

Statement of Purpose

The purpose of this study is to highlight a rare presentation of non-specific necrotizing infection with *Streptococcus agalactiae* Group B Streptococcus (GBS) and illustrate an emergent podiatric surgical case with a rare microbiology etiology.

Literature Review

In the article entitled *Necrotizing Fasciitis in Adults Due to Group B Streptococcus. Report of a Case and Review of the Literature* from the Archives of Internal Medicine, Riefler et al. discovered the first case of Group B streptococcal necrotizing fasciitis in an adult diabetic unrelated to obstetric complications in 1988. However, before then, necrotizing fasciitis secondary to Group B streptococcus was described in infants and adult women in the postpartum period. (3)

Ten years later, Gardam et al. postulated that Group B streptococci had been reported to cause necrotizing fasciitis only in 4 instances over the previous four decades before 1998. Two of those cases involved neonates. In their article entitled *Group B Streptococcal Necrotizing Fasciitis and Streptococcal Toxic Shock-Like Syndrome in Adults*, they reported 3 new cases of Group B streptococcal necrotizing fasciitis in adults with significant underlying illness in southern Ontario and Quebec within a 10-month timeframe. Only one of those 3 cases fulfills the criteria for streptococcal toxic shock-like syndrome, such as fever, chills, muscle aches, nausea, vomiting, hypertension, organ failure, tachycardia, and tachypnea. (2)

In 2004, Wong et al. presented and discussed the clinical presentation, antimicrobial therapy, and outcome of five patients with Group B streptococcus necrotizing fasciitis in their article entitled *Group B Streptococcus Necrotizing Fasciitis: An Emerging Disease*. The first patient was a 48-year-old female with underlying conditions/predisposing conditions of diabetes mellitus and peripheral vascular disease. The patient's right thigh was the affected site with a positive tissue biopsy and negative blood culture, requiring wound debridement 3 times for infection control. Parenteral penicillin was used for two weeks followed by amoxicillin for a total duration of 60 days, and the patient survived. The second patient was a 60-year-old diabetic female with the left foot and calf as her affected site. Tissue biopsy was positive with negative blood culture, and the patient required 3 wound debridements for infection control. Parenteral penicillin and cloxacillin were used for 21 days followed by oral penicillin for a further 14 days, and the patient survived. The third patient was a 44-year-old female with underlying comorbidities and predisposing conditions of diabetes mellitus and peripheral vascular disease. The affected side was the left lower limb with a positive tissue biopsy and negative blood culture, requiring wound debridement 2 times for infection control. Parenteral penicillin and cloxacillin were used for 21 days followed by oral amoxicillin for a further 21 days, and the patient survived. The 4th patient was a 51-year-old diabetic female with the right lower limb as her affected site. Both tissue biopsy and blood cultures were positive for GBS, requiring wound debridement 3 times for infection control. Parenteral penicillin for 16 days followed by oral amoxicillin for 21 days were administered, and the patient survived. The 5th patient was a 38-year-old female with no known past medical history. Her right hand was the affected side with both tissue biopsy and blood culture positive for GBS, requiring wound debridement 3 times. Parenteral penicillin for 14 days followed by oral amoxicillin/clavulanate for 14 days were administered, and the patient survived. (4)

In 2019, Collis et al. published a severe case of GBS in their article entitled *Fulminant Group B Streptococcal Necrotizing Fasciitis in a Patient with Undiagnosed Malignancy: A Case Report*. They presented a 70-year-old female with no known past medical conditions reporting to an emergency department complaining of severe pain in her upper back without antecedent trauma. On examination, the patient was febrile with a temperature of 102.9, tachycardic, tachypnic, hypotensive, and disoriented. Her white blood cell count was 13.5 with 100% lymphocyte, and absolute neutropenia. Clinically, erythema, evolving subcutaneous ecchymosis, and extreme tenderness were observed in her right upper back, shoulder area, and right upper arm. She was started on intravenous Vancomycin and intravenous Zosyn, and general surgery was consulted. Thoracic CT scan showed anasarca without gas in the soft tissue as well as extensive thoracic adenopathy concerning for possible lymphoma or metastatic malignancy. The patient became so hypotensive that she required intubation and pressor support. Intraoperatively, necrotizing fasciitis involving the deep dermis and multiple muscle groups were found. The patient was taken to the operating room (OR) twice in a 2-day window due to being floridly septic after the first intervention. Tissue cultures from the OR and blood cultures from admission both grew Group B streptococcus. Lymph nodes from the patient's back showed architectural effacement by a population of small, mature lymphocytes. Peri-scapular lymph node staining positive (brown) for CD20/CD5 and negative for CD10 and cyclin D, a profile consistent with Chronic lymphocytic leukemia (CLL)/small lymphocytic lymphoma. The patient slowly recovered with intensive ICU support. Oncology and plastic surgery were consulted. The patient then underwent extensive skin grafting. She also received treatment for her CLL/small lymphocytic lymphoma. (1)



Figure 1: Initial presentation to the ED.



Figure 2: MRI obtained during inpatient admission.



Figure 3: Presentation after initial procedure



Figure 4: Presentation after Primary closure procedure



Figure 5: Presentation of wound 7 months post initial presentation.

Case Study

The patient is a 63-year-old nondiabetic male with significant past medical history of peripheral arterial and venous disease, hypertension, prior pulmonary embolism and deep vein thrombosis, gastroesophageal reflux disease, stage 3 chronic kidney disease, antiphospholipid syndrome, and bipolar I disorder who presented to the St. Rita's Medical Center (SRMC) Emergency Department with acute onset of excruciating pain and significant swelling of the right calf that began approximately one day prior to presentation. He reported being evaluated by his primary care physician several hours earlier, who expressed concern regarding the acute nature of the right lower extremity findings and advised emergency evaluation. The patient endorsed severe pain with weight-bearing on the right lower extremity, describing the pain as throbbing and similar to a "pulled muscle," rated 6 out of 10, without radiation. He reported working regular 12-hour shifts requiring prolonged standing, which he felt exacerbated his symptoms. The patient was under active podiatric care for a chronic refractory right medial ankle ulcer, which had been slowly improving with Triad cream, collagen powder, daily dressing changes, and compression therapy. However, he expressed increased concern regarding the new onset of calf pain and swelling. He also noted the development of blistering over the right calf one day prior to presentation (Fig. 1). He denied systemic symptoms, including fever, chills, nausea, vomiting, chest pain, palpitations, or shortness of breath.

Surgical history included partial amputation of the left fourth toe and excisional debridement of the left third toe with skin substitute application in February 2023, as well as right medial ankle ulcer debridement with skin substitute application in October 2024.

On vascular examination, dorsalis pedis and posterior tibial pulses were biphasic on Doppler with brisk capillary refill bilaterally. Increased warmth and non-pitting edema were noted in the proximal right calf, with a positive Homan's sign.

Dermatologic examination revealed a fibrogranular venous ulcer on the right medial ankle measuring 5.5 x 4.5 x 0.2 cm with minimal drainage and no overt signs of cellulitis or concerns for osteomyelitis, as well as severe erythema, edema, ecchymosis, and small roofed sanguineous blisters over the right medial calf.

Neurologic examination was intact, and musculoskeletal examination demonstrated significant pain with palpation and compression of the right calf.

Laboratory evaluation revealed leukocytosis with a white blood cell count of 15.0, elevated procalcitonin of 1.23, and C-reactive protein of 23.2, with stable vital signs and no documented fever. Wound cultures grew *Streptococcus agalactiae* and *Pseudomonas aeruginosa*, while blood cultures remained negative.

Venous duplex ultrasound demonstrated chronic mural thrombus with partial flow in the bilateral femoral and popliteal veins, without evidence of acute deep vein thrombosis. Arterial duplex ultrasound showed good distal pulsatility in the right leg.

Radiographs demonstrated degenerative changes and diffuse soft tissue edema without fracture, gas, or osteomyelitis. MRI revealed extensive subcutaneous edema consistent with cellulitis and nonspecific fasciitis between the gastrocnemius and soleus muscles (Fig 2).

The patient was started on intravenous vancomycin and piperacillin-tazobactam on admission, with vancomycin discontinued after 24 hours and piperacillin-tazobactam transitioned to oral linezolid per Infectious Disease recommendations. He underwent staged surgical intervention including right medial compartment fasciotomy, incision and drainage, debridement of the right medial ankle wound, application of skin substitutes, and wound VAC placement (Fig 3). Intraoperatively, necrotic nonviable liquefactive soft tissue was identified and sent for pathology. Subsequent procedures included partial and primary wound closures with additional skin substitute applications (Fig. 4).

The patient continued to receive inpatient wound care with clinical improvement. Post discharge patient was followed closely in the SRMC wound care clinic where aggressive wound care has been performed. Patient's wound has decreased significantly in size and severity (Fig. 5) and has not required further surgical intervention.

Analysis and Discussion

Necrotizing fasciitis is perhaps the most common form of soft tissue infection that affects the superficial fascia and deep subcutaneous tissue with a fulminant course and high mortality rate. The etiology of necrotizing fasciitis is primarily *Streptococcus pyogenes*, Group A Streptococcus (GAS). However, the emergence of *Streptococcus agalactiae*, Group B streptococcus (GBS) has been described in infants and pregnant women.

In our case, a 63-year-old male with no history of type 2 diabetes mellitus presented with a necrotizing fasciitis-like infection. The following procedures were performed:

- Medial crural compartment fasciotomy; right leg incision & drainage with delayed primary closure. Wound debridement of the right medial ankle, application of skin graft to the right medial leg, and application of wound VAC to the right leg.
- Right Leg: primary closure of the anterior medial wound, right partial closure with skin substitute application to the posterior medial crural wound. Application of skin substitute to the anterior of the right crural proximal wound; right leg application of skin substitute to the anterior distal tibial wound, and application of skin substitute to the right medial ankle. Wound vac application to the right leg.

The management of necrotizing fasciitis, per the literature review, includes source control with aggressive surgical debridement in addition to antimicrobial therapy. In some cases, especially in this current case study, multiple surgical debridements and delayed primary closure procedures may be warranted before removing the infected soft tissue region. Negative pressure therapy may be warranted based on the soft tissue defect after the surgical interventions. Additionally, skin substitute grafting materials may be needed for long-term wound care management. Wound care products and regular dressing changes are also significantly important in attempting to facilitate a favorable environment leading to remission and ultimately wound healing. Moisture control, adequate exposure to proper oxygen levels, and adequate intake of nutrients and protein are essential for cellular activity in promoting tissue regeneration.

References

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