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Original Article

Olecranon septic bursitis managed in an ambulatory setting

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[See acknowledgements for a listing of the members of the HPTP Study Group.]

Medical subject headings: antibiotics; bursitis; cefazolin; clindamycin; elbow joint; home infusion therapy; infusions, parenteral; joint diseases; lactams; sepsis; Staphylococcus aureus; staphylococcal infections; ulna

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Abstract

Background: The epidemiology, outcome and management of olecranon septic bursitis (OSB) have not been described in a large cohort of ambulatory patients.

Methods: A retrospective study of all 118 cases of OSB presenting over 21 months to all regional Home Parenteral Therapy Program clinics in Calgary (referral base approximately 1 million).

Results: The minimum population annual incidence was 10/100 000. The mean (and standard deviation) age was 44 (13) years, and males predominated (88%). One-third of patients had at least one comorbid illness, with preceding injury in 53% of cases. The most common symptoms were pain (87%), redness (77%) and fever or chills (45%). Common signs included erythema (92%), swelling (85%), edema (75%), tenderness (59%), fluctuance (50%), heat (36%) and reduced range of motion (27%). Fever (body temperature of ≥37.8°C) occurred in 20%.

Staphylococcus aureus was identified in 88% of culture-proven cases of OBS. The most common antibiotic regimen was sequential intravenous administration of cefazolin (for a median of 4 d) followed by clindamycin orally (for a median of 8 d). Sixty (51%) patients required a drainage procedure and only 1 patient required admission to hospital.

Conclusion: OSB is more common than reported and can be treated successfully in ambulatory settings with sequential intravenous therapy followed by oral therapy and drainage in selected cases.

Résumé

Contexte : On n’a pas décrit l’épidémiologie, l’issue et la prise en charge de la bursite rétro-olécranienne sep-tique (BRS) dans une cohorte importante de patients ambulatoires.

Méthodes : Étude rétrospective des 118 cas de BRS qui se sont présentés en 21 mois à toutes les cliniques du programme régional de thérapie parentérale à domicile de Calgary (bassin de présentation d’environ 1 million de personnes).

Résultats : L’incidence annuelle minimale selon la population s’est établie à 10 sur 100 000. L’âge moyen (et l’écart type) était de 44 (13) ans et les hommes étaient en majorité (88 %). Le tiers des patients avaient au moins une maladie simultanée et 53 % avaient un traumatisme antérieur. Les symptômes les plus courants étaient la douleur (87 %), la rougeur (77 %) et la fièvre ou les frissons (45 %). Les signes courants comprenaient l’érythème (92 %), l’enflure (85 %), l’œdème (75 %), la sensibilité (59 %), la fluctuance (50 %), la chaleur (36 %) et la réduction de l’amplitude du mouvement (27 %). Vingt pour cent des patients avaient de la fièvre (température
Introduction

Olecranon septic bursitis (OSB) is a well-recognized condition that occurs approximately 4 times as often as infection of the prepatellar bursa.1 Despite its presumed frequent occurrence, published studies of OSB are limited, and population incidence rates are unknown. Investigators from northwestern Spain recently published a series that included 35 cases of OSB collected over 10 years.2 Other series of 20, 17, 12 and 11 cases were published between 1978 and 1986.3–6 These reports identified a predominance of OSB in men, with the majority of cases occupationally related to a history of preceding trauma to the area.2–6 It has also been suggested that diabetes mellitus, alcoholism, chronic renal insufficiency, immunodeficiency and intravenous drug abuse may be associated with development of OSB, but study designs have been inadequate to determine the actual risks.2–6 Staphylococcus aureus has been identified as the cause of OSB in more than 80% of cases.2–6 Other reported bacterial causes have included groups A, B and G streptococci, anaerobes, Brucella abortus, Haemophilus influenzae, Serratia marcescens, Pseudomonas aeruginosa, Enterobacter cloacae and mycobacteria including Mycobacterium tuberculosis, M. xenopi and M. marinum.12–7 There have also been several case reports of septic bursitis due to Prototheca sp. of algae.8–10

The aim of our study was to use a retrospective cohort design to examine the epidemiology, etiology, management and outcome of this disease in a large, regional ambulatory patient population.

Patients and methods

Patient population

The Home Parenteral Therapy Program (HPTP) clinics in Calgary provide outpatient intravenous antibiotic therapy for patients who require this route of treatment but otherwise do not need admission to hospital. The clinics, staffed by 10 infectious disease specialists and 1 general internist, receive about 2000 referrals annually. Most referrals are from local emergency departments where patients typically receive 1 to 3 doses of antibiotics parenterally before presenting to an HPTP clinic. The adult clinics are located at each of the 3 adult acute care hospitals serving the Calgary Regional Health Authority (CRHA, population 930 000): Foothills Medical Centre, Peter Lougheed Centre, and Rockyview General Hospital. The study period was from Apr. 1, 1998, to Dec. 31, 1999, and all patients seen at the HPTP clinics in whom OSB was diagnosed were considered for the study. Patients were identified as possible candidates using the HPTP database, which records diagnostic and demographic information on all patients referred to the HPTP clinics. This study was approved by the University of Calgary Conjoint Medical Research Ethics Board before it was initiated.

Data collection and case definitions

All data were collected by a chart review with use of standardized forms by one of the study investigators (K.B.L.). Both the HPTP clinic chart and the hospital emergency–inpatient charts were reviewed for each patient. Patients were considered to have OSB if this diagnosis was written on the patient’s chart by an HPTP physician and chart review confirmed compatible features.

Information obtained from patients’ charts included demographic data (age, gender, date of first physician contact, initial HPTP assessment, and discharge), clinical information such as symptoms, signs and the presence of potential predisposing factors (including preceding injury and comorbid illnesses), laboratory investigations (including complete blood counts, blood chemistry, cultures and...
radiologic findings) and management (antibiotic type, route of administration and type of drainage). Hospital records were reviewed to obtain data on patients who were subsequently admitted to hospital.

Laboratory analysis

Bacteria were identified and tested for antimicrobial susceptibility by Calgary Laboratory Services using standard methods according to National Committee for Clinical Laboratory Standards guidelines.\textsuperscript{11,12} Antibiotic susceptibility was routinely performed using the automated Vitek system (BioMerieux Vitek, Hazelwood, Mo.).

Data management and analysis

Data from standardized forms were entered manually into a spreadsheet format and analyzed by using the Statistica 5.0 (Statsoft; Tulsa, Okla.) statistical package. All data were assessed for the assumption of normality using histograms before analysis. Normally or near-normally distributed variables were reported as means with standard deviations (SDs) and non-normally distributed variables as medians with ranges. Different means were compared using the $t$-test and medians using the Wilcoxon rank-sum test. Incidence rates were calculated from population statistics obtained from the Alberta Health Population Registry (a local health database). For all comparisons a probability value of less than 0.05 was considered significant.

Results

Population

Over the 21-month study period, 118 cases of physician-diagnosed OSB were identified, representing 3% of all the patients referred to the HPTP clinics. Based on the population served by the HPTP clinics, the minimum population incidences of OSB were 10 for all adults and 18 for adult males per 100 000 population annually. There was a seasonal distribution with peaks in the number of patients presenting to the HPTP clinics in the summer months (Fig. 1). OSB occurred far more commonly in men than in women (88% men, male-to-female ratio, 7.4:1). The
mean (and SD) age was 44 (13) years. Employment status was documented for 46 (39%) cases. There was a broad range of occupations, including those with a heavy physical component (e.g., construction trades, mechanic) and those without (e.g., teacher, lawyer).

Predisposing conditions

A history of preceding elbow injury was identified in 63 (53%) patients of whom 42 (36%) had associated skin lesions. The preceding injury occurred a median of 5 (range from 0 to 38) days before symptom onset. The presence of at least 1 comorbid medical illness was documented in 39 (33%) patients (Table 1).

Clinical characteristics

The median time from symptom onset to first physician contact was 1 day (range from 0 to 27 d) and from symptom onset to HPTP referral was 4 (range from 1 to 26) days. There was a slight predominance of involvement of the left elbow in 63 (53%) patients. The most common symptoms reported were pain (87%), swelling (85%), redness (77%), fever and chills (45%) and increased warmth (19%) over the bursa. Erythema over the elbow was the most commonly recorded sign on physical examination, occurring in 92% of patients. Other important signs included edema (75%), tenderness (59%), fluctuance (50%), heat (36%) over the bursa, decreased range of motion (27%), and lymphadenitis–lymphadenopathy (6%). The mean (and SD) initial temperature recorded in the emergency department was 37.0 (0.8) °C and did not differ significantly whether patients had taken antibiotics orally earlier \( p = 0.08 \) or whether the diagnosis of OSB was associated with a positive bursal culture \( p = 0.4 \). Temperature \( \geq 37.8°C \) was observed in 22 (20%) of 110 patients in whom body temperature was measured.

Laboratory data

Investigations were performed in a minority of patients. Complete blood count was done in 27 (23%) patients and showed a mean (and SD) leukocyte count of 10.2 (3.5) \times 10^9/L. Plain radiographs were obtained in 23 (20%) patients when they were seen in the emergency department. One patient had a nondisplaced fracture and none of the radiographs showed evidence of osteomyelitis. Bursal aspirate or swab samples were sent for culture in 45 (38%) patients. Fourteen swabs were culture negative, all being from patients already receiving antibiotic therapy. Positive cultures included 26 that grew \( S. aureus \) alone, 3 that grew group G \( Streptococcus \), 1 that grew group A \( Streptococcus \), and 1 that grew both \( S. aureus \) and group A \( Streptococcus \). All \( S. aureus \) isolates were sensitive to oxacillin, cefazolin, clindamycin, trimethoprim-sulfamethoxazole, and gentamicin.

Management

Antibiotic treatment most commonly involved intravenously administered cefazolin followed by step-down to orally administered clindamycin. Initial therapy prescribed by emergency physicians was cefazolin in 100 (85%) patients, clindamycin in 15 (13%) and cloxacillin in 1 (1%). Two (2%) patients had received no prior antibiotics because they were referred directly to an HPTP clinic. Four patients receiving cefazolin were switched to clindamycin before referral to an HPTP clinic. In the HPTP clinics at least one dose of antibiotic was given intravenously to all patients. The agents chosen initially were cefazolin in 82 (69%) patients, clindamycin in 35 (30%) and cloxacillin in 1 (1%). Five patients treated with

<table>
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<tr>
<th>Table 1: Comorbid illnesses of patients ((N = 118)) treated in the Home Parenteral Therapy Program in Calgary for olecranon septic bursitis*</th>
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<tbody>
<tr>
<td><strong>Comorbid condition</strong></td>
</tr>
<tr>
<td>Any</td>
</tr>
<tr>
<td>Cardiovascular</td>
</tr>
<tr>
<td>Neurologic</td>
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<td>Musculoskeletal</td>
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*Some patients had more than one comorbid condition.
cefazolin were subsequently switched to other intravenous agents with 4 patients receiving clindamycin and 1 penicillin. The median number of total days of intravenous therapy was 4 (range from 1–14).

The most common choice of antibiotic for oral stepdown therapy was clindamycin (prescribed in 65 [55%] cases). Cephalexin was prescribed for 30 (25%) patients. Penicillin was used as monotherapy in 1 case caused by group G *Streptococcus*. The median duration of oral therapy prescribed was 7 (range from 5–30) days. An antibiotic class change from β-lactam (cefazolin or cloxacillin) to clindamycin occurred during therapy in 61 (52%) patients. The documented reason for the switch was poor response in 12, new allergy to cefazolin in 2 and was unspecified in 47 patients. The total length of antibiotic therapy from the emergency visit to planned completion of oral therapy was a median of 12 (range from 8–35) days. There was no difference in time to HPTP discharge among those patients treated with β-lactams alone compared to those whose regimens included clindamycin (*p* = 0.9).

Sixty (51%) patients had at least 1 drainage procedure for the management of OSB. The first procedure occurred a median of 1 (range from 0–20) days after first physician contact. Twenty patients had 2 procedures and 3 required 3 procedures. Of the total 83 procedures, 51 involved incision and drainage and 32 needle aspiration. With the exception of 1 patient who was admitted to hospital, all procedures were performed in an HPTP clinic, emergency department or ambulatory surgery clinic. One patient required admission (2-d hospital stay) for surgical drainage and observation for prominent systemic symptoms.

**Outcome**

After discharge from the HPTP clinic, 14 patients required further medical attention for OSB. Five patients were reassessed for persistent symptoms and treated further with orally administered antibiotics without problems. One man who was treated with 2 days of cefazolin intravaneously and switched to clindamycin orally returned 3 days later with worsening symptoms. He required 4 more days of cefazolin intravenously before successful stepdown again to orally administered clindamycin. Five patients were reassessed for chronic symptoms, but no further antibiotics were prescribed. One of these patients was referred to a plastic surgeon for complete bursectomy. There was no difference in outcome among patients who received drainage procedures and those who did not.

Diarrhea was a significant adverse event in 3 cases. Two of these patients were recipients of renal transplants. One patient suffered severe diarrhea 1 week after successful treatment with 4 days of cefazolin intravenously followed by 1 week of clindamycin orally. *Clostridium difficile* pseudomembranous colitis was diagnosed by toxin assay and endoscopy and required 2 weeks of inpatient treatment. The second patient was treated with 12 days of cefazolin intravenously, then 5 days of cephalexin orally. *C. difficile*-associated diarrhea was diagnosed at the end of treatment and required oral therapy with metronidazole then vancomycin. A final patient returned to the HPTP clinic 2 days after being stepped down from cefazolin intravenously to clindamycin orally. Antibiotics were discontinued and the diarrhea resolved.

**Discussion**

To our knowledge, this is the largest study of OSB in the English language literature, reporting more than 3 times the number of patients than the next largest series.\(^2\) We were able to establish a minimum incidence rate of OSB in our region and describe the epidemiology in a population-based context. We demonstrated that the majority of patients with OSB may be managed successfully in an ambulatory setting using sequential intravenous followed by oral therapy, and that many patients do not require a drainage procedure for a good treatment outcome.

The number of cases of OSB we identified in our region suggests that this is a common condition. Previous hospital-based studies have reported rates of 0.8 to 12 per 10 000 admissions, but there have been no estimates of population rates.\(^1\)\(^3\) Since virtually all the medical care in the Calgary region is administered by the CRHA and the population size is known we were able to calculate population-based estimates. However, because many cases of OSB may
be treated with orally administered antibiotics and
not referred to the HPTP clinic, our estimate of 10 per 100,000 population per year should be regarded as a minimum incidence. Our ability to identify 118 cases of OSB in only 21 months highlights one strength of a regional-based health care system. For example, in the Spanish single hospital-based study reported by Garcia-Porrua and associates, 35 cases of OSB were identified over a 10-year study period. Because of the ability to identify a large number of cases of disease occurring in the population, jurisdictions such as CRHA are ideal for epidemiologic clinical studies.

As in other reports, we have recognized a preponderance of males and a high rate of preceding injury to the elbow. Although we did not have 2 full years of data, there appeared to be peaks of presentation during the spring and summer months. This may be a result of increased outside physical activities during these warmer months, although this is only speculation. The high rate of preceding injury suggests a causal relationship between the injury and OSB, although it is also possible that patients with OSB are more likely to recall injuries to the elbow as a result of increased attention to the area. However, the majority of patients reporting injuries also had skin lesions suggesting that injury may truly be a risk factor for OSB. The rate (33%) of comorbid conditions observed among the study subjects was similar to that reported in smaller series. These illnesses may be risk factors for acquiring OSB, but they are just as likely to be “risk factors” for severity or referral, or both. This is because only those patients with disease considered to require intravenous therapy are referred to the HPTP clinics.

The clinical features of OSB are typically characterized by pain, swelling and erythema over the olecranon bursa. Of interest is that fever, although a common symptom, was only observed in a minority (20%) of cases. This finding is consistent with previous series reported by Canoso and Sheckman but is in contrast to the reports by Garcia-Porrua and associates and Soderquist and Hedstrom, in which fever was identified in the majority of patients. These varying results could potentially arise from differences in severity, etiology or preceding use of antibiotics. However, in our series, there was no significant difference in temperature among those with or without preceding antibiotic usage or among those with or without positive bursal cultures. These data suggest that the absence of fever should not be used to rule out an infectious cause for OSB.

The finding that S. aureus was the most common identified causative organism of OSB has been consistent among all reported series from North America and Europe. Our study had a relatively low rate of isolation of a causative agent because only 50% of patients had samples collected for culture. Furthermore, antibiotics had been given before samples were taken for culture in all those whose results were negative. Our distribution of infecting agents (S. aureus and groups A and G Streptococcus) likely reflects the true overall etiology in our population because empiric treatment was narrow spectrum and successful. Based on these observations, the empiric use of cloxacillin, first-generation cephalosporin, or clindamycin is reasonable in our population.

One of the most important findings of this study was the demonstration that patients having OSB who require intravenous therapy can be successfully managed as outpatients. Before the HPTP program was introduced, this patient population would have been managed either by multiple emergency department visits or by admission to hospital. The former is inconvenient and also has the disadvantage of increasing emergency department traffic. The latter has the main disadvantage of substantially increasing costs to the system and also requires employed patients to be absent from work. Patients on the HPTP program for short periods (up to 3 d) are required only to come to the clinic once a day. Those on longer-term treatment are visited by a home care nurse at their residence. Since the antibiotics are administered by a small pump that is worn with a belt around the waist, patients are fully ambulatory and many continue to work. The success of managing patients with OSB through the HPTP program is highly dependent on the integrated approach among the HPTP clinic, emergency department and ambulatory surgery clinic staff, and community caregivers.

Although we demonstrated that outpatient management of OSB can be successful, the optimum treatment strategy is not well defined. In our group the most commonly used antibiotic regimen was ce-
fazolin intravenously followed by clindamycin orally. Clindamycin has several features that make it a good choice for the treatment of OSB. It has a relatively broad spectrum of gram-positive activity, including most *Streptococcus* sp, and nearly all strains of methicillin-sensitive *S. aureus* are highly susceptible, with the minimal inhibitory concentrations approximately fourfold lower than for cloxacillin.13 Furthermore, clindamycin achieves high levels in soft tissues, including abscesses, and has the advantage of high oral bioavailability (>90%) compared with cloxacillin (~50%).13–15 In addition, clindamycin may be a better drug than β-lactams for treating OSB because it is not limited by the inoculum effect.16,17 However, there are 3 main drawbacks to the use of clindamycin as compared with β-lactams. First, its spectrum of activity includes anaerobes, which is unnecessary in most cases. Second, a course of clindamycin is substantially more expensive than cloxacillin or first-generation cephalosporins. Third, although not shown in our study, clindamycin is associated with a higher risk of *C. difficile*-associated disease.18 Although we were not able to define an optimal antibiotic for OSB, on the basis of our data it would appear that 4 days of intravenously administered antibiotics followed by orally administered antibiotics to complete 10 to 14 days of total therapy should suffice for most patients.

It is not clear what the optimal strategy for drainage procedures should be for managing OSB. We performed drainage procedures in only one-half of our patients with no appreciable differences in outcome compared with those treated with antibiotics alone. However, patients having more severe disease were likely selected for drainage, so the value of this mode of treatment cannot be determined by our study design. Potential advantages of drainage are that the microbial etiology can be confirmed and that acute symptoms may resolve faster. Disadvantages include the discomfort of the procedure and that patients may be left with an open wound or draining sinus after cure of the acute infection. The results of our study suggest that drainage procedures should not be considered mandatory for the successful treatment of all cases of OSB. Our recommendation is that drainage procedures should be performed in systemically unwell patients or those with easily palpable fluctuant collections, suspected atypical causes, such as immunocompromised patients or those with an unusual exposure history, and in those failing to show a clinical response to 48 to 72 hours of narrow-spectrum antistaphylococcal therapy.

There are some important limitations to this study. First, the diagnostic criteria could have led to inclusion of some noninfectious cases. However, this number is expected to be small since typically there were clinical features to suggest infection (i.e., fever and chills, cellulitis or lymphangitis) and the response to intravenously administered antibiotics was usually prompt. Furthermore, there was no difference in clinical findings between OSB patients with and without positive bursal cultures. Second, clinic or hospital charts are variably complete in reporting clinical information, and missing data is expected to occur. Ideally, data collection would be prospective. Although it is recognized that missing data may lead to bias, variability in chart abstraction was limited by having all chart reviews performed by a single investigator using a standardized data collection form.

In conclusion, OSB is a common condition that primarily affects middle-aged males. It typically follows injury to the elbow and presents with pain, swelling and erythema but often without fever. This condition can usually be treated successfully in an outpatient setting with empiric sequential intravenously followed by orally administered antibiotics directed against *S. aureus*, with drainage reserved for selected cases. Randomized controlled trials are needed to determine the optimal antibiotic management strategy for this condition and to further determine the role of bursal drainage procedures.

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References


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Correction

In the June 2001 issue of the journal, page 142, in the article “Epigenetic inheritance associated with human chromosome 14” by Deepak Kamnasaran, there was an error in Fig. 1. The wording at the far right of the figure “Mouse Chromosome 1” was incorrect. It should read “Mouse Chromosome 14.” We apologize to the author and our readers for this mistake.