Distal Interphalangeal Joint Arthrodesis Complicated by Postoperative Infection: A Rare Presentation of Disseminated Herpes Simplex Virus.

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ABSTRACT:

Postoperative infection following elective arthrodesis of the interphalangeal joint is an uncommon, yet concerning complication often necessitating urgent debridement. Bacterial pathogens are the most common offenders, and can generally be treated effectively with timely debridement and an appropriate antibiotic regimen. We present the rare case of a female patient with a history of oral herpes lesions who underwent elective arthrodesis of her middle and index fingers for treatment of erosive osteoarthritis, and subsequently developed a florid postoperative herpetic infection at her surgical site. To our knowledge, this is the first report of a disseminated herpes simplex viral infection causing endogenous postoperative reinfection in the hand.
Introduction:

Arthrodesis of the distal interphalangeal (DIP) joint is an effective surgical treatment option for painful end-stage arthritis of the digits. Current techniques utilizing compression screw fixation offer predictable union rates with minimal potential for complications. [1-4] Though uncommon, post-operative infection is a potentially worrisome complication that may necessitate urgent debridement and in some cases, hardware removal. [3] When infection does occur, bacterial organisms are the most common offending pathogens, and are typically treated successfully with debridement and an appropriate antibiotic regimen. Non-bacterial post-surgical infections are uncommon in routine hand surgery. We present the very rare case of a female patient who underwent elective arthrodesis of her middle and index fingers for treatment of erosive osteoarthritis, who subsequently developed a herpetic infection at her surgical site, mimicking a postoperative bacterial infection. To our knowledge, this is the first report of a disseminated post-operative herpetic infection in the hand.

Case Report:

A 46 year-old right-hand-dominant female dental hygienist presented to our clinic for evaluation of a three-year history of progressively-worsening bilateral hand pain. The patient localized the pain to her DIP joints, where she also noted swelling and deformity. She stated that the pain was interfering with her work, and that she also had difficulty with opening jars, often dropping items as well. Her past medical history was noncontributory. Due to her significant family history of rheumatoid arthritis in her mother, psoriatic arthritis in her brother, and erosive arthritis in her sister, she had previously undergone a full workup by her rheumatologist for autoimmune and/or inflammatory disease which was negative. Written review of symptoms was negative for any history of systemic or occupational infectious conditions, including Human Immunodeficiency Virus (HIV) and Herpes Simplex Virus (HSV). Her physical exam was grossly normal with the exception of significantly decreased range of motion in the DIP joints of both hands, worst in the
index and middle fingers. There were no skin lesions noted on her digits or hands bilaterally.

Standard fluoroscopic imaging demonstrated significant erosive degeneration of the DIP joints bilaterally, with the index and middle finger most severely affected. Given her significant pain and functional limitations, the decision was made to proceed with DIP arthrodesis of her left, non-dominant index and middle finger. Under sedation with injected local anesthetic, the patient underwent uncomplicated arthrodesis of her left middle and index finger DIP joints, using 2.3 mm cannulated compression screws (TriMed Cannulated Screw System, TriMed, Santa Clarita, CA; Figure 1). The patient’s operative fingers were steriley dressed and splinted, and she was discharged home that same day.

The patient was instructed to keep her surgical dressing in place until her second postoperative day, at which time she was permitted to shower daily, allowing warm water to gently rinse over her surgical site, without scrubbing. After thoroughly patting her surgical sites dry, she was to re-dress her incisions with sterile gauze. She was instructed to avoid any activity which would lead to sweating, or any form of moisture buildup over the surgical site until her two week follow-up appointment. She was to remain out of work until bony union had been achieved at her fusion sites. On postoperative day 5, the patient attended her originally scheduled visit with the occupational therapist for her standard initial consultation. At this time the patient was noted to have minimal serous drainage from her index finger incision site, and none from her middle finger. Her incisions were redressed and she was placed in custom fabricated cap orthoses for both fingers.

The patient returned to clinic on post-operative day eight, with complaints of worsening pain, swelling and erythema for two days. She denied any fevers or other systemic symptoms. On exam, she was noted to have significant swelling with vesicular lesions over her middle finger dorsally with erythema tracking volarly to the metacarpal-phalangeal (MCP) joint. Her index finger was similarly involved, but
to a lesser extent. \textbf{(Figure 2)} She was also noted to have serosanguinous drainage from her surgical incision sites and blistering dorsally over the proximal phalanx of her middle finger.

Due to concern for acute postoperative bacterial infection, the patient was taken urgently to the operating room for wound exploration, irrigation and debridement. Upon reopening of her wounds, she was found to have some fibrinous exudate, but no frank purulence. After cultures were obtained, her wounds were thoroughly irrigated with a saline and antibiotic mixture, loosely re-approximated and packed with iodoform. Her hand was splinted and she was admitted to the hospital and started on empiric intravenous (IV) vancomycin. After consultation with the infectious disease team on post-operative day one, IV Cefepime was added to the patient’s antibiotic regimen. The following day, the infectious disease team added metronidazole as there had been no clinical improvement in the interim. On the third post-operative day, the erythema and vesicles had worsened. \textbf{(Figure 3)} Only at that time, did the patient reveal a history of intermittent peri-oral ulcers for which she took valacyclovir prophylactically when she would feel a “tingle” in her mouth. Under the presumptive diagnosis of Herpes Simplex Virus (HSV) infection, a Tzanck smear was obtained, and the patient’s antibiotic regimen was switched to IV clindamycin and valacyclovir. By the following day (post-operative day four from her debridement), she had improved clinically and discharged home on oral valacyclovir and clindamycin. Her cultures and Tzanck smear both remained negative. At one month after her debridement, the swelling, erythema and vesicular lesions had all resolved. \textbf{(Figure 4)} At five months, she had minimal complaints, was back to working full-duty, and her fusion sites appeared to have achieved full bony union. \textbf{(Figure 5)}

\textbf{Discussion}

Although infection with HSV is relatively common worldwide, its occurrence in the setting of a surgical site infection is rare, with few such cases reported outside of burn patients. \cite{5, 6} Primary HSV infection typically occurs via direct contact with
infected skin or mucous membranes where the virus is transmitted retrograde along nerve tissue where it can remain latent for a lifetime. [5-7] Numerous internal or external factors can incite recurrence, including local mechanical trauma. [5-9] When recurrence does occur, it most often does so in the nerve distribution of the primary infection, or in close proximity. [7] Endogenous reinfection at a location remote from the primary site is rare, and is typically only seen in the setting of immune system compromise. [7]

The predominant form of the virus, Herpes Simplex Virus Type 1 (HSV-1), most commonly presents on orofacial tissues, typically recurring as herpes labialis. [LEWIS] Not surprisingly, dental care providers are at increased risk of HSV-1 infection as compared to the general population, and particularly vulnerable to infection when treating patients with active herpetic lesions. However, the lack of any visible lesions does not preclude the care provider from becoming infected with HSV-1 as some individuals have been shown to shed HSV-1 in their saliva, even when asymptomatic. [LEWIS]

Given our patient’s history, it is interesting to note that, primary inoculation from a patient that results in herpetic gingiomastivitis is rare; that is, when dental care providers get infected from patients, it is local whitlow. It is also important to note that a prior HSV-1 infection at another site, does not protect from whitlow.

. Series by x et al of four patients, revealed that 3 of the 4 affected failed to adhere to universal precautions, a 4th developed HSV keratitis by an unknown mechanism of transmission, although it was postulated that the virus was aerosoled in that case.

In the presented case, our patient’s primary infection with HSV most likely occurred in the past, given her history of oral ulcers which responded to antivirals. However,
as the patient did not report any history of lesions elsewhere on the body including
the hands, her endogenous postoperative reinfection was most likely the result of a
disseminated HSV infection incited by a stress reaction to surgery. This is in contrast
to the majority of reports on disseminated HSV, which generally occur in critically ill
or immunocompromised patients. [7]

Despite her initial incomplete history, it is unlikely that knowledge of the patient’s
history of oral ulcers would have changed her early management as preoperative
administration of anti-virals is not considered standard prophylactic treatment
outside of burn treatment and laser skin resurfacing. [5, 8] However, at the time the
patient returned to clinic with a clinical picture consistent with infection, a lower
threshold for a diagnosing a viral etiology may have prompted earlier treatment
with IV anti-viral medication. Our patient’s history was of critical importance, given
her negative findings on Tzanck smear. This is not unusual, as sensitivities of the
test for detecting HSV have been reported to range between 50% and 70%. [10]

The complex clinical picture in our case bears many similarities to a case presented
by Brkljac and colleagues whereby a 19-year-old female presented with clinical
findings highly suggestive of flexor tenosynovitis of her middle finger. [9] That
patient underwent three separate operative debridements over a period of 13
months before disclosing a prior history of HSV, after which treatment with
acyclovir resulted full symptom resolution and no recurrences. [9]

In conclusion, we feel this case illustrates an atypical presentation of infection that
the hand surgeon should be aware of. In particular, a clinical picture consistent with
a postoperative bacterial infection that does not improve with operative
debridement and broad-spectrum antibiotics should alert the surgeon to an atypical
pathogen. The importance of clinical history cannot be over-emphasized, as patients
with occupational or social risk factors, or those with prior history of HSV should be
carefully scrutinized. If HSV is suspected, a Tzanck smear should be obtained to aid
in diagnosis, although its suboptimal sensitivity should preclude its use as the sole
determinant for ruling out disease, when negative. Empiric anti-virals should be implemented in cases of high clinical suspicion, although the role of prophylactic anti-viral medication in elective hand surgery remains unclear.
REFERENCES


Figure 1.
Preoperative (a) posteroanterior (PA) and (b) lateral fluoroscopic images of the patient’s operative hand showing significant erosive arthritis at the distal interphalangeal (DIP) joint of the index and middle fingers.

Figure 2.
Postoperative oblique fluoroscopic images demonstrating arthrodesis with screw fixation at the distal interphalangeal (DIP) joints of the index and middle fingers.

Figure 3.
Postoperative day 8 clinical image demonstrating significant swelling with vesicular lesions over the dorsal aspect of her middle finger, and to lesser degree, her index finger with blistering dorsally over proximal phalanx of her middle finger. Serosanguinous drainage was also appreciated from her surgical incision sites.

Figure 4.
Clinical image from post-debridement day 3, demonstrating worsened swelling and vesicular lesions despite broad-spectrum IV antibiotics.

Figure 5.
Clinical images from 5-month follow-up, demonstrating complete resolution of swelling, erythema and vesicular lesions.