration of the affected joint, which is often required to identify the causative organism.

MRI is the investigation of choice for assessing the extent of the infection. MRI is sensitive and more specific than CT. Soft tissue signal abnormalities may be visible after only 48 h [23,29–32]. The capsule and ligaments typically produce a low-intensity signal on T1-weighted images that enhances after gadolinium injection. T2-weighted images show high-intensity signal. MRI can rule out concomitant discitis and, above all, detect local spread, which was found in the 5 patients in our case series who underwent this investigation. Local spread may manifest as abscesses, pyomyositis of the spinal muscles or ilio-psoas muscle, or posterior epidural abscess potentially responsible for spinal cord or nerve root compression.

The treatment relies chiefly on medical measures. Given the absence of a consensus about the optimal treatment of SAFJ, we follow recommendations for discitis. Patients are immobilized in the supine position for 3–4 weeks, after which they gradually resume the erect position with a spinal support. Two antibiotics, usually selected for their effectiveness against staphylococci, are given intravenously for 1 month. Patients are then switched to the oral route, for 2 additional months [6,26,27]. Clinical findings and laboratory tests are monitored closely. Surgery is reserved for patients with neurological manifestations due to epidural abscesses [7,16]. Aspiration of pus from the facet joint under CT guidance may provide faster pain relief and improve the effectiveness of the antibiotics [13].

References


