Prepatellar bursitis: a rare manifestation of chronic brucellosis

Damian P. C. Mawer,1 P. Hugh McGann,2 Jonathan A. T. Sandoe,1,3 Mark Emerton,4 Nicholas J. Beeching5,6,7 and Mark H. Wilcox1,3

Correspondence
Jonathan A. T. Sandoe
jonathan.sandoe@nhs.net

1Department of Microbiology, Leeds General Infirmary, Old Medical School, Thoresby Place, Leeds LS1 3EX, UK
2Department of Infection and Travel Medicine, St James’s University Hospital, Beckett Street, Leeds LS9 7TF, UK
3Leeds Institute of Biomedical and Clinical Sciences, University of Leeds, Old Medical School, Thoresby Place, Leeds LS1 3EX, UK
4Department of Orthopaedics, Chapel Allerton Hospital, Chapeltown Rd, Leeds LS7 4SA, UK
5Tropical and Infectious Disease Unit, Royal Liverpool University Hospital, Prescot Street, Liverpool L7 8XP, UK
6National Institute of Health Research Health Protection Research Unit in Emerging and Zoonotic Infections, Liverpool, UK
7Liverpool School of Tropical Medicine, Pembroke Place, Liverpool L3 5QA, UK

Introduction: Bursitis is a rare complication of brucellosis that has only once been described in a country where disease has been eradicated in domestic animals.

Case Presentation: A 63-year-old diabetic man presented with an 11-year history of painless swelling over his right knee. Magnetic resonance imaging (MRI) showed a large, multiloculated cyst overlying the knee joint. The patient underwent bursectomy which revealed caseous necrosis. Operative samples cultured Brucella abortus. The patient was treated with a combination of surgery and antimicrobials (doxycycline, rifampicin and gentamicin). His only risk factor for acquiring Brucella was drinking unpasteurized milk during childhood. Fifty eight cases of Brucella bursitis have been described in the English-language medical literature. Half have involved the prepatellar bursa. Only one case, from Australia, occurred in a country that has eradicated brucellosis in domestic animals. Although symptoms are often prolonged, local features of inflammation are usually absent. Diagnosis is primarily by bursal fluid culture. Treatment involves antimicrobials with or without aspiration or excision of the bursa. As the diagnosis was unexpected, several laboratory workers were exposed to the Brucella isolate before its identification. Follow up according to UK guidelines revealed no cases of occupationally acquired infection.

Conclusion: Bursitis is an unusual manifestation of brucellosis. It is extremely rare outside countries where the infection is endemic, but the chronicity of symptoms and increase in global travel mean that patients with the condition may present in non-endemic settings. Clinicians should therefore consider the diagnosis in cases of unexplained chronic bursitis.

Keywords: Brucella; brucellosis; bursectomy;; bursitis; doxycycline; gentamicin; prepatellar; rifampicin.
1–7% of bone and joint disease. Only 58 cases have been described in the English language literature over the past 100 years (see Table 1) and this figure may have been inflated by repeated reporting of a number of cases (Johnson & Weed, 1954). Apart from one case from Australia (Davis & Broughton, 1996), all of the reports have come from countries where brucellosis remains endemic in domestic animals.

We describe the first case of Brucella bursitis in England, where brucellosis in domestic animals has been eradicated. As the cause was unexpected, the diagnosis was delayed and a number of laboratory staff were exposed to the isolate before it had been identified. By reporting this case and reviewing the associated literature to highlight common features of the condition, we hope that clinicians in non-endemic countries will consider brucellosis in any unexplained chronic bursitis. This should ensure that the diagnosis is made earlier and that laboratory staff can take the necessary precautions when handling both clinical samples and unidentified bacterial isolates.

### Case report

The patient was a 63-year-old Caucasian man with a history of non-insulin dependent diabetes mellitus and hypertension. He was a retired high school teacher who had consumed unpasteurized milk whilst holidaying in the Republic of Ireland during childhood. The patient holidayed annually at a hotel in Jersey from 2001 to 2011. His only travel outside the UK was to the Pyrenees in 1989. In 2000, he noted a painless swelling over his right knee. It slowly enlarged over the following years, until he was seen by an orthopaedic surgeon in 2005. A diagnosis of a simple cyst was made on the basis of clinical examination and magnetic resonance imaging.

### Table 1. Cases of Brucella bursitis published in the English-language literature

<table>
<thead>
<tr>
<th>Reference</th>
<th>Number of bursitis cases</th>
<th>Total number of patients in series</th>
<th>Site(s) of infected bursa(e)</th>
<th>Species (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kennedy (1904)</td>
<td>1</td>
<td>1</td>
<td>Subdeltoid</td>
<td>Not reported (probable B. melitensis)</td>
</tr>
<tr>
<td>Johnson &amp; Weed (1954)</td>
<td>4</td>
<td>4</td>
<td>Prepatellar</td>
<td>B. abortus</td>
</tr>
<tr>
<td>Rotés-Querol (1957)</td>
<td>3</td>
<td>174</td>
<td>Olecranon (two cases)</td>
<td>Not reported</td>
</tr>
<tr>
<td>Schirger et al. (1960)</td>
<td>3</td>
<td>224</td>
<td>Prepatellar</td>
<td>B. abortus (2)</td>
</tr>
<tr>
<td>Kelly et al. (1960)</td>
<td>8*</td>
<td>36†</td>
<td>Prepatellar</td>
<td>B. abortus (6)</td>
</tr>
<tr>
<td>Ariza et al. (1985)</td>
<td>3</td>
<td>331</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>Mousa et al. (1987)</td>
<td>1</td>
<td>452</td>
<td>Olecranon</td>
<td>Not reported</td>
</tr>
<tr>
<td>Colmenero et al. (1991)</td>
<td>2</td>
<td>263</td>
<td>Olecranon</td>
<td>Not reported</td>
</tr>
<tr>
<td>González-Alvaro et al. (1994)</td>
<td>1</td>
<td>2</td>
<td>Olecranon (bilateral)</td>
<td>B. melitensis</td>
</tr>
<tr>
<td>McDermott et al. (1994)</td>
<td>1</td>
<td>1</td>
<td>Suprapatellar</td>
<td>B. abortus</td>
</tr>
<tr>
<td>Solera et al. (1996)</td>
<td>2</td>
<td>64</td>
<td>Prepatellar ‡</td>
<td>Not reported</td>
</tr>
<tr>
<td>Davis &amp; Broughton (1996)</td>
<td>1</td>
<td>1</td>
<td>Prepatellar</td>
<td>B. abortus</td>
</tr>
<tr>
<td>González-Gay et al. (1997)</td>
<td>1</td>
<td>1</td>
<td>Prepatellar</td>
<td>B. abortus</td>
</tr>
<tr>
<td>Garcia-Porrúa et al. (1999)</td>
<td>3*</td>
<td>(75 cases of septic bursitis)</td>
<td>Not reported</td>
<td>B. abortus</td>
</tr>
<tr>
<td>González-Gay et al. (1999)</td>
<td>3</td>
<td>158</td>
<td>Prepatellar (2)</td>
<td>B. abortus</td>
</tr>
<tr>
<td>Taşova et al. (1999)</td>
<td>5</td>
<td>238</td>
<td>Prepatellar (3)</td>
<td>Not reported</td>
</tr>
<tr>
<td>Guiral et al. (1999)</td>
<td>1</td>
<td>1</td>
<td>Subacromial (2)</td>
<td>Not reported</td>
</tr>
<tr>
<td>Pourbagher et al. (2006)</td>
<td>13‡</td>
<td>251</td>
<td>Iliopsoas</td>
<td>B. melitensis</td>
</tr>
<tr>
<td>Traboulsi et al. (2007)</td>
<td>1</td>
<td>1</td>
<td>Prepatellar (6)</td>
<td>Not reported</td>
</tr>
<tr>
<td>Traboulsi et al. (2007)</td>
<td>1</td>
<td>1</td>
<td>Prepatellar</td>
<td>B. melitensis</td>
</tr>
<tr>
<td>Wallach et al. (2010)</td>
<td>1</td>
<td>1</td>
<td>Prepatellar</td>
<td>B. abortus</td>
</tr>
</tbody>
</table>

* Number likely to include some previously reported cases.
† Cases of osteoarticular brucellosis only.
‡ Unclear if one or both cases involved the prepatellar bursa.
§ Bursitis diagnosed radiologically.

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(MRI). The patient declined an offer of surgical excision. Following this, the lesion continued to enlarge, eventually causing minor restriction of knee flexion. The patient reported experiencing night sweats approximately once per month during this period but no other constitutional symptoms.

In March 2011 he experienced an episode of cellulitis over the knee, precipitated by a carpet burn sustained when he fell at home. The cellulitis was treated with oral flucloxacillin and he was referred back to the orthopaedic surgeon. MRI in April showed a 15 cm multiloculated cyst encasing the anterior aspect and sides of the knee, lying in the soft tissue over the quadriceps muscles and patellar tendon (Fig. 1). The radiological impression was of severe chronic bursitis. Three months later, the patient again developed cellulitis of the skin overlying the lesion. Clinical examination at that time revealed an associated sinus. A superficial swab isolated Streptococcus agalactiae (Lancefield group B). Again, the cellulitis responded to flucloxacillin. In August 2011, a biopsy was taken for histological examination. This showed necrosis with areas of both acute and chronic inflammation, consistent with an infected prepatellar bursa. No sample was sent for culture. One month later, the patient underwent complete excision of the lesion. At surgery, there was extensive caseous necrosis.

Investigations

Three samples of tissue and one of pus were negative on Gram and auramine staining. They were cultured on chocolate, Columbia blood and cysteine lactose electrolyte deficient agar (all from Oxoid) at 36 °C in aerobic conditions (supplemented with carbon dioxide for the chocolate and blood agar). They were also cultured on fastidious anaerobe agar (FAA; E&O Laboratories) at 36 °C in anaerobic conditions. For each tissue sample, an anaerobic broth culture was set up which was subcultured to chocolate, FAA and neomycin agar on 3 consecutive days, after 5 days incubation. All of the tissue samples isolated Serratia marsescens and a coagulase-negative Staphylococcus.

After 72 h incubation, colonies of a small Gram-negative cocco-bacillus were noted on the blood and chocolate agar plates from all samples. The organism was identified by using a VITEK 2 system (Bio Merieux) as Brucella melitensis (98 % probability). Subsequent PCR of the 16S rRNA gene generated a 609 bp sequence that had 100 % similarity with Brucella spp. sequences published on the BLAST database. The Animal and Plant Health Agency Reference Laboratory (Weybridge, England) identified the organism as Brucella abortus biovar five. Serological testing of the patient’s blood at the Brucella Reference Unit (Liverpool, England) showed a Brucella IgG titre of $>1:2560$ and IgM titre of $<1:20$. No follow up testing was performed.

Treatment

The patient was initially given oral ciprofloxacin, 500 mg twice daily, to treat the Serratia superinfection. Following the identification of Brucella, this was switched to oral

![Fig. 1. T2-weighted sagittal (a) and coronal (b) MRIs of the right knee, showing a large cystic lesion overlying the quadriceps muscles and patellar tendon.](http://jmmcr.sgmjournals.org)
doxycycline 100 mg twice daily, oral rifampicin 600 mg once daily and intravenous gentamicin 7 mg kg⁻¹ body weight once daily. After 19 days of antimicrobial therapy, the patient underwent split skin grafting. The gentamicin was stopped at 2 weeks. The original plan was to give the patient a total of 12 weeks oral antibiotics, but treatment was stopped after 6 weeks due to persistent nausea.

Outcome and follow-up
The patient was discharged from follow-up after 11 months, and at 3 years has had no evidence of relapse.

Discussion

Brucella bursitis was first described in 1904 by Kennedy (1904). The condition has parallels with fistulous withers in horses (Cohen et al., 1992). Early published cases are mostly from the USA (Johnson & Weed, 1954; Schirger et al., 1960; Kelly et al., 1960). More recent reports come from northern Spain, Turkey and Kuwait (Taşova et al., 1999; Mousa et al., 1987; Pourbagher et al., 2006; González-Gay et al., 1999). This is consistent with the current global epidemiology of brucellosis, which remains endemic in parts of the Mediterranean and the Middle East (Corbel & Beeching, 2011).

Brucellosis has been described involving a number of bursae (Table 1). Previous reviewers have suggested that the olecranon bursa is the most common site (Akhvlediani et al., 2011) but our review of the literature has revealed more cases of prepatellar bursitis.

In 1954, Johnson & Weed (1954) published the first comprehensive description of four cases of prepatellar bursitis. Six years later, the same group included eight cases in a series of osteoarticular brucellosis (Kelly et al., 1960). It is unclear if the patients from the original report were included in this number. Since that paper, there have been a further four single case reports (Davis & Broughton, 1996; González-Gay et al., 1997; Traboulsi et al., 2007; Wallach et al., 2010). All of these patients have had prepatellar bursitis as the only or main manifestation of Brucella infection. All but one of the cases occurred in men, perhaps reflecting an increased risk of exposure through occupation. In the majority of cases (6/8) the patients were farmers, in whom local inoculation with Brucella may have occurred during recurrent trauma from kneeling (Johnson & Weed, 1954). However, in one case, the route of infection was the consumption of cheese made with unpasteurized milk, suggesting haematogenous seeding of the bursa (Traboulsi et al., 2007). We believe this is the mechanism by which our patient acquired Brucella infection.

Despite the small number of cases of prepatellar bursitis due to Brucella, several common features are evident (Table 2). The first is the duration of symptoms before diagnosis. Although cases are occasionally described as presenting acutely (Akhvlediani et al., 2011), the majority of patients with bursitis are symptomatic for much longer. Amongst the cases of prepatellar infection, the duration of illness ranges from 2 months to 14 years. This is consistent with the observation in several case series that symptoms are more prolonged in patients with osteoarticular forms of brucellosis, compared to those without focal disease (González-Gay et al., 1999; Schirger et al., 1960; Ariza et al.; 1985).

<table>
<thead>
<tr>
<th>Reference</th>
<th>Gender</th>
<th>Occupation</th>
<th>Duration of symptoms</th>
<th>Systemic features</th>
<th>Local inflammation</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson &amp; Weed (1954)</td>
<td>Male</td>
<td>Farmers (four cases)</td>
<td>8 months – 14 years</td>
<td>No</td>
<td>No</td>
<td>Bursectomy in all cases; aureomycin 3 g and streptomycin 1 g daily for 6–30 days in three cases</td>
</tr>
<tr>
<td>Davis &amp; Broughton (1996)</td>
<td>Male</td>
<td>Retired farm worker</td>
<td>2 months</td>
<td>Yes</td>
<td>N/K</td>
<td>Doxycycline for 22 weeks and rifampicin for the first 6 weeks (doses not stated)</td>
</tr>
<tr>
<td>González-Gay et al. (1997)</td>
<td>Male</td>
<td>Farmer</td>
<td>10 years</td>
<td>No</td>
<td>Yes*</td>
<td>Streptomycin 1 g once daily for 3 weeks and doxycycline 100 mg twice daily for 6 weeks plus bursectomy</td>
</tr>
<tr>
<td>Traboulsi et al. (2007)</td>
<td>Female</td>
<td>Housewife</td>
<td>1 year</td>
<td>No</td>
<td>No</td>
<td>Streptomycin 1 g daily and doxycycline 100 mg twice daily for 2 weeks, then doxycycline 100 mg and rifampicin 600 mg one daily for 8 weeks, with recurrent aspiration</td>
</tr>
<tr>
<td>Wallach et al. (2010)</td>
<td>Male</td>
<td>Former abattoir worker</td>
<td>5 years</td>
<td>Yes</td>
<td>Yes</td>
<td>Doxycycline 100 mg twice daily and rifampicin 300 mg twice daily (both for 6 weeks)</td>
</tr>
</tbody>
</table>

* Patient had coinfection with S. agalactiae at presentation
Fever and other constitutional symptoms are common in brucellosis, both with and without osteoarticular involvement (Tašova et al., 1999; Mousa et al., 1987). In contrast, in six of the eight detailed case reports of pre-patellar bursitis, there was no history of fever or other systemic upset (Johnson & Weed, 1954; González-Gay et al., 1997; Traboulsi et al.; 2007). Infrequent night sweats was the only systemic symptom our patient described. In addition, local signs of inflammation are usually mild or absent, except when secondary infection is present (González-Gay et al., 1997). The indolent nature of the Brucella bursitis may relate to the fact that B. abortus is the commonest infecting organism (Table 1). This species is classically said to be less virulent than B. melitensis (Corbel & Beeching, 2011).

Diagnosis is usually achieved by culturing Brucella in synovial fluid aspirated from the bursa (González-Gay et al., 1999), though it is not always positive (Pourbagher et al., 2006). In some cases of bursitis, the organism can also be recovered from blood cultures (García-Porrúa et al., 1999). Serology is almost always positive at high titres in patients with bursitis, as well as other osteoarticular complications (Mousa et al., 1987; Colmenero et al., 1991). In our case, the diagnosis was not expected, and precautions to limit the risk of exposing laboratory workers to Brucella (a category 3 pathogen) were not taken during microbiology processing of samples. Laboratory staff who were exposed to this isolate of B. abortus were followed up in line with UK guidance (Brucella Reference Laboratory, 2013). This did not reveal any evidence of occupationally acquired infection.

Treatment of Brucella bursitis involves antimicrobial therapy with or without aspiration or bursectomy. Early authors favoured surgical resection (Johnson & Weed, 1954; Kelly et al., 1960), but in more recent reports medical treatment alone, sometimes with aspiration, has been successful (González-Alvaro et al., 1994; Traboulsi et al., 2007; Wallach et al., 2010). This most likely reflects improvements in antimicrobial treatment for brucellosis. Our patient underwent complete excision of the lesion before the diagnosis had been made. Subsequent treatment was with 6 weeks of oral doxycycline and rifampicin, with intravenous gentamicin for the first 2 weeks. This combination was chosen in the basis of its efficacy in a meta-analysis of brucellosis treatment trials (Skalsky et al., 2008). Twelve weeks of therapy is advised when focal disease is present (Corbel & Beeching, 2011), but a variety of both agents and treatment durations have been used for bursitis (Table 2).

Bursitis is a rare but well-described complication of brucellosis. This case and review of the literature shows that the diagnosis requires a high index of suspicion as clinical features are often non-specific. The diagnosis should be considered in cases of unexplained chronic bursitis, even in countries where brucellosis has been eradicated in domestic animals. Samples for microbiological analysis should be collected and processed using appropriate precautions to prevent exposure of laboratory staff to the pathogen.

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