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

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1 ABSTRACT:

2 Postoperative infection following elective arthrodesis of the interphalangeal joint is
3 an uncommon, yet concerning complication often necessitating urgent debridement.

4 Bacterial pathogens are the most common offenders, and can generally be treated
5 effectively with timely debridement and an appropriate antibiotic regimen. We

6 present the rare case of a female patient with a history of oral herpes lesions who

7 underwent elective arthrodesis of her middle and index fingers for treatment of

8 erosive osteoarthritis, and subsequently developed a florid postoperative herpetic

9 infection at her surgical site. To our knowledge, this is the first report of a

10 disseminated herpes simplex viral infection causing endogenous postoperative

11 reinfection in the hand.

12

13

14 Introduction:

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

29

30 Case Report:

31 A 46 year-old right-hand-dominant female dental hygienist presented to our clinic
32 for evaluation of a three-year history of progressively-worsening bilateral hand pain.
33 The patient localized the pain to her DIP joints, where she also noted swelling and
34 deformity. She stated that the pain was interfering with her work, and that she also
35 had difficulty with opening jars, often dropping items as well. Her past medical
36 history was noncontributory. Due to her significant family history of rheumatoid
37 arthritis in her mother, psoriatic arthritis in her brother, and erosive arthritis in her
38 sister, she had previously undergone a full workup by her rheumatologist for
39 autoimmune and/or inflammatory disease which was negative. Written review of
40 symptoms was negative for any history of systemic or occupational infectious
41 conditions, including Human Immunodeficiency Virus (HIV) and Herpes Simplex
42 Virus (HSV). Her physical exam was grossly normal with the exception of
43 significantly decreased range of motion in the DIP joints of both hands, worst in the

44 index and middle fingers. There were no skin lesions noted on her digits or hands
45 bilaterally.

46

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

56

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

69

70 The patient returned to clinic on post-operative day eight, with complaints of
71 worsening pain, swelling and erythema for two days. She denied any fevers or other
72 systemic symptoms. On exam, she was noted to have significant swelling with
73 vesicular lesions over her middle finger dorsally with erythema tracking volarly to
74 the metacarpal-phalangeal (MCP) joint. Her index finger was similarly involved, but

75 to a lesser extent. (Figure 2) She was also noted to have serosanguinous drainage
76 from her surgical incision sites and blistering dorsally over the proximal phalanx of
77 her middle finger.

78
79 Due to concern for acute postoperative bacterial infection, the patient was taken
80 urgently to the operating room for wound exploration, irrigation and debridement.
81 Upon reopening of her wounds, she was found to have some fibrinous exudate, but
82 no frank purulence. After cultures were obtained, her wounds were thoroughly
83 irrigated with a saline and antibiotic mixture, loosely re-approximated and packed
84 with iodoform. Her hand was splinted and she was admitted to the hospital and
85 started on empiric intravenous (IV) vancomycin. After consultation with the
86 infectious disease team on post-operative day one, IV Cefepime was added to the
87 patient's antibiotic regimen. The following day, the infectious disease team added
88 metronidazole as there had been no clinical improvement in the interim. On the
89 third post-operative day, the erythema and vesicles had worsened. (Figure 3) Only
90 at that time, did the patient reveal a history of intermittent peri-oral ulcers for
91 which she took valacyclovir prophylactically when she would feel a "tingle" in her
92 mouth. Under the presumptive diagnosis of Herpes Simplex Virus (HSV) infection, a
93 Tzanck smear was obtained, and the patient's antibiotic regimen was switched to IV
94 clindamycin and valacyclovir. By the following day (post-operative day four from
95 her debridement), she had improved clinically and discharged home on oral
96 valacyclovir and clindamycin. Her cultures and Tzanck smear both remained
97 negative. At one month after her debridement, the swelling, erythema and vesicular
98 lesions had all resolved. (Figure 4) At five months, she had minimal complaints, was
99 back to working full-duty, and her fusion sites appeared to have achieved full bony
100 union. (Figure 5)

101

102 Discussion

103 Although infection with HSV is relatively common worldwide, its occurrence in the
104 setting of a surgical site infection is rare, with few such cases reported outside of
105 burn patients. [5, 6] Primary HSV infection typically occurs via direct contact with

106 infected skin or mucous membranes where the virus is transmitted retrograde
107 along nerve tissue where it can remain latent for a lifetime. [5-7] Numerous internal
108 or external factors can incite recurrence, including local mechanical trauma. [5-9]
109 When recurrence does occur, it most often does so in the nerve distribution of the
110 primary infection, or in close proximity. [7] Endogenous reinfection at a location
111 remote from the primary site is rare, and is typically only seen in the setting of
112 immune system compromise. [7]

113

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

122

123 Given our patient's history, it is interesting to note that, primary inoculation from a
124 patient that results in herpetic gingivostomatitis is rare; that is, when dental care
125 providers get infected from patients, it is local whitlow.

126 *It is also important to note that a prior HSV-1 infection at another site, does not*
127 *protect from whitlow.*

128

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

132

133

134

135 In the presented case, our patient's primary infection with HSV most likely occurred
136 in the past, given her history of oral ulcers which responded to antivirals. However,

137 as the patient did not report any history of lesions elsewhere on the body including
138 the hands, her endogenous postoperative reinfection was most likely the result of a
139 disseminated HSV infection incited by a stress reaction to surgery. This is in contrast
140 to the majority of reports on disseminated HSV, which generally occur in critically ill
141 or immunocompromised patients. [7]

142

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

152

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

159

160 In conclusion, we feel this case illustrates an atypical presentation of infection that
161 the hand surgeon should be aware of. In particular, a clinical picture consistent with
162 a postoperative bacterial infection that does not improve with operative
163 debridement and broad-spectrum antibiotics should alert the surgeon to an atypical
164 pathogen. The importance of clinical history cannot be over-emphasized, as patients
165 with occupational or social risk factors, or those with prior history of HSV should be
166 carefully scrutinized. If HSV is suspected, a Tzanck smear should be obtained to aid
167 in diagnosis, although its suboptimal sensitivity should preclude its use as the sole

168 determinant for ruling out disease, when negative. Empiric anti-virals should be
169 implemented in cases of high clinical suspicion, although the role of prophylactic
170 anti-viral medication in elective hand surgery remains unclear.

171

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199

200

201

202 FIGURE LEGEND

203 **Figure 1.**

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

207 **Figure 2.**

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

210 **Figure 3.**

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

215 **Figure 4.**

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

218 **Figure 5.**

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

221