

Necrosis of both hands and feet in the course of streptococcal sepsis: a case report

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ABSTRACT

A case of severe streptococcal phlegmon of the right upper extremity with subsequent necrosis of both hands and feet in a young, homeless alcoholic man is reported. The disease developed after a minor injury to the hand, and it progressed rapidly, resulting in the involvement of the whole hand and sepsis over 2 days. After admission, antibiotic and anticoagulant therapy was

immediately administered, followed by wide surgical incisions on the hand and forearm. Nonetheless, over the course of 3 days, ischemia of the affected hand developed, followed by ischemia of the contralateral hand and both feet the next day. The treatment employed was not effective, and the patient eventually died on the fifth day after admission.

Keywords: *Streptococcus phlegmon*; sepsis; tissue necrosis.

INTRODUCTION

Phlegmon is a purulent infection spreading out in the loose connective tissue. Phlegmon in the hand is usually a complication of other local infections such as felon, infected wound or purulent tenosynovitis. In most cases an infecting organism is *Staphylococcus aureus* and less frequently *Streptococcus pyogenes*. Factors that predispose to the disease include diabetes, chronic alcoholism and immunodeficiency [1, 2]. A trend is observed to increase the number of phlegmon of Streptococcal etiology treated in the authors' institution [1, 2, 3, 4, 5]. These infections are more dangerous than staphylococcal, because the course is more vigorous, with systemic reaction and frequent sepsis. Also local complications are more serious, including extensive necrosis of the skin, requiring secondary coverage with skin grafts or local flaps. In this article, we report about a patient suffering from streptococcal phlegmon of one hand, which was complicated by sepsis and rapid necrosis of both hands and feet.

CASE REPORT

A 37-year-old man was admitted to the authors' institution due to an infection of his right hand. The patient was a homeless chronic alcoholic with liver dysfunction resulting from chronic ethanol intoxication. Two days earlier, he sustained a minor skin scratch wound on the dorsal side of his hand. The following day, the entire hand exhibited redness, swelling, and other signs of infection. Upon admission, the hand and forearm appeared red and swollen, but certain areas of the skin were pale in a mosaic manner. Multiple small blisters were observed in the red area (Fig. 1). The patient's general condition was moderately serious; he was conscious, with stable circulation and

respiration, temperature of 37°C, blood pressure of 100/60, and a pulse rate 96/min. Biochemical inflammatory tests were significantly elevated: C-reactive protein (CRP) level was 350 mg/dL, leucocyte count was 30 G/L, and procalcitonin concentration was 24 ug/L, suggesting sepsis. The symptoms and signs of infection suggested a streptococcal origin. The patient was immediately administered intravenous antibiotics (amoxicillin with clavulanic acid) and fractionated heparin (enoxaparin, 2 x 0.4 g), followed by surgery. Under brachial plexus block anesthesia, a wide longitudinal incision was made on the dorsal side of the metacarpus, wrist, and forearm. Muddy fluid was discovered at the incision and drained from the subcutaneous tissue for bacterial culture. After achieving hemostasis, the wounds were left open. The patient was transferred to the surgical ward, but his condition deteriorated within a few hours: systemic pressure tended to decrease, pulse rate increased, and he presented mental confusion, suggesting the progression of sepsis. The patient was moved to the Intensive Care Unit, where he was intubated and anti-shock management. The following day, the patient's condition stabilized, and the local status of the hand slightly improved: the intensity of redness decreased, and the swelling subsided. Local treatment involved daily dressing changes, while systemic antibiotic and antithrombotic therapies were continued. Bacterial culture revealed a *Streptococcus pyogenes* infection, which was susceptible to all standard antibiotics. Over the next 3 days, signs of right-hand ischemia were observed: the hand became cold, pale, and the fingers turned dark (Fig. 2, 3). A pulse in the radial artery was not detectable, leading to suspicion of hand artery thrombosis. The dose of enoxaparin was increased to 2 x 0.8 g. The following day, the condition of the hand remained unchanged and similar signs were noticed in the left hand and both feet (Fig. 4, 5). The patient's general condition significantly deteriorated: renal failure developed, and systemic

pressure was low, necessitating high doses of adrenaline and dopamine. Although amputation of necrotic parts of the limbs was considered, it was ultimately canceled due to the patient's critical condition. Unfortunately, the patient eventually died at the fifth day after admission due to septic shock.



FIGURE 1. Characteristic, multiple small blisters observed on the patients forearm and arm



FIGURE 2. The dorsal side of the patient's right hand. Note wide incisions on the skin and signs of ischemia in the digits



FIGURE 3. The palmar side of the patient's right hand. Note signs of ischemia in the hand



FIGURE 4. The left hand of the patient with signs of ischemia



FIGURE 5. The left foot of the patient with signs of ischemia

DISCUSSION

The presented case is one of several subsequent cases of streptococcal phlegmon in the upper extremities that were treated at the authors' institution. Over a span of 5 years (2018–2022), a total of 23 patients were identified and managed. Among them, 2 patients died, and 2 had all 4 fingers in the affected hand amputated [2, 3, 4, 5]. Upon admission, all patients exhibited varying degrees of sepsis, with significantly elevated levels of inflammatory parameters such as CRP and procalcitonin. The general condition of 21 patients allowed for treatment in the surgical ward, while 2 patients required admission to the Intensive Care Unit, where unfortunately they both succumbed to the illness). Surgical intervention was performed for all patients, involving wide incisions in the skin and subcutaneous tissue extending from the hand to the arm (Fig. 1, 6, 7). In cases where multiple parts of the limb displayed signs of infection, repeated incisions were performed on a daily basis. The primary incisions were typically carried out under brachial plexus block anesthesia and a tourniquet, while subsequent incisions were performed under local anesthesia. Some patients required excision of necrotic skin, resulting in defects in the hand or forearm. Once the wounds were clean of pus and tissue debris, they were temporarily closed with stitches. Larger defects necessitated split skin grafting for coverage.

Swab tests conducted on all patients confirmed the presence of *Streptococcus pyogenes* organisms, which were generally susceptible to most antibiotics. Two patients underwent amputation of the II–V fingers due to necrosis (Fig. 6, 7) [3, 4]. This was similar to the case presented in this report, although the other patients did not develop necrosis of the other extremities as observed in this particular patient.



FIGURE 6. Another case of streptococcal phlegmon in the upper extremity. Note necrosis of all fingers and multiple small blisters in the skin



FIGURE 7. Final view of the patient's extremity after finger amputation and closure of the skin incision

The presented case serves as an example of rapid necrosis in both hands and feet during the course of *Streptococcal* infection. The patient exhibited typical characteristics associated with this type of infection: a young, homeless, individual who abused alcohol, likely with immunodeficiency due to chronic alcoholism. The primary cause of the rapid necrosis in the hands and feet was likely thrombosis of distal arteries and veins resulting from the streptococcal infection and sepsis. While such occurrences are uncommon in normal streptococcal hand infections, the authors' institution identified three similar cases [3, 4].

Several case reports in the literature describe similar clinical scenarios, including 3 papers from the authors' institution [2, 3,

4, 5]. Hohendorff et al. reported a case involving an 81-year-old woman who sustained a laceration on her forehead after falling at home. Despite no apparent entry point for the infection on her hand, a fulminant streptococcal necrotizing fasciitis developed and her hand was amputated to save her life [6]. Freyer and Peters documented a case of a 48-year-old patient who was dependent on drugs and developed streptococcal toxic shock syndrome following the combination of levamisole and cocaine usage. This combination proved particularly dangerous, leading to severe intoxication and compromised immunity. The infection entered through a needle bite in the cubital fossa, and limb ischemia occurred accompanied by serious systemic complications. Intensive therapy resulted in the patient's survival, but partial amputations of the limbs were necessary [7].

Other authors reported on 2 patients with necrotizing fasciitis of the hand, whose lives were saved through intensive medical therapy and radical, serial surgical debridement [8, 9].

The problem presented in this article is both interesting and relevant, as streptococcal infections in the upper limb are increasingly occurring in hospitals. It is crucial for doctors working in emergency units and surgical admission rooms to be familiar with the fundamental principles of diagnosing and managing this potentially life-threatening or hand-devastating disease.

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