Journal of Clinical and Translational Endocrinology: Case Reports 2 (2016) 15–16

Contents lists available at ScienceDirect

Journal of Clinical and Translational Endocrinology: Case Reports

journal homepage: www.elsevier.com/locate/jecr

Necrotizing fasciitis in a 68-year old patient with insulin-treated steroid diabetes

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ARTICLE INFO

Article history:
Received 22 January 2016
Accepted 2 May 2016

Keywords:
Necrotizing
Fasciitis
Diabetes
Methicillin
Resistant
Staphylococcus

ABSTRACT

A 68-year old man was admitted to our department with left arm erythema, pain, and swelling after injecting insulin isophane. LRINEC score, CT, and MRI imaging diagnosed necrotizing fasciitis. With surgical debridement, tight glycemic control and treatment, the patient was discharged 13 days later.

Case presentation

Within 48 hours, after injecting insulin isophane for his steroid diabetes, a 68-year old patient presented to the Emergency Department of our hospital with erythema, induration, pain, and swelling of his left arm, which extended from the digits up the underarm. The skin appeared cyanotic and cool. The left forearm was mottled, with pitting edema, diffuse crepitus, epidermolysis, and large (2–3 cm) bullae. He was septic with hypotension (blood pressure 70/40 mmHg), chills, fever (temperature 39°), and low conscious level (Glasgow coma scale 9/15). Respiratory rate was 21 breaths/minute, and the oxygen saturation was 98% on room-air. Capillary refill occurred in 4 sec. The patient was able to move his fingers within a limited range. Sensation of light touch was intact in the distribution of radial, ulnar, and median nerves.

Laboratory-test results showed severe hyponatremia (110 mEq/L), leukocytosis (WBC $20^{*}10^{3}/\mu L$), anemia (hemoglobin 10 g/L), creatinine 1.7 mg/dL, glucose 93 mg/dL, and C-reactive protein 265 mg/dL. LRINEC score was 11, i.e. diagnostic for necrotizing fasciitis. Plain radiographic findings were similar to those of cellulitis, with increased soft-tissue thickness and opacity. Duplex ultrasonography excluded deep vein thrombosis. Computerized-tomography revealed fluid collections within the deep fascia, asymmetrical fascial thickening, and edema extending into the inter-muscular septa, as well as muscle. There was no soft-tissue gas or bone-distraction. Loss of muscle texture was demonstrated in MRI-T1, while MRI-T2 revealed subcutaneous and intramuscular edema in a reticulated pattern as well as subfascial and interfascial crescentic fluid collections.

Two peripheral intravenous lines and a urethral catheter were inserted. Femoral vein catheterization was performed. The patient's upper limb was elevated above the heart level. Specimens of blood, urine, stool and bullae-fluid were sent for culture. There was little urinary output, and during the 1.5 hours in the Emergency Department 2 liters of normal-saline were infused intravenously, as were prednisolone 25 mg, esomeprazole 40 mg, amiodarone 150 mg, and enoxaparin sodium 6000 anti-Xa b.i.d subcutaneously. One dose of tetanus toxoid was given, and norepinephrine was administrated, with a dose adjusted to maintain a mean arterial pressure ≥65 mmHg. Piperacillin/tazobactam 4.5 mg, daptomycin 500 mg, and clindamycin 600 mg were initiated. Morphine was administered as needed for pain. Biphasic isophane insulin 30/70 (16 IU in the morning and 8 IU in the afternoon) were administrated, together with insulin lispro according to sliding scale. A plastic surgeon was quickly contacted and hyaluronidase 1.500U was injected in the patient's forearm and hand to decompress the increased pressure of the compartments by absorbing the extravasated blood and fluid. During this period, 900 ml of packed red blood cells were injected through the femoral vein of the right leg. The plastic surgeon

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http://dx.doi.org/10.1016/j.jecr.2016.05.001

removed the bullae and subcutaneous tissue necrosis, and placed a skin-dressing, wet with fucidic acid. Cultures of blood and bullae-fluid obtained before the initiation of antibiotics were sterile.

The patient had heart failure, atrial fibrillation, rheumatoid arthritis, insulin-treated steroid-induced diabetes, and seasonal allergies. As the patient improved, the skin became less cyanotic, and a flashed, deep-red color developed. Blue discoloration persisted over the fingers of the left arm distally for some time. Urinary output gradually improved, together with renal function, and electrolytic abnormalities were corrected. Fever was diminished and the patient was discharged at 13 days.

Discussion

Necrotizing fasciitis (NF) is an aggressive, life-threatening emergency in diabetes [1]. Diabetes is reported as a comorbid condition in 60–70% of NF cases [2]. Common organisms incriminated are Staphylococcus aureus, group A streptococci, Escherichia Coli, Klebsiella Pneumoniae and a variety of anaerobic organisms [3]. Predisposing factors include trauma, surgery, insect bite, and scratch. Patients with diabetes affected are significantly older with high glucose (>110 mg/dL), and potassium levels (>4.0 mEq/L), which are associated with increased mortality [2]. Diabetes is a clinical predictor for limb amputation in patients with NF [4,5].

Risk factors of mortality in NF patients also include female gender, age >60years, chronic heart disease, cirrhosis, hypoalbuminemia <3g/dL, systolic blood pressure <90 mmHg, pulse rate > 130, serum creatinine ≥1.6 mg/dL, and skin necrosis [4]. Factors in favor of a good prognosis in our patient were early diagnosis, immediate surgical intervention, male gender, pulse rate < 130, glucose < 110 mg/dL, serum potassium 3.7 mEq/L, and negative blood cultures on admission. Methicillin-resistant Staphylococcus aureus (MRSA) sensitive to clindamycin, vancomycin, linezolid, and daptomycin was isolated from debrided sample.

It is important to state that the needle used for the insulin injection was not sterile, but used previously by the same patient. Transmission of bacterial pathogens during blood-contaminated injuries, despite the relatively transient nature of most bacterial infections in the bloodstream, has been previously reported [6]. Even though the injury was minor, the infection progressed rapidly and required aggressive therapy. Timely and appropriate antibiotic administration has been shown to reduce the mortality rate significantly in NF [7]. Recent studies have revealed emerging monomicrobial pathogens of NF, indicating that the causative agents are consistently changing [8]. Daptomycin was initiated because of the possibility of community-acquired MRSA [9]. Clindamycin significantly improves survival in group A streptococcus infections [10].

The present case report supports the importance of recognizing that the bacteriology of NF is constantly changing and current antibiotic coverage must include a spectrum of activity on methicillin-resistant staphylococcus aureus. Effective antibiotic treatment and surgical debridement lead to favorable prognosis of NF in an immunocompromised patient with insulin-treated steroid diabetes. In our patient, use of the LRINEC score also contributed to the early diagnosis of NF and prompt hospital discharging. Finally, among the factors previously described in favor of a good prognosis in a diabetic patient with NF, tight glycemic control during hospitalization should also be included.

In conclusion, achievement of euglycemia, maintenance of tissue perfusion, blood pressure, oxygenation, and antimicrobial therapy were the temporizing measures used to our diabetic patient, until surgical exploration was performed. Everyday rigorous surgical cleaning was also of major importance to the good prognosis of our patient.

Conflict of interest

The authors declare they have no conflicts of interest. The authors whose names are listed above certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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