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# Long-term results of bacterial septic arthritis of the wrist<sup>☆</sup>



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## KEYWORDS

Septic arthritis;  
Bacterial arthritis;  
Arthrotomy;  
Infection;  
Wrist;  
Staphylococcus aureus

**Abstract** Septic arthritis of the wrist is a serious condition, yet little is known about its long-term outcome. A retrospective analysis of 22 patients treated for bacterial septic arthritis of the wrist was conducted with subsequent follow-up of 18 patients with a median period of 44 months to assess functional results via DASH-Score and clinical examination. Arthrotomy was used to treat all patients; in 19 patients, multiple operations were needed to cure the infection. Follow-up revealed a mean DASH-score of 34 (SD 22) and a significant correlation with needed surgical radicality and number of needed operations. The range of motion of the wrist and grip strength of the affected side was 49% (SD 20%) and 70% (SD 28%) of the contralateral side, respectively. In conclusion, septic arthritis of the wrist leads to long-term functional restrictions with a strong correlation with the stage of the disease. Hence, early diagnosis and treatment are paramount.

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## Introduction

Septic arthritis of the wrist is a surgical emergency in hand surgery. The etiology of this infectious condition ranges

from septic bacteremia to posttraumatic and, importantly, iatrogenic after wrist surgery or intervention. Diagnosis can be challenging and involves differential diagnoses of crystal arthropathy, rheumatoid arthritis, or activated osteoarthritis.

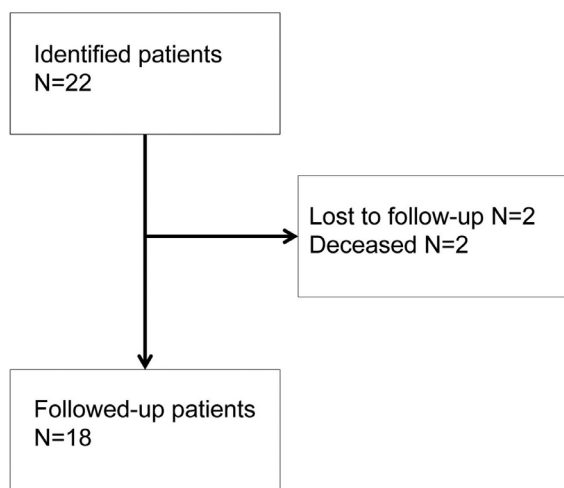
Depending on the state and progress of the infection, radical surgical debridement may require resectioning joint structures, which can ultimately lead to loss of function.

The literature on the long-term results of treatment is scarce. Therefore, this study aimed to perform a long-term follow-up of treated patients with septic arthri-

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**Figure 1** Flow diagram of patients included in the study.

tis of the wrist to assess the functional outcome and disability. We hypothesised long-term disability depending on the stage of infection. Additionally, variables regarding epidemiology, diagnosis, and treatment of the condition were analysed.

## Patients and methods

Twenty-two patients, treated in our institution for bacterial septic arthritis of the wrist from 2008 to 2015, were identified based on their medical records. The inclusion criterion was septic arthritis of the wrist with positive bacterial culture from the microbial specimen; the only exclusion criterion was anyone under the age of 18. [Figure 1](#) shows a flow diagram of the patients included in the study.

Data regarding patient characteristics, diagnostic variables, and treatment were collected retrospectively from their medical records. Patients were then contacted November 2016 via mail and asked to fill out a questionnaire including a standardised “Disabilities of the Arm, Shoulder and Hand” questionnaire (DASH, <http://www.dash.iwh.on.ca/>) and additional questions regarding the side of hand dominance, occupational rehabilitation, and visual analogue scores from 0 to 10 with increments of 0.5 for pain at rest and pain under strain.

Patients were then asked to visit the clinic for a follow-up examination to measure the upper extremity’s range-of-motion and grip strength.

The study was conducted according to the Declaration of Helsinki, approval by the ethics committee of the Ruhr-University in Bochum was given (approval number 16-5830-BR). The STROBE guidelines for cross-sectional studies were followed.

Statistical analyses were performed using Student’s *t*-test to compare means in parametric data. Correlation analyses were performed using Pearson’s correlation coefficient. All the tests were 2-sided, with  $p < 0.05$  considered statistically significant.

## Results

### Retrospective analysis

The age of patients upon diagnosis ranged from 29 to 84 with a median of 60.5 years. 18 of the patients were male, representing the vast majority of the study population.

Three patients were immunocompromised due to therapy or an underlying disease; only one patient had a preexisting condition of gout.

Findings upon presentation included wrist pain (21 patients), wrist swelling (21 patients), erythema (16 patients), and hyperthermia of the wrist (12 patients). A typical presentation of a patient with septic arthritis of the wrist is shown in [Figure 2](#).

Laboratory findings, upon presentation, showed leukocyte levels of 12.8/nl (SD 9.2) with 10 patients within reference range (4-10/nl) and C-reactive protein levels of 13.6 mg/l (SD 10.9) with eight patients within reference range (<5 mg/l).

Radiologic signs of osteolysis, as seen in [Figure 3](#), or infectious alterations of bone were present in seven cases.

In nine patients, septic arthritis evolved after wrist surgery including arthroscopy or scapholunate ligament reconstruction; in one case, a corticosteroid injection into the carpometacarpal joint of the thumb was the underlying etiology.

*Two patients developed septic arthritis as a result of occupational accidents, one patient after SL-ligament rupture and repair and another patient after arthroscopic treatment of TFCC-injury.*

Microbial culture revealed the pathogen to be a Methicilin sensible Staph. aureus (MSSA) in 15 cases, a Methicilin resistant Staph. aureus (MRSA) was found in two cases, and *Mycobacterium tuberculosis* could be identified in one case.

Arthrotomy was used to treat all patients, with 19 patients requiring more than a single operation until the infection was cured, excluding secondary reconstructive operations.

Operative radicality was adjusted to the severity and progress of arthritis; in seven patients, irrigation during surgery and soft tissue debridement was sufficient, four patients additionally received resection of articular surfaces, and ten patients needed resection of carpal bones. One patient had severe necrotising soft tissue infection and received a distal forearm amputation.

In 15 patients, treatment involved immobilisation via an external fixator; this included all patients who had received carpal bone resection.

In the follow-up period, five patients had undergone total wrist fusion; this included four patients who had received carpal bone resection and one patient who had received articular surface resection.

12 patients did not require soft tissue reconstruction, and two patients needed skin grafting. Local flaps were transposed in four cases, and another four patients received free microvascular tissue transfer. [Figure 4](#) shows the final result of a patient receiving a pedicled radial forearm flap. Characteristics of the study population are presented in [Table 1](#).

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