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A case of necrotizing fasciitis caused by *Finegoldia magna* in a patient with type 2 diabetes mellitus

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SUMMARY

Diabetes mellitus is one of the serious conditions associated with necrotizing fasciitis, a severe bacterial skin infection that spreads quickly and is characterized by extensive necrosis of the deep and superficial fascia resulting in devascularization and necrosis of the associated tissues. In addition to debridement and aggressive surgery procedures, the effectiveness of therapy depends on choosing the appropriate antibacterial agents. Hence the key to successful management is an early and accurate diagnosis. We report a case of necrotizing fasciitis caused by *Finegoldia magna* in a patient with type 2 diabetes mellitus.

Keywords: necrotizing fasciitis, type 2 diabetes mellitus, diabetic foot ulcers, anaerobes, GPACs.

INTRODUCTION

Diabetic foot ulcers are one of the main causes of hospitalization and the major cause of morbidity in individuals suffering from diabetes and, if not properly treated, can need amputation. The effectiveness of therapy depends on choosing the appropriate antibacterial agents, and for this reason the key to a successful management is an early and accurate diagnosis. When signs of a clinical infection and gradual tissue necrosis with progressive cutaneous changes over the affected site are present, necrotizing fasciitis should be suspected, and an immediate intervention of surgical debridement and empiric antibiotic therapy could be useful to prevent amputation [1-3]. Necrotizing fasciitis is a deep and devastating soft tissue infection that often develops as an extension from a skin lesion caused by a trauma, frequently trivial [4]. Symptoms include red or purple skin in the affected area, severe pain, fever, and vomiting [5]. The major causative organisms include *Streptococcus pyogenes*, *Staphylococcus aureus*, anaerobic bacteria and intestinal flora [4,6]. Diabetic patients may be predisposed to necrotizing fasciitis by the tissue hypoxia caused by arteriosclerosis and the immunodeficiency associated with poor glycemic control. Accurate diagnosis with an early and aggressive surgical debridement of all involved tissues, combined with prompt intravenous broad-spectrum antibiotic treatment are important to stopping this severe kind of infection that could rapidly progress to disseminated vascular coagulation, septic shock and death [5, 7]. We herein report a case of necrotizing fasciitis caused by *Finegoldia magna* in a patient with diabetes mellitus type 2.

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CASE REPORT

A 56-year-old male with type 2 diabetes mellitus with several complication including hyper-

Figure 1 - Patient at admission presented necrotizing fasciitis of the forefoot, anterior (A) and posterior view (B).

tension, dyslipidemia and mild chronic kidney disease (CKD) was admitted to Diabetic Foot Surgery Department of San Camillo Hospital in Treviso with acute diabetic foot infection of right forefoot.

At the admission the patient, that had started antibiotic therapy with ciprofloxacin (500 mg orally every 12 hours) from one week before, presented hyperpyrexia from 10 days and right foot tumefaction and edema with purulent secretions (Figures 1A, 1B). The blood tests revealed a white blood cell (WBC) count of 13,530/mm^3, haemoglobin (Hb) of 11.3 g/dL, platelets (PLTs) count of 278,000/mm^3, glucose of 179 mg/dL, creatinine of 2.22 mg/dL, urea of 29 mg/dL, moreover he presented a concentration of C-reactive protein of 22.95 mg/dL (normal value: 0.00 - 0.33 mg/dL). Due to the fever, three sets of blood cultures were immediately collected and sent to Laboratory Department for microbiological analysis. After X-ray, that showed thickening of soft tissues, foot drainage, including debridement procedure (Figure 2A, 2B), was immediately performed and two samples of purulent secretion were aseptically collected from the wound and sent to Laboratory Department for microbiological investigations. Further imaging investigations were not performed considering the severity of the infection, that made necessary an immediate medical intervention [8].

Calculated LRINEC (Laboratory Risk Indicator for Necroziting Fasciitis) score was 7, indicating that the patient had an intermediate risk for necrotizing soft-tissue infections [9]. At the same time an empiric therapy with piperacillin-tazobactam i.v. (4.5g x 3) and clindamycin i.v. (600 mg x 3) was started in substitution to current antibiotic therapy. A lower dosage of therapy was due to mild CKD of the patients (eGFR, mL/min per 1.73 m^2: 39.56). After two days from drainage, despite

Figure 2 - Debridement procedure was undertaken on first hospital day , anterior (A) and posterior view (B).

the improvement of general clinical conditions of the patient and fever disappearance, an intervention of surgical amputation was necessary for the evolution to gangrene of second and third toes. During surgery procedure, gray necrotic tissue, noncontracting muscle and a positive "finger test" result were found and two samples of bone fragments were aseptically collected and sent to Laboratory Department for microbiological diagnostic procedure.

Microbiological test results

The three sets of blood cultures were incubated into BACT/ALERT® 3D System (bioMérieux). After an incubation time of 5 days all blood samples were negative, excluding bacteremia. Gram stained smear of pus from debridement showed presence of numerous leukocytes and of Gram-positive cocci. Samples were inoculated directly on Chocolate agar + PolyViteX (bioMérieux) at 37°C in 5% CO_2 atmosphere, on Columbia agar + 5% sheep blood (COS) and Schaedler agar +5% sheep blood agar (bioMérieux) at 37°C in anaerobiosis, on MacConkey Agar and Sabouraud Gentamicin Chloramphenicol 2 agar (bioMérieux) at 37°C in O_2 atmosphere. Purulent secretion samples were also inoculated in thioglycolate broth and incubated at 37°C for 5 days. After 48 hours the appearance of turbidity at the bottom of thioglycolate broth and presence of colonies on COS and Schaedler agar plates indicated growth of strictly anaerobic bacteria. Colonies grown on agar plates were identified as *Finegoldia magna* after biochemical identification with Vitek®2 ANC ID card and confirmed by matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) (MALDI Biotyper, Bruker). Antimicrobial susceptibility testing was carried out with broth microdilution method using Sensititre™ Anaerobe MIC Plate AN02B panel (ThermoScientific), that provide results related to the minimum inhibitory concentration (MIC). All MIC values were evaluated with EUCAST Clinical Breakpoint for bacteria (v 8.0) [10]. The strain was susceptible to all tested antimicrobials (penicillin, ampicillin, piperacillin/tazobactam, imipenem, clindamycin, vancomycin and metronidazole) confirming the efficacy of the empiric antibiotic therapy that remained unchanged. From the day after amputation, the patient showed a rapid improvement of health conditions and became afebrile, declaring progressive subjective well-be-

Figure 3 - Amputation was needed on fourth hospital day (anterior view).

Figure 4 - Postoperative anterior view of patient foot on the fourth postoperative month.

ing. Leukocyte count decreased to 6,620/mm^3, C-reactive protein decreased to 5.89 mg/dL and creatinine to 1.87 mg/dL. After eight days of post-operative care, the patient was discharged with well granulating post-surgical wound (Figure 3) and complete remission of signs of total inflammation. Also, the two cultures of bone fragments samples, collected after surgery, were positive for *F. magna.*

Antibiotic therapy was continued with amoxicillin (500 g x 2) and clindamycin (300 g x 3) orally for other 20 days. The patient was followed-up weekly by physicians as outpatient and, after one month from the surgery, he underwent to dermal substitution grafting that permitted a complete re-epithelization (Figure 4).

CONCLUSIONS

F. magna is a Gram-positive anaerobic coccus member of *Clostridiales* family, that until 1999 was formerly known, along with several other Gram-positive anaerobic cocci (GPACs), as *Peptostreptococcus magnus* [11]. Although it is an opportunistic human pathogen that normally colonizes skin and mucous membranes, it is often found in biofilms on chronic ulcers such as in diabetic foot or decubitus ulcers and it may potentially cause life-threatening infections [12-17].

Diabetic patients are more susceptible to necrotizing fasciitis probably because they exhibit impaired cutaneous wound healing and increased susceptibility to infection [18]. In cases of necrotizing fasciitis, bacteria spread quickly once they enter the body. They infect the fascia, connective tissue that surrounds muscles, nerves, fat, and blood vessels. The infection also damages the tissues next to the fascia and although a strong intravenous antibiotic therapy is immediately started, sometime antibiotics may not reach all the infected areas particularly if toxins destroy soft tissue and reduce blood flow, for this reason often surgery is necessary in addition to antibiotics to remove dead tissue and to quickly stop this infection that can become life-threatening in a very short amount of time [5]. Preventive measures, timeliness in diagnosis, prompt administration of appropriate antibiotic therapy and effective surgical debridement are absolutely necessary to ensure the effective treatment of complications of diabetic foot infections and reduce the risk of amputation [5,19]. In our case, the patient came to the hospital ten days after the fever appearance and, at the admission, he reported that some days before he caused a small incision at his right forefoot with a nail-clipper scissors. Delay in hospitalization could be explained by the fact that necrotizing fasciitis is a deep-seated infection where the epidermidis is minimally involved at initial presentation, and, even if localized pain is a clue to the disease, certain patients, notably those with diabetic neuropathy with loss of sensation, can experience minimal pain, resulting in a missed diagnosis [1].

F. magna is one of the most common anaerobic pathogens, but sometimes it is forgotten as a cause of infection in the bones and joints, probably because anaerobic bacteria culture is often time-consuming [20].

Physician should be suspect infection by GPACs in case of cellulitis and necrotizing fasciitis specially when aerobic cultures appear to be sterile, empirical administration of broad spectrum antibiotics should be started immediately and, once culture and gram stain results are known, the therapy should be adjusted as appropriate [17]. At the same time, microbiologist should pay more attention to the accurate research of anaerobic bacteria.

Conflict of interest

None declared.

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