Acta Scientific Clinical Case Reports

Volume 2 Issue 3 March 2021

Case Report

Atypical Organism of Necrotizing Fasciitis: *Klebsiella oxytoca*

Gary Driver[1]*, Edward Ballow[2] and William G Montross[3]

[1]*Resident PGY3, Department of Podiatric Medicine and Surgery, Rocky Mountain Regional VA Medical Center, Denver, Colorado, United States*

[2]*Chief of Department of Podiatric Medicine and Surgery, Rocky Mountain Regional VA Medical Center, Denver, Colorado, United States*

[3]*UCHealth, Colorado Springs, Colorado, United States*

***Corresponding Author:** Gary Driver, Resident PGY3, Department of Podiatric Medicine and Surgery, Rocky Mountain Regional VA Medical Center, Denver, Colorado, United States.

Received: February 11, 2021

Published: February 25, 2021

Abstract

Klebsiella infection is a rare cause of necrotizing fasciitis that presents with multifocal infection sites and hematogenous spread [1]. *Klebsiella oxytoca* infection is even more rare. This organism is strongly associated with septic shock, acute renal failure, and multi-organ Involvement in the setting of necrotizing fasciitis. We report a 75-year-old male with *Klebsiella oxytoca* necrotizing fasciitis who presented to the Emergency Department with eruptions of bilateral lower extremities and pain. Soft tissue emphysema was noted to the left foot and ankle. The patient had an indwelling foley catheter in place for one week prior to presentation. Tissue culture revealed *Klebsiella oxytoca* and urine culture revealed *Klebsiella oxytoca* and *Escherichia coli.* The history and presentation shows strong association that the source of inoculation would be hematogenous spread to bilateral lower extremities from a urinary tract infection.

Keywords: Necrotizing Fasciitis; *Klebsiella oxytoca*

Introduction

To our knowledge there are less than five cases of *Klebsiella oxytoca* causing necrotizing fasciitis that have been reported in the literature. Greer., *et al*. reported a case of a patient developing three discontinuous areas of necrotizing fasciitis to the lower extremities caused by *Klebsiella oxytoca* after heart transplantation [12]. Oishi., *et al*. documented a case of an immunocompromised patient that suffered bacterial translocation of *Klebsiella oxytoca* to the lower extremities [13]. Lodha., *et al*. describe another case report of a 19-day-old boy diagnosed with *Klebsiella oxytoca* NF following acute appendicitis [14].

One of the difficulties with treatment of necrotizing fasciitis is the swift nature of the progression of and subtle clinical signs to guide toward the diagnosis. In 2004, Wong., *et al*. developed the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score. This score was based on routine laboratory examinations [7]. The LRINEC score is a 13-point scoring system based on 6 laboratory tests: C-reactive protein (CRP), total white cell count, hemoglobin, sodium, creatinine and glucose. A score of ≥ 6 should raise suspicion and a score ≥ 8 is a strong predictor of underlying necrotizing fasciitis infection.

In the original paper by Wong., *et al*. in 2004, they demonstrated a positive predictive value of 92% and a negative predictive value of 96% [7]. However, these high values have only been reproduced a few times in the literature. Fais., *et al*. (2018) reported a case series of seven patients with necrotizing fasciitis and reported the LRINEC score turned positive only a few hours before septic shock. They also reported in this case series that death occurred within 24 hours of septic shock. In Type II cases with the presence of emphysema via radiographs, multi-organ failure and death occurred less than 12 hours from septic shock [4].

Case Report

A 75 y/o male with a history of diabetes mellitus Type 2 and chronic kidney disease stage 3 presented to the Emergency Department with chief complaint of pain in bilateral feet and legs for the past 4 - 6 days. He was recently admitted for treatment of *Clostridium difficile* Colitis and septic shock. He was seen 4 days prior to the ED visit by his primary care physician with complaint of right first metatarsophalangeal joint pain and was treated with prednisone for suspected gout. The pain had increased and had spread to the contralateral limb. He admitted to pain in the left heel and right 3rd digit with edema and blisters to bilateral feet. He denied any dermatological changes proximal to his knees, but did admit to bilateral thigh pain. He had an indwelling catheter in place for one week and admitted to scrotal edema.-

Physical examination revealed dusky erythematous changes with a 1cm serous bullae noted to the dorsal 3rd interspace, left foot. Dusky erythematous changes were noted to the medial left ankle with a 4cm mixed hemorrhagic/serous bullae. Fluctuance and crepitus was noted of the left foot and ankle (Figure 1 and 2). The right foot had an abrasion/ruptured bullae at the base of the digits without point tenderness. No fluctuance or crepitus was noted to the right foot or ankle. There were unremarkable dermatological findings proximal to the mid lower leg bilaterally and non-pitting diffuse 3+ edema noted distal to the knee bilaterally. Pain was noted on palpation to erythematous areas bilaterally (L > R) and pain noted on palpation proximal to the knee to the thigh region bilaterally (L > R).

Upon admission, his vitals were within normal limits. His cardiac, pulmonary, and abdominal examinations were normal. Patient was alert and oriented with no clouding of consciousness. His laboratory findings were as follows: white blood cell count

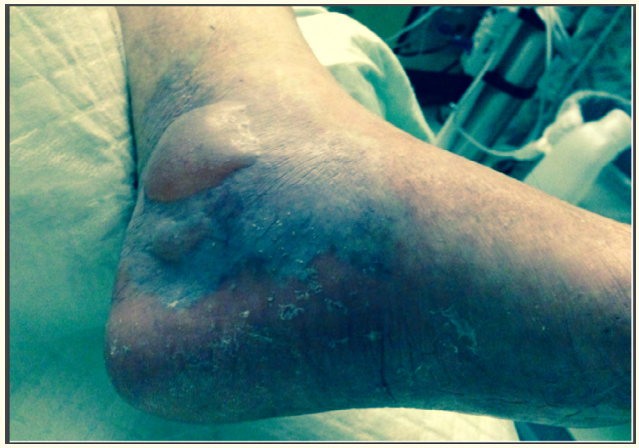


Figure 1: Dusky erythematous changes were noted to the medial left ankle with a 4 cm mixed hemorrhagic/serous bullae.

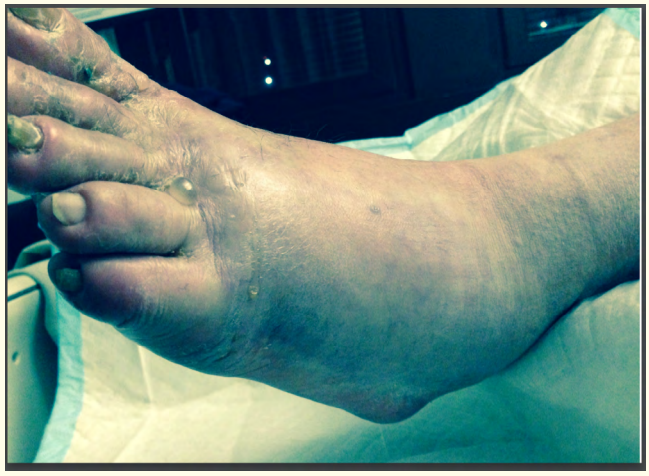


Figure 2: Dusky erythematous changes with a 1cm serous bullae noted to the dorsal 3rd interspace, left foot.

11.2 mm^3; hemoglobin, 11.9 g/dl; platelet count, 191 per mm^3; sodium, 132 meq/L; potassium, 6.7 meq/L; serum creatinine, 2.2 mg/dl; EGFR, 29.30; serum creatine phosphokinase, 194.2 U/L; glucose, 425 mg/dl; C-reactive protein, 116 mg/L. Radiographs revealed large subcutaneous emphysema in the left foot and ankle and benign radiographic findings of the right foot (Figure 3).

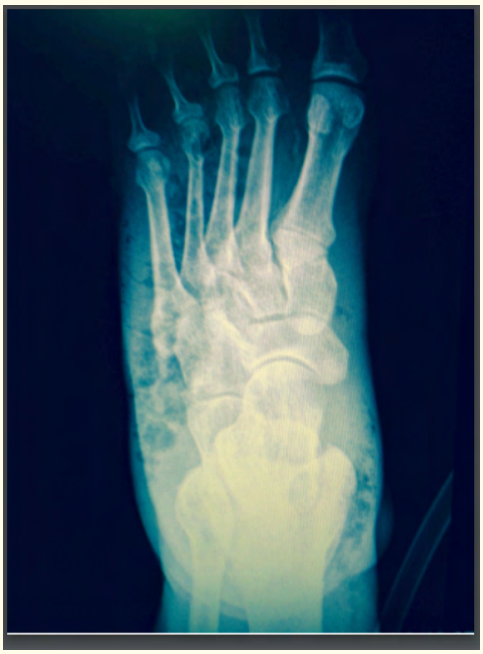


Figure 3: Large areas of subcutaneous emphysema to the left foot and ankle.

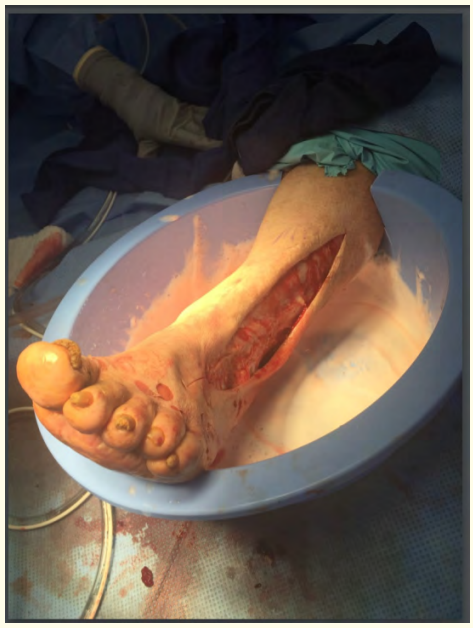
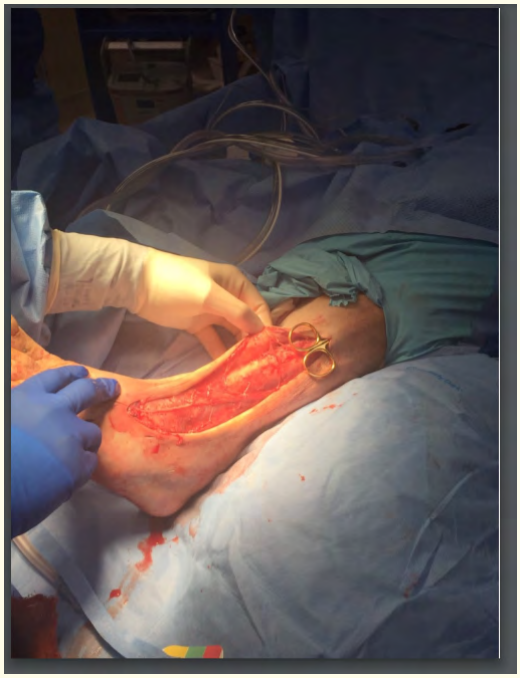


Figure 4: Left lateral ankle/lower leg avascular with grey appearance in nature. Dishwater grey fluid noted.

A bedside incision and drainage was done of the left foot, which revealed fetid malodor with expression. Urine and wound cultures were obtained. An operating room was quickly mobilized. Upon surgical intervention of the left lower extremity, the entirety of the soft tissue was boggy, grey in nature, and very avascular. Fluid was noted to be dishwater grey in color. Tissue planes separated easily with finger/blunt dissection (Figure 4-6). Upon further proximal debridement of the left lower extremity it was noted the infection extended proximal to the knee. Proximal debridement of the left lower extremity and incision and drainage was performed to the right foot and ankle (Figure 7). The patient was transferred to the SICU, intubated and was hypotensive requiring 24hr pressor support. Multiple organ failure was evident and the patient was listed in critical condition.

The following day he returned to the operating room for further bilateral debridement leaving 65% of the left lower extremity without covering and 40% of the right lower extremity without covering. A supramalleolar guillotine amputation was performed. Tissue culture identified *Klebsiella oxytoca*, urine culture identified *Kleb-*



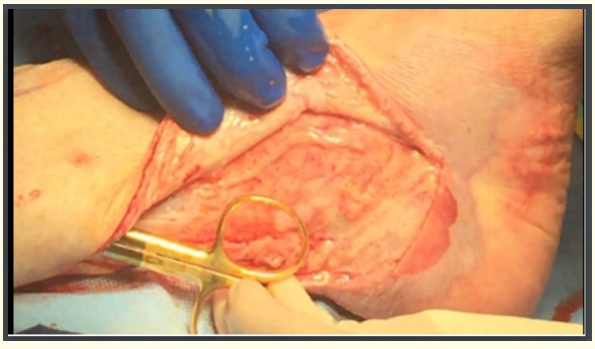


Figure 5 and 6: Tissue planes easily separated with blunt dissection.

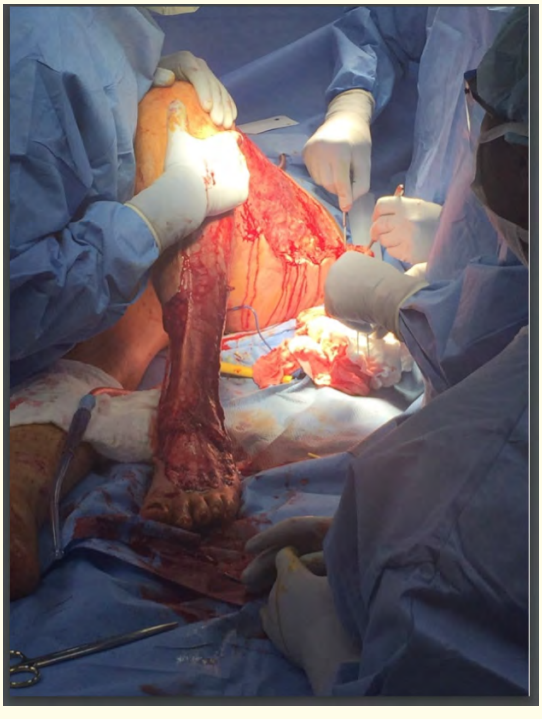


Figure 7: Proximal debridement of the left lower extremity to the upper 1/3 of the thigh region.

siella oxytoca and *Escherichia coli*, and blood cultures remained negative. Antibiotic coverage included IV Piperacillin/Tazobactam, IV metronidazole, and PO vancomycin in the setting of recent *Clostridium difficile* infection.

The patient's condition fluctuated over the next week requiring an additional minor bilateral debridement, re-intubation and extubation and 4 hours of SLED (Sustained Low Efficiency Dialysis) as he was not producing urine. He was noted to have integumentary compromise of 36% of his total body surface. Once stable, 17 days after admission he was transferred to the University of Colorado Hospital (UCH) burn unit with plan for skin grafting. During his tenure at UCH he underwent a left below-knee amputation; followed by a tracheotomy and bilateral above-knee amputations. He remained critically ill and passed away soon after.

Discussion

The question remains in our case report of the source of inoculation. Given the information of the urinalysis and tissue culture and the urinary tract infection preceding the necrotizing fasciitis infection, the likely occurrence is inoculation and hematogenous spread from the urinary tract infection. Thus, we must be suspicious of clinical signs of infection with or without laboratory changes according to the LRINEC score. This laboratory scoring system must be utilized carefully as many laboratory values may be elevated due to other underlying comorbidities. Nonetheless, it does provide a framework for evaluation of patients.

In our patient, the laboratory values that produced a score were: hemoglobin, sodium, creatinine and glucoses levels. This created a total score of 6, which in the setting of infection should raise suspicion. However, this does remain a relatively low score given the advanced nature of the infection in our patient. It should also be noted that in the setting of chronic kidney disease creatinine laboratory values can concomitantly be elevated. Perhaps of more significance were the clinical signs of infection seen on physical exam. Our patient presented with severe edema, pain and erythema. Kiat., *et al.* [3] reviewed the literature regarding cutaneous signs of necrotizing fasciitis and the reliability they provide when making the diagnosis of necrotizing fasciitis. Upon review of the literature, they demonstrated that the most common initial signs seen are: swelling (79%), pain (76.9%) and erythema (69.9%).

Klebsiella species is a gram-negative rod enteric bacterium. It is an opportunistic pathogen. It is normally found in the bowel of humans and animals, as well as water and soil. *Klebsiella* species are often a cause of bronchopneumonia, urinary tract infection, and septicemia in admitted patients [11]. Of concern with an infection caused by this organism is the growing multi-antibiotic resistance and prolonged hospital stays. In necrotizing fasciitis infections,

Klebsiella Oxytoca, is of concern as it is associated with skip lesions, septic shock, and acute renal failure. One must take into account these skip lesions when evaluating a patient and have a low threshold for treatment to allow the best possible outcome.

Necrotizing Fasciitis (NF) is a rare bacterial infection that is life threatening and limb threatening. The incidence of necrotizing fasciitis is low with 0.4 cases per 100,000 in the United Kingdom. The spread of this infection and the destruction of the fascia can occur at a rate of approximately 2 - 3 cm/hr [5]. In a 20 patient series, reviewed by Bucca., *et al*. [6] in 2013, they observed an 8.3% survival rate following median time to debridement of 20 hours. Despite advances in surgical treatment and antibiotics, the mortality rate ranges from 6% to 76% [2].

Conclusion

This rare life-threatening infection is a diagnosis that must be quickly achieved and treated; otherwise mortality rate quickly increases. One must be able to recognize the subtle clinical signs in a setting of minimal abnormalities noted to laboratory values as we have shown the LRINEC score is not always reliable. Although rare, this assessment must always remain a possibility until proven otherwise.

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