Concise Report

Medical vs surgical treatment for the native joint in septic arthritis: a 6-year, single UK academic centre experience

Vinod Ravindran¹, Ian Logan¹ and Brian E. Bourke¹

Objective. Medical treatment (serial closed-needle aspiration) and surgical treatment (arthroscopy/arthrotomy combined with joint washout) are well-recognized methods to treat septic arthritis (SA) of native joints. We compared the outcome of proven SA based on the method of treatment.

Methods. We reviewed case notes of adult patients who were admitted to our institution from January 2001 to December 2006 with proven SA (Newman Grade A organism isolated from the joint).

Results. Thirty-two episodes were treated medically and 19 surgically (4 with arthrotomy, 15 with arthroscopy) in the study period. All had mono-articular SA. No significant difference in the age, symptom duration before treatment and duration of intravenous antibiotic therapy was present between the two groups. Medical treatment resulted in complete recovery in more patients (69% vs 53%, P = 0.24) but longer period of hospitalization [median (interquartile range), 16.5 (14–19) vs 15 (11–17), P = 0.34], although the difference between the groups was not significant. More surgically treated patients had deterioration in functional status at the time of discharge from the hospital (29% vs 44%, P = 0.27), but the difference between the groups was not statistically significant. Surgically treated patients required significantly more sessions of physiotherapy (mean ± s.d., 7 ± 2 vs 10 ± 3, P = 0.002). Mortality was similar (one in each group).

Conclusion. Results from this study show that for the native joint SA, surgical treatment was not superior to the medical treatment and, therefore, highlight the need for careful case selection for surgical intervention.

Key words: Septic arthritis, Treatment, Outcome, Serial aspiration, Arthroscopy.

Introduction

Septic arthritis (SA) is the most serious among a wide variety of conditions that can cause acute mono- or oligoarticular arthritis [1]. Delayed or inadequate treatment of SA leads to irreversible joint damage resulting in disability and economic consequences [1]. Despite better antibiotics and improved hospital care, studies in SA have reported an unchanged case fatality rate of 5–15% [2]. Bacterial products released during the process rapidly induce destruction of the cartilage extracellular matrix. As the adult articular cartilage has poor regenerative capacity, this process may lead to irreversible cartilaginous damage and a dysfunctional joint even if the primary infection is cured with antibiotics [3, 4].

Thus, successful treatment of a septic native joint should include removal of purulent material from the joint space, which can be achieved either surgically (arthroscopy or arthrotomy and washout) or medically (through closed-needle aspiration). Although it is generally accepted that prosthetic joint SA would require surgical intervention, the role of surgical intervention in treatment of native joint SA remains unclear [5].

We assessed the outcome of SF culture-proven SA in our institution in a study over the duration of 6 years (2001–2006). Our primary aim was to compare the outcome of native joint SA based on medical (defined as serial closed-needle aspiration of the affected joint) and surgical treatment (defined as arthroscopy/arthrotomy and washout of the affected joint). Both groups were treated with conventional antibiotic regimens.

Methods

Case ascertainment

Using the hospital activity index (HAI), episodes of SA in adult patients (aged >18 years) in our institution over a 6-year period (January 2001–December 2006) were identified. The microbiology department database was cross-checked to identify patients with positive SF culture in the study period. Patients with prosthetic joint SA or with negative SF culture were excluded from the study. Thus, all patients included in our study fulfilled the Newman Grade A (organism isolated from the joint) criteria [6].

Review of case notes

Case notes of patients were reviewed and using a structured proforma, the following information was extracted: age, gender, pre-existing joint disease, functional status before SA (completely able to perform usual self-care and activities of daily living or any limitation thereof), comorbidities and risk factors for SA, presentation, assessments, investigations, pathogen(s) responsible, treatment and outcome.

Assessment of outcome

Determination of functional status at the time of discharge from the hospital was based on the physiotherapist’s assessment and comments from the team responsible for the management of SA. This information was compared with functional status before SA. Deterioration was defined as any worsening of function or any new limitation in function ascribed to SA. Complete recovery was defined as absence of worsening of functional status and new limitation in function. SA was considered to have contributed to death when no other specific cause was apparent from the case notes.

Statistical analysis

Data were expressed as mean ± s.d. or median [interquartile range (IQR)] where appropriate. Independent Student’s t-tests were used.
for variables with a normal distribution and Mann-Whitney U-test for non-parametric variables. Dichotomous variables were compared using χ²-tests. Statistical analyses were performed using SPSS version 17 software (SPSS, Chicago, IL, USA). All tests were two-tailed and \( P < 0.05 \) was considered significant.

**Results**

**Identification and selection of cases**

In the study period, a total of 82 episodes of SA in adult patients were identified from the HAI. Thirty-one episodes were excluded (18 with prosthetic joint SA and 13 with negative SF culture) following cross-checks with the microbiology department database and review of case notes. The remaining 51 episodes of native joint SA in 50 patients were studied. One patient had an SA of the same joint 2 years apart. Thirty-two episodes were treated medically and 19 were treated surgically. Four episodes in the surgical group (three hips and one knee) were treated with arthroscopy and the rest with arthroscopy.

**General management**

Patients either presented themselves or were referred by their general practitioner to the emergency department, and then by subsequent triage were managed by either orthopaedic or medical specialties. All patients underwent joint aspiration (closed needle and/or arthroscopy/arthrotomy with washout). The majority of medically treated patients required two serial aspirations of the affected joint (range 1–5). In the study period, there were no episodes of medical failures (i.e. the infected joint could not be sterilized after repeated joint aspirations and use of systemic antibiotic therapy).

**Antibiotic therapy**

All episodes of SA were treated with broad-spectrum intravenous antibiotics initially as per the existing protocol in our institution [flucloxacillin and fusidic acid or suitable alternative in patients with known allergies or suspected Gram-negative sepsis or methicillin-resistant *Staphylococcus aureus* (MRSA) or intravenous drug users]. Antibiotic therapy was changed subsequently if required based on Gram-stain characteristics and antibiotic sensitivity of the organism. A switch to suitable oral antibiotic(s) was generally made after 2 weeks of intravenous therapy and/or when improvement in symptoms, signs and acute-phase response was noted. Oral treatment was continued for four more weeks or until an outpatient review. All patients were on oral antibiotic therapy at the time of discharge from the hospital, and the difference in the duration of intravenous antibiotic therapy was not statistically significant between the two groups (Table 1).

**Demographics, presentation and affected joints**

Medically treated patients were older but the difference in the age of patients between the two groups was not statistically significant (Table 1). The majority were males. There was no statistically significant difference in the duration of symptoms before treatment between the two groups (Table 1). All episodes were mono-articular SA. Knee was the commonest joint involved (73%) followed by wrist (14%) and hip (8%). All seven wrist joint SA were treated medically, whereas all four hip joint SA were treated surgically.

**Risk factors**

Pre-existing joint disease (RA or OA) was the most common risk factor in both groups and was not statistically significantly different between the two groups (Table 1). Three patients had recent (range 6 days to 5 weeks) procedures on the affected joint (one each knee arthroscopy, open reduction and internal fixation of elbow fracture and open reduction of shoulder dislocation); all three were treated surgically. In the surgically treated group, one patient was an intravenous drug user and two others had diabetes. The medically treated group had additional risk factors.

**Bacterial isolates**

*Staphylococci* were the most commonly isolated bacteria (53%) (Table 1). Of these, 15 episodes (29%) were due to *S. aureus* and in one mixed growth of both *S. aureus* and coagulase-negative *Staphylococcus* was responsible (supplementary table 1, available Online). MRSA was isolated from the four episodes of SA. Coagulase-negative staphylococci were responsible for the five episodes of SA treated surgically and the two episodes treated medically. Streptococci were implicated in only one episode of SA in the surgical group. Gram-negative bacilli were not cultured in any episode of SA treated medically and 19 were treated surgically.

**Outcome**

**Morbidity.** Medical treatment resulted in complete recovery in more patients (69 vs 53%, \( P = 0.24 \)) but longer period of hospitalization [median (IQR), 16.5 (14–19) vs 15 (11–17), \( P = 0.34 \)] although the difference between the groups was not statistically significant (Table 2).

Of the 13 episodes of knee joint SA treated with arthroscopy and joint lavage, complete recovery was noted only in five. Overall, more medically treated knee joint SA resulted in complete recovery than those who had arthroscopy but the difference was not statistically significant (71 vs 38%, \( P = 0.05 \)).

More surgically treated patients had deterioration in functional status at the time of discharge from the hospital, but the difference between the groups was not statistically significant (29 vs 44%, \( P = 0.27 \)). Surgically treated group required significantly more sessions of physiotherapy.

**Mortality.** One death was reported in each group: one was an 81-year-old female with diabetes who developed multi-organ failure as a result of overwhelming Gram-negative septicemia and the other was a 61-year-old female who had rituximab
therapy for severe active RA and developed knee joint *S. aureus* sepsis 4 weeks after the rituximab therapy.

### Discussion

In the treatment of native joint SA, the role of surgical intervention is still controversial [7, 8] as there is very limited evidence to support this. We compared the outcome of native joint SA treated medically or surgically, better outcome was not seen in the latter group. Arthroscopy with joint washout and debridement is a new but widely used method to treat both native and prosthetic joint SA [9]. In our study, although arthroscopy was used in ~80% of the surgically treated SA, outcome was still not superior when compared with the group treated medically.

The results of our study are similar to the only previous study, which directly compared the outcome of native joint SA in patients treated by arthroscopy or serial needle aspiration [10]. In this study of 59 patients (80% adults), more medically treated patients recovered without sequelae (67% vs 42%) [10].

In our study, the decision regarding which treatment modality to use was made clinically and this choice may have been influenced by the overall health of the patient including comorbidities. It is, therefore, likely that the medically treated group in our study reflected the clinicians' assessment that many of these patients represented poor surgical risks. Even in apparently younger adults with no adverse risk factors, a superior outcome was not observed with surgical treatment. Although surprising, this finding has been noted before [10, 11].

Early surgical intervention in hip joint SA to prevent avascular necrosis and chondrolysis is recommended [2, 12]. All three patients who had arthrotomy for hip joint SA experienced deterioration in their physical status. Poor functional outcome following arthrothomy in patients with native hip joint SA has been recognized [13]. Delayed presentation in native hip joint SA beyond 3 weeks has been shown to be associated with the need for excision arthroplasty [14]. Earlier phase of native hip joint infection (when the articular cartilage is still intact and inflammatory process is restricted to the synovial membrane) could be treated with arthroscopy [13]. The treatment of knee native joint SA by arthroscopy is well established [15]. However, in patients who had this intervention, a significantly better outcome compared with medical treatment was not observed in our study.

Our study was limited by being retrospective with relatively small numbers of patients. However, SA is a rare condition and multicentric prospective randomized controlled trials to ensure large number of patients, although highly desirable, remain logistically difficult. Diagnostic homogeneity to allow comparison was ensured by including only SF culture positive episodes (Newman Grade A) of SA [6]. However, this method of case ascertainment would have left out cases of SA with negative SF culture but with positive culture from other source(s), for example, blood culture.

### Supplementary data

Supplementary data are available at *Rheumatology* Online.

### References