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## Necrotizing Soft Tissue Infection with Compartment Syndrome: A Case Report

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### ABSTRACT

Necrotizing soft tissue infection (NSTI) is a rare infectious condition that spreads rapidly and may be associated with compartment syndrome. Group A  $\beta$ -hemolytic streptococcus is one of the most common causative organism of NSTI. Herein, we present a case of NSTI associated with compartment syndrome of the upper extremities following possible tonsillitis. The case was successfully treated after administering systemic antibiotics and performing emergency surgical debridement.

**Keywords:** Streptococcus pyogenes, necrotizing soft tissue infections, compartment syndrome

### INTRODUCTION

Necrotizing soft tissue infection (NSTI) is a rare infectious condition that spreads rapidly to subcutaneous soft tissue and muscle tissue (1). NSTI may occur after major traumatic injuries as well as small wounds on the skin or mucosa (e.g., tears, abrasions or insect bites), varicella infection, non-penetrating soft tissue injuries (e.g., muscle stretching or contusion), during routine obstetric and gynecological procedures, after intramuscular injection of nonsteroidal anti-inflammatory drug, and in immunocompromized patients (2, 3).

Group A  $\beta$ -hemolytic streptococcus is one of the most common human pathogens of NSTI. These microorganisms frequently induce ischemic tissue necrosis and systemic inflammatory response by invading subcutaneous tissues with endotoxins and exotoxins (4).

Herein, we have reported a case of NSTI with compartment syndrome in the arm following a possible throat infection.

### CASE REPORT

A 42-year-old male barber was admitted to our department with complaints of high fever, erythema, edema, discoloration, and severe pain in his right arm. He had been admitted to another health facility 4 days prior and had been prescribed oral amoxicillin/clavulanate for a diagnosis of cryptic tonsillitis. Two days later, the patient began to suffer from rash and severe pain in the right arm. An ultrasonography was performed and the patient was admitted to another health institution with these complaints. Antibiotic treatment was continued due to cellulitis seen during ultrasonography and a non-steroid anti-inflammatory agent called dexketoprofen-trometamol was added to the treatment. On admission, the physical examination revealed fever



**Figure 1. Oropharyngeal hyperemia as seen in the patient**

(38.3 C), tachypnea (36 breaths/minute) and tachycardia (112 beats/min). He was conscious, but he was asleep. The oropharynx was hyperemic and no crypt and cervical lymph adenomegaly were seen (Fig. 1). Redness and swelling were seen on the right wrist stretching to the lateral thoracic region (Fig. 2A). There was widespread

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**Figure 2. a, b. (a) Extensive swelling, erythema, redness, and discoloration due to bullae on the right wrist, axillary regions, and lateral thoracic region. (b) Cyanotic appearance of the right hand and fingers**

discoloration due to bullous lesions on the medial side of the right arm. The right hand and fingers were cyanotic and the right radial pulse was weak and filiform (Fig. 2B). There was hypersensitivity on palpation and hypesthesia in the black discolored areas. The patient did not reveal any co-morbid conditions in his medical history. Laboratory findings included leukocytosis, thrombocytopenia, and an elevated level of transaminases (Table 1). Chest-X-ray was normal. The level of C-reactive protein was 388 mg/dl and procalcitonin was 21 mg/dl. Upper Extremity Ultrasound Doppler showed no arterial or venous obstruction. Gram-positive cocci



**Figure 3. Appearance of the lesion after surgical debridement and fasciotomy**

and polymorphonuclear leukocytes were seen on the Gram-stained smear taken from the lesions. Upon achieving a clinical diagnosis of necrotizing soft tissue infections originating from the throat, intravenous crystallized penicillin G (6 × 4 million units), clindamycin (4 × 600 mg), and fluid infusion therapy was initiated. Surgical debridement and a fasciotomy extending from the wrist to the axillary region were performed on the same day (Fig. 3). Revision debridement procedures were carried out four more times. On the third day of treatment, *Streptococcus pyogenes* was isolated from the lesion samples taken intraoperatively. Initial antimicrobial therapy was continued for 14 days and open wounds were closed and grafted. The patient soon recovered and was discharged at the end of the second week of treatment.

## DISCUSSION

NSTI, often called a “necrotizing fasciitis,” is a soft tissue infection that results in extensive, life-threatening necrosis of the skin and tissues. NSTI usually develops with sudden onset and progresses rapidly. It may be associated with sepsis and multisystem organ failure (1). The frequency of disease is 0.3–5 per 100.000 cases; therefore, it can be difficult to distinguish NSTI from other more common clinical conditions such as cellulitis (1). The mortality rate of NSTI is high (between 20% and 30%). Rapid diagnosis of NSTI and emergency surgical debridement of necrotic tissue are associated with decreased mortality (1, 2). Although the presented case was treated with an antistreptococcal oral antibiotic, surgical debridement was needed as well, and a proper clinical response could be obtained only after debridement.

**Table 1.** Laboratory findings during admission, follow-up, and discharge

| Hospital days     | Laboratory parameters     |                           |           |           |             |             |            |            |
|-------------------|---------------------------|---------------------------|-----------|-----------|-------------|-------------|------------|------------|
|                   | WBC (10 <sup>3</sup> /μL) | PLT (10 <sup>3</sup> /μL) | AST (U/L) | ALT (U/L) | BUN (mg/dL) | CRE (mg/dL) | CRP (mg/L) | PCT (μg/L) |
| Day 1 (admission) | 14.500                    | 68.000                    | 55        | 70        | 27          | 0.8         | 388        | 21         |
| Day 3             | 16.110                    | 55.000                    | 34        | 23        | 15          | 0.6         | 310        | 15         |
| Day 7             | 13.500                    | 257.000                   | 28        | 29        | 5           | 0.3         | 84         | 8          |
| Day 10            | 9.860                     | 423.000                   | 19        | 24        | 5           | 0.4         | 99         | 0.4        |
| Day 14            | 6.690                     | 598.000                   | 25        | 30        | 9           | 0.6         | 26         | 0.05       |
| Discharge         | 9.000                     | 434.000                   | 29        | 40        | 6           | 0.3         |            | 0.05       |

WBC: White blood cell; PLT: Platelet; AST: Aspartate aminotransferase; ALT: Alanine aminotransferase; BUN: Blood urea nitrogen; CRE: Creatinine; CRP: C reactive protein; PCT: Procalcitonin

Described risk factors for NSTI are diabetes mellitus, intravenous drug abuse for over 50 years, hypertension, and malnutrition/obesity (5). In a case series of NSTI reported by Türe et al., 2 out of nine cases had no co-morbidity (3). Uehara et al. (6) reported 116 patients with NSTI in the upper extremity. The mortality rate was reported to be higher in patients with advanced age and renal dysfunction, while the risk of amputation was higher in diabetic and septic patients. Our patient did not present any risk factors for NSTI, but clinic-related sepsis was a risk factor during amputation.

Microbiologically, NSTI can be classified into three types. Type 1 infections are polymicrobial and are the most common; they tend to affect the perineum and truncal regions. Type 2 infections, such as those caused by *Staphylococcal*, *Streptococcal*, and *Clostridia* species, are considered to be monomicrobial infections caused by agents. Such infections can cause toxic shock syndrome. Type 3 infections are controversial and constitute the least observed group. They are mediated by *Vibrio vulnificus* and are accessed by a break in the skin exposed to seawater (4). It is known that penicillin plus clindamycin treatment decreases the mortality rate in Type 2 NSTIs caused by group A streptococci (GAS) (7). In this patient, the microorganism was thought to be GAS according to the symptoms (that started with a sore throat) and the Gram staining findings. Therefore, empirical treatment was started with penicillin and clindamycin.

Acute compartment syndrome is a serious and urgent medical condition following a traumatic event in an extremity. The intense edema produced by circumferential NSTI is thought to give rise to compartmental syndrome (8). The risk of amputation increases if the diagnosis is delayed (9). Compartment syndrome due to necrotizing infections is rarely described in the literature. In these cases, a fasciotomy, debridement, or amputation were needed to achieve a proper outcome, much like the present case (8, 10).

## CONCLUSION

Necrotizing soft tissue infection may be associated with compartment syndrome. In infected patients, the risk of limb amputation increases with the development of compartment syndrome. Therefore, immediate surgical intervention is very important. In this case, the patient underwent emergency surgical intervention and rapid systemic antibiotic therapy; therefore, the treatment process was successfully managed, and the patient recovered fully.

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## REFERENCES

1. Fernando SM, Tran A, Cheng W, Rochweg B, Kyeremanteng K, Seely AJE, et al. Necrotizing Soft Tissue Infection: Diagnostic Accuracy of Physical Examination, Imaging, and LRINEC Score: A Systematic Review and Meta-Analysis. *Ann Surg* 2019; 269(1): 58–65. [CrossRef]
2. Stevens DL, Bryant AE. Necrotizing Soft-Tissue Infections. *N Engl J Med* 2017; 377(23): 2253–65. [CrossRef]
3. Türe Z, Demiraslan H, Coruh A, Alp E, Doganay M. Injectional severe soft tissue infection. *Infect Dis (Lond)* 2016; 48(9): 708–11. [CrossRef]
4. Henry SM, Davis KA, Morrison JJ, Scalea TM. Can necrotizing soft tissue infection be reliably diagnosed in the emergency department? *Trauma Surg Acute Care Open* 2018; 3(1): e000157. [CrossRef]
5. Smith-Singares E, Boachie JA, Iglesias IM, Jaffe L, Goldkind A, Jeng EI. Fusobacterium emphysematous pyomyositis with necrotizing fasciitis of the leg presenting as compartment syndrome: a case report. *J Med Case Rep* 2017; 11(1): 332. [CrossRef]
6. Uehara K, Yasunaga H, Morizaki Y, Horiguchi H, Fushimi K, Tanaka S. Necrotising soft-tissue infections of the upper limb: risk factors for amputation and death. *Bone Joint J* 2014; 96-B(11): 1530–4. [CrossRef]
7. Waddington CS, Snelling TL, Carapetis JR. Management of invasive group A streptococcal infections. *J Infect* 2014; 69 Suppl 1: S63–9.
8. Leechavengvongs S, Jidpugdeebodin S, Milindankura S. Necrotising fasciitis causing compartment syndrome of the forearm and septic shock due to *Vibrio vulnificus*: a case report. *Hand Surg* 2006; 11(1-2): 77–82. [CrossRef]
9. Walters TJ, Kottke MA, Hargens AR, Ryan KL. Non-invasive Diagnostics for Extremity Compartment Syndrome following Traumatic Injury: A State of the Art Review. *J Trauma Acute Care Surg*. 2019 Apr 1. doi: 10.1097/TA.0000000000002284. [Epub ahead of print]. [CrossRef]
10. Chang-Chien CH. Bacteraemic necrotizing fasciitis with compartment syndrome caused by non-O1 *Vibrio cholerae*. *J Plast Reconstr Aesthet Surg* 2006; 59(12): 1381–4. [CrossRef]