CLINICAL VIGNETTE

Fournier's Gangrene Presenting as Left Lower Extremity Weakness

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A thirty-year-old man was admitted to the stroke neurology service with left lower extremity weakness worrisome for stroke. The patient reported sitting on his couch two nights prior when he noticed some left leg weakness along with generalized fatigue. On awakening the following morning, he was unable to lift his left leg off the bed. He also noticed a new rash in his left groin, which was swollen and erythematous. The patient called Emergency Medical Services and was brought to the emergency department by ambulance. A contrast head computed tomogram (CT scan) revealed right middle cerebral artery (MCA) occlusion and old right MCA infarct; therefore, a recrudescence of his prior stroke was suspected. He denied weakness in any other extremities and no bowel or bladder dysfunction was reported. He did not recall any trauma to his left leg and denied fever, chills, cough, diarrhea, or emesis. He has no prior history of cellulitis of the area or perirectal abscess and no known history of prostatitis or other urologic infections. His prior medical history is significant for hypertension, poorly-controlled type two diabetes mellitus, chronic kidney disease on hemodialysis via right chest perm-a-cath three times a week. He had a right middle cerebral artery infarct two years prior and was previously on clopidogrel for one-year post-stroke, with no residual weakness. His medications included carvedilol, hydralazine, lisinopril, metoprolol and hydrochlorothiazide. His diabetes regimen included sitagliptin, lantus insulin, and premeal insulin lispro. He denied alcohol, tobacco, or illicit drug use and his family history was significant for maternal end-stage kidney disease. He had an old left plantar ulcer and was last admitted six months prior for debridement and intravenous antibiotics. There was no redness, swelling, or pain noted in the ulcer. He was started on parenteral vancomycin and piperacillin-tazobactam with concern for left deep plantar infection. A Magnetic Resonance Image (MRI) with contrast of his brain was notable for gliosis and encephalomalacia with evidence of remote hemorrhage in the right MCA territory and left caudate nucleus. The following morning, on the second day of his admission, Medicine was consulted. On physical exam, he was febrile, 37.9^{o} C with a heart rate of 90/min. with normal respiratory rate and blood pressure. He had an obese body habitus with a body mass index of forty. His cardiac, pulmonary, and abdominal exam were unremarkable. His groin and abdominal skin folds were free of intertrigo. Neuro exam was only significant for left lower extremity weakness related to severe pain when he attempted to raise his leg. The skin over his left inguinal area was erythematous, tender, and warm with extension to the scrotum. His labs were remarkable for a leukocytosis of $15X10^3/mm^3$ with a left shift, a hemoglobin of 10 g/dL, and a serum glucose of 277 mg/dL. His C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), creatinine kinase (CK) and aspartate aminotransaminase (AST) were all elevated. Transfer to medicine was initiated and, given the rapid clinical progression and the presence of multiple risk factors, severe soft tissue infection (SSTI) was suspected. A stat CT scan of his pelvis was ordered and general surgery consultation was obtained. Notably, his Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score was 12. His CT scan showed a fourteen-centimeter air and fluid collection in the medial left thigh with subcutaneous gas tracking into the left groin and left hemi-scrotum, concerning for a necrotizing infection such as Fournier's gangrene. Prominent bilateral inguinal as well as left common and external iliac lymphadenopathy was also present (Figure 1). Repeat examination showed worsening erythema, induration, and violaceous extension of the area confirming Fournier's gangrene. He proceeded emergently to the operating room for debridement of his entire scrotum with extensive debridement of his left thigh and perineum including muscle was performed. After an extended stay in the intensive care unit, the patient was discharged.

Discussion

Necrotizing soft tissue infections (NSTI's) include necrotizing fasciitis, myositis, and cellulitis. They usually lead to rapid tissue destruction, systemic illness, and often result in significant morbidity and mortality. Hospitalists and internists need to have a high index of suspicion in the appropriate setting as early accurate diagnosis, treatment, and most importantly, obtaining early surgical intervention are essential.[1] NSTI's can involve the epidermis, dermis, subcutaneous tissue, fascia, and muscle. Necrotizing infection can be categorized based on the offending organism and presence of gas in the tissues. Necrotizing fasciitis (NF) is a deep soft tissue infection that results in rapid destruction of the muscle, fascia, and overlying subcutaneous fat. Most often the infection expands via the muscle fascia because of its lower blood supply. The muscle tissue is frequently spared because of its generous blood supply.[2] Necrotizing fasciitis has two microbiologic types: polymicrobial (type I) caused by aerobic and anaerobic bacteria and monomicrobial infection (type II) infection which is usually caused by Group A *Streptococcus* or other beta-hemolytic *Streptococci*.[3] It may also occur as a result of *Staphylococcus aureus* infection. Less common pathogens causing monomicrobial (type II) necrotizing infection include *Vibrio vulnificus* and *Aeromonas hydrophila* and occur in the setting

of traumatic injury associated with sea water or fresh water, respectively. Fournier's gangrene, necrotizing fasciitis of the perineum, as in our patient, is caused by facultative organisms, *E. coli*, *Klebsiella*, enterococci, along with anaerobes, *Bacteroides*, *Fusobacterium*, *Clostridium*, anaerobic or micro-aerophilic streptococci.[4] The incidence of NF ranges from 0.3 to 15 cases per 100,000 population.[5] Risk factors for NSTI include penetrating or blunt trauma, surgery, including colonic, urologic, and gynecologic procedures, mucosal irregularities: hemorrhoids, rectal fissures, episiotomy, immunosuppression: diabetes, cirrhosis, neutropenia, HIV infection, malignancy, obesity and alcoholism.[6] As in our case, diabetes is an important risk factor for necrotizing infection involving the lower extremities, perineum, and head and neck region.[7] Additionally, the use of sodium-glucose cotransporter-two inhibitors has been associated with NSTI of the perineum.[8] As in our patient, necrotizing infection is more likely to affect the lower extremities than upper extremities, especially in patients with diabetes and/or peripheral vascular disease. Necrosis usually progresses over hours due to extensive tissue destruction leading to systemic toxicity, limb loss, and ultimately death.[9] Therefore, early recognition of necrotizing infection is critical. Clinical manifestations include erythema (70 percent); edema (75 percent); severe pain (out of proportion to exam findings in some cases; 72 percent); fever (60 percent); tissue crepitus (half of cases); and bullae, necrosis, or ecchymosis of the skin (38 percent).[10] As the disease progresses, hypotension, malaise, myalgias, diarrhea, and anorexia can occur. If the edema is severe, it may produce a compartment syndrome requiring fasciotomy. After seventy-two hours, skin breakdown with bullae and gangrene can be seen. By this point reduced sensation develops due to thrombosis of small blood vessels and superficial nerve destruction. Subcutaneous gas is often present in the polymicrobial Type I form of necrotizing fasciitis, especially in patients with diabetes.[11] Laboratory findings are generally nonspecific and may include leukocytosis with left shift, acidosis, coagulopathy, hyponatremia, elevated C-reactive protein and/or erythrocyte sedimentation rate. Elevated creatine kinase (CK) and aspartate aminotransferase (AST) levels suggest deep infection involving muscle or fascia, as in our patient. The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score assess risk of NF. LRINEC is composed of: white cell count, hemoglobin, sodium, glucose, creatinine, and C-reactive protein. Our patient's score of 12 was associated with a >94% likelihood of NF. While a high score may suggest NF, the score should never be used to rule out the diagnosis given its lower sensitivity.[12] Ultimately, surgical exploration, which should never be delayed when there is a high index of suspicion, is the gold standard to confirm the diagnosis of necrotizing infection, evaluate its extent, and to debride devitalized tissue. The surgical goal is to perform aggressive debridement of all necrotic tissue until healthy, viable (bleeding) tissue remains. Inspection and debridement should be continued every one to two days until necrotic tissue is no longer present.[13] For severe necrotizing infection involving the extremities, amputation may be needed to control the infection. Early debridement improves chances of survival which is significantly increased in patients taken to surgery within 24 hours and even more so if within six hours. The best initial radiographic imaging exam is computed tomography (CT) scan. NF should be highly suspected if there is gas in the soft tissues, which is seen most frequently in the setting of clostridial infection or polymicrobial (type I) necrotizing fasciitis. Tissue gas is highly specific for NSTI.[14] Broad-spectrum empiric antibiotic therapy and hemodynamic support should always be implemented pre-, during, and post-surgery. Treating with antibiotic therapy without debridement results in a mortality rate close to 100 percent.[15] Antibiotics should be continued until no further debridement is needed and the patient's hemodynamic status has stabilized. Fournier's gangrene is ultimately associated with a 22 to 40 percent mortality rate. Factors associated with higher death rates include: white blood cell count >30,000/microL; band neutrophils greater than ten percent, serum creatinine >2.0 mg/dL (177 mmol/L), age >60 years, streptococcal toxic shock syndrome, clostridial infection, delay in surgery for more than 24 hours, and infection involving the head, neck, thorax, or abdomen.

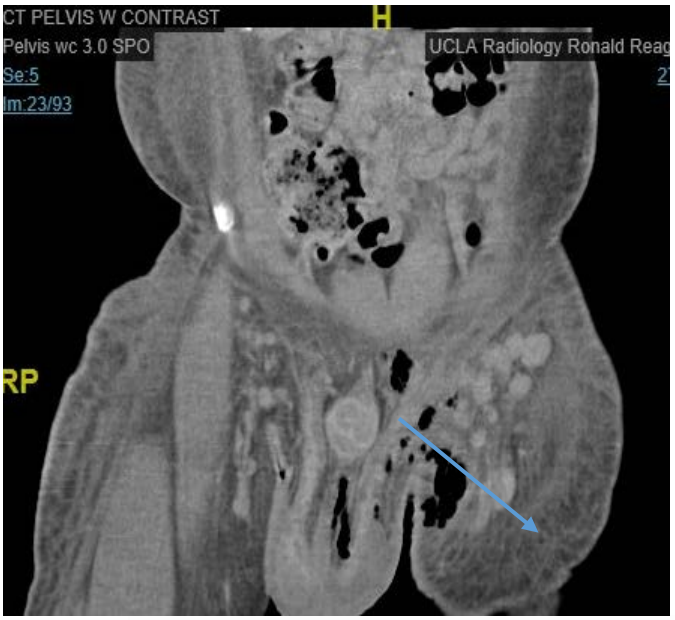

Figure 1. A fourteen-centimeter air and fluid collection in the medial left thigh with subcutaneous gas tracking into the left groin and left hemi-scrotum, concerning for a necrotizing infection such as Fournier's gangrene. Prominent bilateral inguinal as well as left common and external iliac lymph-adenopathy was also present.

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