Initial Debridement of Dorsal Hand Abscesses in the Operating Room Does Not Improve Outcomes

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Abstract

Background: Hand infections frequently involve the dorsal aspect of the hand and often develop secondary to some traumatic mechanism. Although *Staphylococcus aureus* is most commonly isolated, anaerobic and polymicrobial infections are not uncommon. To date, treatment is largely anecdotal, with some surgeons preferring a formal debridement in the operating room, while others opt for an initial debridement at the bedside. The goals of this study were to compare outcomes between treatment modalities and to identify the most common causative organisms. **Methods:** A 10-year retrospective chart review was conducted to identify adult patients who presented with a dorsal hand infection to a single, level I, urban trauma center. Demographic data were collected as well as the abscess size, location, duration of symptoms, treatment administered, number of formal debridements, length of hospital stay, and complications. **Results:** The number of formal debridements was significantly less in the initial bedside debridement group ($P < .01$), as was the hospital length of stay ($P < .01$). There was no significant difference in hospital readmissions, complications, or infection due to methicillin-resistant *Staphylococcus aureus*. There was also no significant difference in abscess size, duration of symptoms, or demographic data including age, sex, comorbidities, intravenous drug use status, and immunocompromised status. **Conclusions:** An initial debridement of dorsal hand infections at the bedside is at least as effective as formal debridement in the operating room. This decreases number of formal debridements and days in the hospital, without any increase in complications. This permits safe, expeditious, and cost-effective treatment for this common condition.

Keywords: hand, anatomy, infection, diagnosis, wound management, outcomes, research and health outcomes, treatment, surgery, specialty

Introduction

Infections of the hand are extremely common, particularly among patients with comorbidities such as diabetes, immunocompromised status, or chronic renal disease.^{1,2} The most common site for hand infections is over the dorsal surface and is secondary to some traumatic mechanism.³⁻⁵ Hand swelling, particularly over the dorsum, may be a result of myriad etiologies, and the distinction between infectious and noninfectious pathology is crucial to expedite treatment and maximize chances for a good outcome.⁶ Unfortunately, many of these infections result from a neglected wound, and therefore delayed presentation is not uncommon.⁷

Imaging modalities may be used in conjunction with physical examination to identify deep infections and expedite discovery of the offending bacteria.^{8,9} The most common causative organism is *Staphylococcus aureus*, and for superficial infections, directed antibiotic therapy is typically sufficient to eradicate the infection.^{1,3,5,10} Deeper infections,

however, present a more worrisome picture, as inadequate treatment can often lead to substantial morbidity due to contiguous or hematogenous spread.^{4,10,11}

The principles of hand infection treatment were classically described by Kanavel in 1912, prior to the advent of antibiotic treatment, and relied exclusively upon surgical debridement.¹² Many authors now prescribe a treatment algorithm of elevation, splinting, antibiotics, and surgical management for those infections that are severe or involve the deeper structures of the hand.^{1,3,10} There is, however, no evidence to date to support either formal debridement in the

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Figure 1. Predebridement image of dorsal hand abscess on patient.

Table 1. Comparison of Formal Debridement in the Operating Room Versus Bedside Debridement.

Study Variable	Operating room	Bedside	<i>P</i> value	95% confidence interval
Average trips to operating room	1.14	0.63	<.01	0.33 to 0.69
Average hospital days	4.29	2.92	<.01	0.57 to 2.01
Average readmissions	0.09	0.05	.51	−0.05 to 0.11
Complications	1	1	.89	−0.04 to 0.04

operating room or a simple bedside procedure. At our institution, for example, this choice is typically governed only by surgeon preference. The potential benefits of bedside procedures include decreased hospital costs, decreased time and staff required, and, particularly for sick patients, the ability to avoid general anesthesia. Here, we aim to demonstrate, through retrospective analysis, whether formal debridement in the operating room actually improves patient outcomes and therefore justifies forgoing the aforementioned benefits of a bedside procedure.

Materials and Methods

After obtaining institutional review board approval, a 10-year retrospective chart review was conducted between 2007 and 2017. Patients included in this study were treated at a single, inner-city level 1 trauma center during this time period; were older than 18 years; and were evaluated by an attending physician from the Department of Orthopaedics in the emergency department or during admission to the hospital. Dorsal hand infections were defined as infections on the dorsal aspect of the hand between the metacarpophalangeal (MCP) joint and the wrist crease (Figure 1). Minimum follow-up for inclusion was 6 months after discharge from the hospital.

Based on our search criteria, a total of 139 patients were included in this study with 76 initially debrided in

the operating room and 63 debrided at bedside. This number was sufficient to provide a statistical power of 0.8 using a post hoc analysis. Information obtained from the patient charts included demographics, whether the initial treatment was performed at the bedside or in the operating room, as well as the causative organism, number of trips to the operating room, number of hospital days, and repeat procedures or hospitalizations. An attending physician supervised or performed all bedside or operative procedures.

Statistical comparisons for continuous variables were conducted using an unpaired *t* test or Fisher exact test, whereas discrete variables were compared using a χ^2 test. Statistical significance was determined with a *P* value less than .05.

Results

In this retrospective chart review, 76 patients were initially taken to the operating room for formal debridement of their dorsal hand abscess, whereas 63 had a bedside debridement as the initial procedure. The number of overall trips to the operating room was significantly less in the group treated with an initial debridement at bedside (mean = 0.63 vs 1.14, *P* < .01), as was the total number of hospital days (mean = 2.92 vs 4.21, *P* < .01) (Table 1).

Table 2. Patient Demographics for Dorsal Hand Abscesses Debrided in the Operating Room Versus Abscesses Treated With Initial Bedside Debridement.

Demographic Variable	Operating room	Bedside	P value
Average duration of symptoms, d	4.32	4.69	.50
Average size, cm	2.75	3.28	.47
Average age, y	39.5	40.3	.68
Sex, M/F	53/23	42/21	.72
Diabetes	13	10	1.00
Intravenous drug use	47	35	.49
Immunocompromised	9	6	.79
MRSA	24	29	.11

Note. MRSA = methicillin-resistant *Staphylococcus aureus*.

Infectious disease (ID) was consulted in 11 of the 139 patients. In 5 of these cases, ID was consulted when cultures revealed polymicrobial infections or multidrug resistant organisms not covered by routinely used oral antibiotics such as amoxicillin-clavulanic acid for oral flora or trimethoprim-sulfamethoxazole. Another 3 cases required ID consult due to transient bacteremia and workup of endocarditis, only one of which was positive. In the remaining 3 cases, ID was consulted for input on remote infection, not the hand abscess itself. All patients requiring ID consults were initially treated with debridement in the operating room.

There was no significant difference in the number of readmissions to the hospital, complications, or infection

due to methicillin-resistant *Staphylococcus aureus* (MRSA) (Table 2). There was a single complication in the bedside debridement group, which was a missed proximal interphalangeal joint infection requiring readmission and debridement in the operating room (Figure 2). Likewise, there was one complication in the formal debridement group, which was wound dehiscence requiring readmission (Figure 2).

There was no significant difference in abscess size, duration of symptoms prior to treatment, or demographic data including age, sex, comorbidities, intravenous drug use status, and immunocompromised status (Table 2). The most common offending organism isolated in both groups was MRSA, with no statistical difference between groups. Similarly, there was no difference in the occurrence of any other offending organism between groups (Table 3).

Discussion

Dorsal hand infections are commonly encountered and represent a significant source of morbidity in those not treated appropriately. Unfortunately, poor outcomes may be encountered even in patients who have undergone careful, appropriate management.¹³ Some authors believe that a formal debridement in the operating room is necessary to fully eradicate the offending organism and debride any infected or nonviable tissue.^{3,14} Others, however, support the use of initial bedside debridement with the goal of decompressing the abscess, decreasing the bioburden of the infection, and improving the effectiveness of antibiotic treatment. These

Figure 2. Comparison of outcomes for bedside debridement versus surgical debridement: (a) average number of formal debridements in the OR, (b) average length of admission, (c) total number of readmissions, and (d) total number of complications.

Note. Variables with a statistically significant differences denoted with a “*.” OR = operating room.

Table 3. Culture Results of Dorsal Hand Abscesses Debrided in the Operating Room Versus Abscesses Treated With Initial Bedside Debridement.

Isolated organism	Operating room	Bedside
MRSA	24	34
MSSA	14	12
Strep species	17	12
Gram-negative species	4	1
Polymicrobial	7	1
None identified, specimen lost, or no cultures taken	10	3

Note. MRSA = methicillin-resistant *Staphylococcus aureus*; MSSA = methicillin-susceptible *Staphylococcus aureus*.

treatments have not previously been compared to determine whether patient outcomes are superior with one approach over the other.^{1,5,10}

The results of this retrospective study, which compared groups with similar demographic data, show that an initial debridement of dorsal hand abscesses at the bedside is at least as effective as formal debridement in the operating room. The primary outcome in this study, number of formal debridements in the operating room, was significantly less in the group treated with an initial debridement performed at the bedside, as was the number of hospital days.

Although a specific cost analysis was beyond the scope of this study, the costs of any formal operation well exceed that of a bedside procedure, which does not require operating room time, staff, equipment, or general anesthesia.¹⁵ Furthermore, an initial bedside debridement can be performed more expeditiously in most hospitals and offers the benefit of avoiding general anesthesia, which may be particularly beneficial for patients who are acutely sick or those with significant comorbidities. Conversely, debridement in the operating room offers the benefit of performing the procedure in a controlled, sterile environment. Furthermore, one can perform a larger, more thorough debridement in the operating room, with the option of utilizing a tourniquet to improve visualization.

The limitations of this study include the retrospective nature of data collection, as well as the variability in treatment delivered. Bedside and operative debridements were performed by a variety of physicians including both residents and attending surgeons. The number of patients studied did not permit subgroup analysis of outcomes stratified by treating physician such as resident, fellowship-trained hand surgeon, and orthopedic surgeon without hand fellowship training. Furthermore, we cannot rule out selection bias regarding which patients were chosen for formal debridement in the operating room versus a bedside procedure. Finally, although the outcome between treatments did reach statistical significance, this is not likely to reach a minimum clinically important difference.

In conclusion, the results of this study demonstrate that an initial debridement at the bedside is not subjecting patients to harm or worse outcomes than those taken for a formal debridement in the operating room. Although there are various benefits and drawbacks of each scenario, an initial bedside debridement offers expeditious, cost-effective, and safe treatment, and should therefore be considered for patients presenting with a dorsal hand abscess.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

No human or animal rights were violated during the conduction of this study as it was performed as a retrospective chart review.

Statement of Informed Consent

No consent was required as this was a retrospective study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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