

# Epidemiology of Suspected Wrist Joint Infection Versus Inflammation

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**Purpose** To determine the cumulative prevalence of septic arthritis presenting to the emergency department of an academic medical center and evaluate the use of clinical data to diagnose infection versus inflammation.

**Methods** We conducted a records review of a single institution with 80,000 annual emergency room visits. We included a consecutive series of patients with suspected wrist infection from January 1, 2007, to December 31, 2008. Adults complaining of atraumatic wrist pain with either erythema or swelling on physical examination or a final diagnosis of septic arthritis, gout, pseudogout, cellulitis, wrist hematoma/edema, or wrist arthritic flare were suspected to have infection. We collected data using a standardized data abstraction form.

**Results** We reviewed 804 patient records. A total of 104 patients meeting inclusion criteria for suspected wrist joint infection during the 2-year study period were included. Mean age was 62.5 years (SD, 20.2 y); 63 were men. There were 12 patients with a history of gout, 4 with a history of pseudogout, and 19 with a history of diabetes. Wrist arthrocentesis was performed in 31 patients, and 11 underwent surgical treatment. There were 16 patients with a final diagnosis of gout, 11 with pseudogout, 43 with cellulitis, 13 with upper extremity hematoma/edema, and 15 with wrist arthritic flare. The cumulative prevalence of septic arthritis was 5%.

**Conclusions** In this series of emergency department patients with suspected wrist joint infection, gout, pseudogout, and cellulitis were the most common etiologies. The cumulative incidence of septic wrist arthritis was low. (*J Hand Surg* 2011;36A:469–474. Copyright © 2011 by the American Society for Surgery of the Hand. All rights reserved.)

**Key words** Septic joint, infected joint, inflammatory arthritis.

THE PRESENTATION OF a hot, swollen painful wrist joint in the absence of trauma is common in the emergency department. The standard evaluation for these patients does not readily provide an ac-

curate diagnosis. The common etiologies of wrist erythema and edema include gout, pseudogout, cellulitis, hematoma/edema, arthritic flare, and joint infection. Of these, septic arthritis is the primary joint-threatening emergency associated with marked morbidity.<sup>1–3</sup> The standard of care for a septic joint is emergent surgical irrigation and debridement combined with parenteral antibiotics.<sup>4–7</sup> The other inflammatory arthritic etiologies can initially be managed more conservatively with activity modification, splinting, anti-inflammatory medications, and injections, with good results.<sup>8</sup>

Differentiating acute sterile inflammatory arthropathy from infection in the wrist can be difficult. Septic arthritis can also occur concurrently with an inflammatory arthropathy, further increasing the difficulty of

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diagnosis.<sup>9</sup> Although wrist arthrocentesis is currently recommended for cell count, Gram stain, and culture to rule out infection, it often yields insufficient fluid for complete evaluation. Laboratory parameters, including white blood count, erythrocyte sedimentation rate, and C-reactive protein, are often obtained to facilitate diagnosis.<sup>5</sup> However, the diagnostic accuracy of these parameters in the setting of suspected wrist infection is unconfirmed, and there is no published clinical or laboratory criterion that reliably differentiates septic wrist arthritis from a sterile inflammatory arthropathy. The purpose of this study was to describe the clinical and demographic characteristics of patients presenting to the emergency department with wrist inflammation and suspected wrist joint infection, to determine the cumulative prevalence of septic arthritis.

## MATERIALS AND METHODS

This was a single-center health records review of consecutive adult patient visits to the emergency department for atraumatic wrist pain and swelling. The study was conducted at an academic tertiary care institution with 80,000 emergency department visits annually. We reviewed all charts of eligible patients during a 24-month period from January 1, 2007, to December 31, 2008. The institutional review board approved the study.

We identified the records for review in 2 phases. First, we selected potentially eligible patients from a hospital records database. Using International Classification of Disease, Ninth Revision, codes, patients over 18 years of age who presented to the emergency department with a painful, swollen, atraumatic wrist joint were identified. We selected charts with any of the following symptoms recorded as the primary patient complaint, emergency department diagnosis, primary discharge diagnosis, or secondary discharge diagnosis field: wrist and pain, swelling, and heat. We excluded records with any of the following terms: fracture, trauma, fall, accident, motorcycle collision, and motor vehicle accident. This produced a list of 804 patients. The lead author reviewed individual records to identify patients with a suspected septic wrist. Individuals with a primary complaint of atraumatic wrist pain with either erythema or edema documented on the physical examination or a final diagnosis of septic arthritis, gout, pseudogout, cellulitis, wrist hematoma/edema, and arthritic flare were considered to have suspected infection. Cases meeting these criteria were included in the study.

Before beginning data collection, we designed a standardized data abstraction form. The following vari-

ables on each patient were recorded: date of visit, date of birth, gender, medical history (including history of gout, pseudogout, diabetes, coronary artery disease, hypertension, chronic renal insufficiency, and immunocompromised state), white blood count ( $1,000/\text{mm}^3$ ), erythrocyte sedimentation rate (mm/h), C-reactive protein level (mg/dL), whether an arthrocentesis was performed, arthrocentesis and culture results, hospital admission, surgical intervention, and final diagnosis.

For patients who were not referred to a hand specialist, we used the emergency department diagnosis. For patients who were referred to a hand specialist, the final diagnosis was the diagnosis recorded on the consultation note.

We entered all data in Microsoft Office Excel 2003 (Seattle, WA). SAS software (version 9.1 TS Level 1M3; SAS Institute, Inc., Cary, NC) was used for all analyses. Categorical data are presented as the percentage frequency of occurrence, and continuous data as the mean (SD).

## RESULTS

The hospital database search identified 804 records meeting search criteria for atraumatic, swollen, hot, painful wrists over a 2-year period. Manual review of the individual charts identified 104 patient visits that met criteria for the review of hot, swollen, atraumatic wrist pain. The remaining cases of wrist pain were due to animal bites, insect stings, wrist sprains, lacerations, burns, polyarthritic flares, and neuropathy, among others.

Table 1 shows the final diagnosis, management, and baseline patient characteristics for the cohort of patients included in the review. Mean age was 62.5 years (SD, 20.2 y), and most patients were men (63). The most common diagnosis was cellulitis (43), with gout being the second most common diagnosis (16). Five percent of patients had a diagnosis of septic wrist arthritis. One patient was diagnosed with wrist flexor tenosynovitis. Hand surgery consultation was obtained in 47 cases, consisting of a team of orthopedic surgery residents, plastic surgery fellows, hand surgery fellows, and a hand surgery consultant. As may be expected, the work-up was more uniform and consistent in patients seen by the hand surgery services. Arthrocentesis was obtained in 31 wrists and 35 patients were admitted to the hospital. A total of 11 patients underwent surgical irrigation and debridement. There were 12 patients with a history of gout and 18% who were immunocompromised. The most common medical comorbidity was hypertension (45), followed by coronary artery disease (40).

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