Unusual presentation of cutaneous anthrax with acute kidney injury: A case report

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Abstract

Our case highlights that complications such as acute kidney injury should be suspected in any patient who presents with a coexisting black necrotic eschar, in which a diagnosis of cutaneous anthrax is a possibility. Establishment of an early diagnosis and starting the management plan with intravenous antibiotics and aggressive support of the circulation with intravenous crystalloid and vasopressors to improve the outcome.

Keywords: Cutaneous anthrax, septicaemia, Acute kidney injury.

1 | INTRODUCTION

Anthrax is an infectious zoonotic disease caused by spore-forming gram-positive bacteria, Bacillus anthracis [1]. Anthrax is more common in animals, and herbivorous animals such as cattle, goats, and sheep become infected with spore-contaminated soil and water sources [2]. Three types of anthrax infection have been identified in humans, depending on the route of spore entry. Cutaneous anthrax is the most common form affecting exposed body parts, especially the hands and the face, and this accounts for 95% of all cases. Other types include inhalation and gastrointestinal anthrax, which are challenging to diagnose and carry a high risk of mortality if left untreated [3]. Anthrax is endemic in low-income agricultural countries, and direct contact with infected animals or animal products such as wool and hair puts certain occupations such as slaughterhouse workers, farmers, and veterinarians at high risk of infection [4,5]. Although anthrax infection is rare in Western countries, recent studies show the emergence of a new entity in northern Europe, especially among heroin-injecting users, with more than 80 confirmed cases causing an outbreak in Scotland [6, 7]. Although this type has never been reported in the United States, the infamous 2001 bioterrorism attacks show the devastating effect that anthrax can have on public safety [8].

2 | CASE PRESENTATION / EXAMINATION

A 56-year-old male farmer resident in the rural area around Khartoum presented with multiple skin lesions involving the face and the left forearm associated with fever for seven days. The patient described his skin lesions initially as painless erythematous papules, and the skin lesions gradually became black. On review of his systems, the patient reported bilateral flank pain, a reduction in urine volume, and a loss of appetite. There was no associated cough, chest pain, shortness of breath, or lower limb swelling. There is no past medical history of diabetes mellitus or hypertension.

His vital signs were as follows: a body temperature of 38 °C, a BP of 95/60 mmHg, a PR of 105 bpm, a RR of 22, and an O2 saturation of 96% in room air. Physical examination revealed a black Escher in the chin area measuring (2x3 cm)(Figure 1); upon examination of the left forearm, two lesions were identified on the extensor surface measuring (3x3 cm) and (4x4 cm), respectively(Figure 2). There was no tenderness on palpation of these lesions nor regional lymphadenopathy. Cardiac examination was normal with no murmurs, and chest auscultation revealed no abnormalities. The neurological examination was normal, with no neck stiffness. Abdominal examination was normal with no pallor, jaundice, or lower limb edema.

3 | DIFFERENTIAL DIAGNOSIS AND INVESTIGATIONS

Laboratory examinations showed a hemoglobin concentration of (11.5 g/dL) and a WBC count of (19,800 mm3), with neutrophilia at 90%. Renal function test showed elevated urea level (120 mg/dL), creatinine level (3.2 mg/dL), serum sodium level (135 mEq/L), and serum potassium level (4 mEq/L). Blood film for malaria (BFFM) was negative twice. Urinalysis showed (3-5) RBCs, 1+ of protein, (4-6) pus cells, and cast. Ultrasound of the abdomen and pelvis showed normal kidneys with a normal-sized prostate. Chains of gram-positive rods were isolated on microscopic examination of the skin lesion(Figure 3); the blood culture was positive and showed bacterial growth. A diagnosis of cutaneous anthrax with acute kidney injury was made

4 | TREATMENT, OUTCOME, AND FOLLOW-UP

The patient received IV dextrose saline (500 ml every 4 hours) for four days, which was then reduced to (500 ml every 6 hours) for another couple of days until the patient was able to take fluids orally. IV antibiotics were initiated early in the form of levofloxacin (750 mg once daily for two weeks). Also, IV paracetamol

(1g) was given per need for pyrexia. After three days, a CBC was done, and the WBC count was (16,200 mm3), renal function test showed a urea level of (92 mg/dL), creatinine level of (2.9 mg/dL). In one week time the temperature subsided, and lab results were repeated again, and the WBC count was (11,300 mm3), renal function test showed dramatic improvement in urea level (63 mg/dL), creatinine level (2.2 mg/dL). In three weeks, the patient's general condition improved, with normalization of the CBC and renal function. A significant improvement in the skin lesions was also noticed. The patient was discharged and advised to follow up in two weeks time.

5 | DISCUSSION

In this article, we describe a 56-year-old patient resident in the Khartoum rural area who is involved in livestock farming and presented initially with erythematous papular lesions involving multiple parts of the skin that eventually progressed to black eschar. This is a classical description of cutaneous anthrax. Although cutaneous anthrax is usually associated with low-grade fever, our case showed otherwise, with the presence of high-grade fever with marked leukocytosis and elevated neutrophilia indicating that the patient progressed to sepsis, which is unusual in cutaneous anthrax. The combination of sepsis and dehydration leads to deterioration in the patient's renal function and the development of acute kidney injury, as shown by the elevated urea and creatinine. The subsequent improvement had been noticed following adequate IV fluids and IV antibiotics treatment.

The pathogenesis of Bacillus anthracis is primarily based on the production of two exotoxins: Lethal Toxin (LeTx) and Edema toxin (ETx). The edema toxin mimics adenylate cyclase and increases the intracellular concentration of (cAMP) which is responsible for the characteristic edematous borders of black eschar in cutaneous anthrax. The lethal toxin is a protease that disrupts the mitogen-activated protein kinase (MAPK), which leads to the inhibition of cell growth and cellular death and also plays a major role in septicemia and shock pathogenesis [9, 10–11].

Our case highlights that complications such as acute kidney injury with elevated urea and creatinine should be suspected in any patient who presents with a coexisting black necrotic eschar that is newly developed and in which a diagnosis of cutaneous anthrax is a possibility. Isolation of gram-positive rods of Bacillus anthracis under a microscope remains the best tool to confirm the diagnosis [12, 13]. Medical health professionals, especially those who live in anthrax-endemic countries, should have a high suspicion of cutaneous anthrax in any patient who presents with erythematous papules and has a history of contact with infected animals or their products. Since untreated cases can develop complications such as septicemia and even death in around 5% to 20% of cases [14], the establishment of an early diagnosis with microbiological investigations and starting the management plan with intravenous antibiotics are required when encountering such cases [15]. Complications such as septicemia and septic shock require aggressive support of the circulation with an intravenous crystalloid solution and vasopressors such as noradrenaline to improve the outcome. Further reporting of such cases is recommended.

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Not applicable.

CONFLICTS OF INTEREST

All authors declare that there are no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

CONSENT

Written consent for publication has been obtained from the patient and the authors.

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