

## Brief Reports



### SEPTIC ARTHRITIS IN INTRAVENOUS DRUG ABUSERS: A HISTORICAL COMPARISON OF HABITS AND PATHOGENS

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**Abstract—Background:** Intravenous drug abuse (IVDA) is a common problem; there were more than 16 million users worldwide in 2008. Numerous reports highlight the infectious skeletal complication associated with IVDA. **Objective:** To determine septic arthritis pathogens in IVDA in a U.S. hospital and compare the current causative organisms to a cohort from the 1980s at the same institution. **Methods:** An institutional review board-approved retrospective cohort study compared a consecutive series of IVDA septic arthritis patients over a 10-year period, 1999–2008 (Group B), with an IVDA septic arthritis database that was collected in the 1980s (Group A). **Endpoints were:** bacterial species and staph species antibiotic susceptibility. **Results:** Group B included 58 patients (35 men, 23 women) with a median age of 46.5 years. Group A included 38 patients (30 men, 8 women), with a median age of 32.5 years. The sets were significantly different in pathogens ( $p = 0.0443$ ). The most common organisms were *Staphylococcus* (staph) species (B 74.51%, A 52.63%), followed by *Streptococcus* (strep) species (B 7.84%, A 31.58%), *Pseudomonas* (B 13.73%, A 13.16%), and *Serratia* (B 3.92%, A 2.63%). Of the total number of septic joints, methicillin-resistant *Staphylococcus aureus* (MRSA) made up 39% of Group B and 34% of Group A. However, within the staph species, MRSA made

up 53% of Group B and 65% of Group A. Strep species made up 7.84% (Group B) vs. 31.58% (Group A), and *Pseudomonas* (13%) and *Serratia* (3–4%) were similar. In the Group B cohort, methicillin-susceptible *Staphylococcus aureus* (MSSA) had a predilection to infect the knee (94.4%), whereas MRSA was found more often in the hip (57.1%). **Conclusions:** In IVDA, MRSA is the most common pathogen causing septic arthritis. The ratio of staph species in septic joints is increasing, and the ratio of MRSA to MSSA remains high (>50%). Strep species are much less common. © 2014 Elsevier Inc.

**Keywords—**intravenous drug abuse; septic arthritis; heroin; tripeleminamine; pentazocine; MRSA; MSSA; *Pseudomonas*

#### INTRODUCTION

Intravenous drug abuse (IVDA) is a common problem worldwide, with more than 16 million users reported in 2008 (1). Along with the effects of the drug itself, numerous reports highlight the infectious skeletal complications seen in intravenous drug abusers (IVDA) (2). Pathogens from the skin or from the injected substance gain entrance into the body when drug users inject using nonsterile technique. These pathogens can spread contiguously from adjacent tissues, directly from

Institutional review board approval was obtained from Wayne State University and the Detroit Medical Center, Detroit, Michigan.

inoculation, or hematogenously through a sustained bacteremia, and can lead to septic arthritis or osteomyelitis in the axial skeleton as well as in the extremities.

The microbiology of these skeletal infections has varied widely in the literature. Reports from the 1970s and early 1980s identified *Pseudomonas aeruginosa* (*P. aeruginosa*) as the most common pathogen (3–6). However, recent studies in the United States and European countries have shown *Staphylococcus aureus* (*S. aureus*) to be more common (7–12). The increase in *S. aureus* species has also led to the emergence of methicillin-resistant *Staphylococcus aureus* (MRSA), with the first community-acquired MRSA outbreak occurring in 1981 in Detroit, Michigan (13).

Detroit Receiving Hospital (Wayne State University), is a Level I trauma center located in downtown Detroit that offers care to the underserved inner-city population. We encounter intravenous drug users routinely on our Orthopedic Service. In this study, we looked at whether or not the pathogens causing septic arthritis in our current intravenous drug-abusing population are similar to those seen at our hospital in the 1980s. We also review the changing modalities of this behavior, as well as the techniques of drug use, which is persistent in our population.

## METHODS

An institutional review board-approved retrospective study was performed in patients with documented septic arthritis who were admitted to our hospital from November 1999 to January 2008. The medical charts of the orthopedic service were reviewed and 184 patients were found to have a diagnosis of “septic arthritis.” These charts were reviewed and 58 of these patients were documented as active intravenous drug abusers. We excluded former intravenous drug abusers and fungal culture results to constrain our cohort to bacterial septic arthritis in “active IVDA.” Five of the 58 patients were excluded because they had no growth reported for their cultures despite an operative irrigation and debridement. Our set also contained two cases of mixed septic arthritis that were excluded due to the lack of a comparison group. The first patient was infected with both *Serratia* and *P. aeruginosa*, and the second demonstrated both *S. epidermidis* and *P. aeruginosa*. After necessary exclusions, our group totaled 51 patient cultures for comparison.

We compared these patients to a cohort of active IVDA patients reported by Chandrasekar and Narula from Detroit Receiving Hospital during the 1980s (10). For the most direct comparison, we used Table 2, “Etiology of skeletal infection,” and excluded totals from the column entitled “Osteomyelitis” as our data set pertains to septic joints exclusively (10). This study also excluded

patients with negative culture results (no growth). *Streptococcus* was consolidated into a single category for more concise analysis.

Data points included age, gender, joint affected, culture results, and sensitivity results. Statistical analysis was performed using SAS 9.3 (SAS Institute, Inc., Cary, NC). Low cell counts, specifically with *Serratia*, necessitated the use of Fisher’s exact test for valid comparisons, with alpha set at 0.05.

## RESULTS

Fifty-one IVDA patients with a median age of 46.5 years, including 31 males and 20 females, made up our current data group (Group B). The previous data set from the 1986 paper by Chandrasekar and Narula (Group A) included 38 patients, 30 males and 8 females, with a median age of 32.5 years (10).

When comparing Group A and Group B, we found the sets to be significantly different in pathogen proportions at  $p = 0.0443$ , with a table probability of  $5.86 \text{ E-}05$  using Fisher’s exact test. Of particular interest, methicillin-susceptible *Staphylococcus aureus* (MSSA) and MRSA have supplanted *Streptococcus* species as the most common within our population (i.e., at Detroit Receiving Hospital). Staph species represent 75% of Group B isolates and only 53% of Group A isolates. MRSA represents 39% of Group B isolates and only 34% of Group A isolates. However, within the staph isolates, MRSA represents 53% in Group B and 65% in Group A. MSSA rose from 18% in Group A to 35% in Group B. *Streptococcus* represented 31% in Group A and a mere 8% in Group B. *Pseudomonas* (~13%) and *Serratia* (~3.5%) both presented in comparably small proportions in Groups A and B. In total, Gram-positive aerobes represent nearly equal proportions – 84% in the previous study, 82% in our data set (Table 1).

Another observation involves an interesting distribution across joints (Table 2). In our present population, MSSA was generally found in the knee joint (94.4% of cases), whereas MRSA strains were much less prevalent in the knee and instead were found in the hip (57.1% of cases).

## DISCUSSION

Previous studies in the 1970s and very early 1980s showed *Pseudomonas* to be the most common bacteria among intravenous drug abusers (3–6). At this time, tripelemamine, an antihistamine with weak serotonin reuptake inhibition, and pentazocine, an opioid analgesic, in combination (“T’s and blues”), was a common injectible discovered to give a “high” when injected. After illegal purchase, the pills were crushed

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