

Clinical Characteristics of Pyogenic Flexor Tenosynovitis in Pediatric Patients

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Purpose To characterize the clinical presentation, common pathogens, antimicrobial susceptibility, and treatment methods associated with pyogenic flexor tenosynovitis (PFT) in pediatric patients.

Methods Patients who underwent surgical treatment for PFT at a large tertiary-care children's hospital between 2001 and 2015 were identified. Descriptive summary statistics were reported on patient demographics, presenting symptoms and clinical examination features, culture results, treatment strategies, and early complications.

Results Thirty-two patients (71.9% male) with a mean age of 9.5 ± 5.5 years (range, 0.8–19 years) were included. At least 3 Kanavel signs were present on presentation in 62% of the cohort, with all 4 signs identified in 34%. Three children (9%) presented with 0 to 1 Kanavel signs, with semiflexed posturing of the digit as the least commonly (41%) manifested sign. The most frequently cultured organisms were methicillin-resistant *Staphylococcus aureus* (MRSA) (38%), methicillin-sensitive *S. aureus* (22%), and *Pasteurella multocida* (13%). Multiple organisms were cultured in 19% of cases. Intravenous antibiotics were administered for a median duration of 4 days (range, 1–16 days) in all cases. Organisms were sensitive to the initial antibiotic regimen in 81% of cases. All methicillin-resistant *S. aureus* infections were sensitive to vancomycin and trimethoprim-sulfamethoxazole, and 83% were sensitive to clindamycin. Incision and drainage (I&D) was performed in all cases, with 18% of patients requiring repeat I&D. Surgical approaches included limited incision (80%), midaxial incision (13%), and Bruner incision (7%). The average length of hospitalization was 5.1 days. Infection resolved in all cases without readmission. No neurovascular complications were identified.

Conclusions The presence of Kanavel signs at presentation are a meaningful indicator of PFT, but are not uniformly present on examination in children and adolescents. Owing to the prevalence of antimicrobial resistance and polymicrobial infection, empirical antibiotic therapy using broad-spectrum agents with MRSA coverage is essential. In our cohort of pediatric patients with PFT of sufficient severity to warrant surgical management, prompt I&D along with culture-guided antibiotics predictably resolves infection. (*J Hand Surg Am.* 2017; ■(■):1.e1-e5. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words Pyogenic flexor tenosynovitis, pediatric, infection.



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PYOGENIC FLEXOR TENOSYNOVITIS (PFT) is an uncommon, yet potentially devastating infection of the flexor tendon sheath requiring timely treatment to prevent loss of function and, in some cases, amputation.^{1–4} Pyogenic flexor tenosynovitis is a clinical diagnosis, most often established with Kanavel's 4 classic signs: flexed posturing of the digit, tenderness to palpation over the tendon sheath, pain with passive extension of the digit, and fusiform digital swelling.^{5,6} Early intravenous antibiotic therapy and multiple modes of surgical irrigation and debridement have proven effective as management of PFT in adult patients.^{2,7,8} The clinical features of PFT in pediatric patients have not been well characterized. The extent to which existing data on the clinical features and management principles in adults apply to children and adolescents is therefore unknown.^{9,10} The objective of this study was to characterize the clinical presentation, common pathogens, antimicrobial susceptibility, and treatment methods associated with PFT in pediatric patients.

MATERIALS AND METHODS

A retrospective review of all patients who underwent surgical treatment for PFT at a tertiary-care children's hospital between January 2001 and October 2015 was performed. Approval from the institutional review board was obtained prior to performing the study. Potential cases were identified via a query of hospital billing records using Current Procedural Terminology codes. Cases were excluded if the review of medical records revealed an alternative diagnosis. Electronic medical records of eligible patients were reviewed and data were abstracted on patient demographics, presenting symptoms and clinical examination, culture results, treatment strategies, and early complications. Descriptive summary statistics were used to report outcome measures.

RESULTS

Thirty-two patients (71.9% male) with a mean age of 9.5 ± 5.5 years (range, 0.8–19 years) were included. Patients presented on average 5.0 ± 3.5 days after symptom onset, with an antecedent injury present in 75% of cases (70% penetrating, 30% blunt). Dog bites accounted for 26% of injuries, and nail-biting was self-reported as the inciting injury in 9% of cases. Fifty-three percent of patients were seen at an outside hospital prior to presentation at our institution. Sixteen percent of patients presented with a delay exceeding 10 days.

TABLE 1. Key Clinical Characteristics at Presentation

Clinical Characteristic	Percentage (n = 32)
Kanavel signs present	
4	34
3	28
2	28
1	6
0	3
Involved digit*	
Thumb	16
Index finger	25
Middle finger	38
Ring finger	19
Little finger	9

*Four patients had infections involving more than 1 digit.

A single digit was infected in 88% of cases, most commonly the middle finger (38%) or index finger (25%), but distributed across all digits (Table 1). At least 3 Kanavel signs were present on presentation in 62% of the cohort, with all 4 signs identified in 34%. Tenderness along the flexor tendon sheath was identified as the most common Kanavel sign (Fig. 1). Three children (9%) presented with 0 to 1 Kanavel signs, with semiflexed posturing of the digit as the least commonly (41%) manifested sign. Applying the generally accepted pediatric febrile temperature threshold of 100.4°F, patients were febrile at presentation in 22% of cases. Subcutaneous purulence was present in 44% of cases and skin necrosis in 12.5%. One patient had findings consistent with osteomyelitis on radiographs. Nine patients had additional sites of infection, including paronychia (4), felon (3), thenar space abscess (1), and dorsal hand abscess (1). Among patients who underwent initial laboratory testing, an elevated white blood cell count was identified in 44% of patients, elevated erythrocyte sedimentation rate (ESR) in 28% of patients, and elevated C-reactive protein (CRP) in 1 patient (Table 2).

The most frequently cultured organisms were methicillin-resistant *Staphylococcus aureus* (MRSA) (38%), methicillin-sensitive *Staphylococcus aureus* (22%), and *Pasteurella multocida* (13%) (Table 3). Multiple organisms were cultured in 19% of cases. Two patients developed associated bacteremia. Intravenous antibiotics were administered in all cases, for a median duration of 4 days (range, 1–16 days) and median duration of total oral and intravenous antibiotics of 16.5 days (range, 7–60 days). Organisms were

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