



Cutaneous anthrax in the northeast of Iran: A case report and review of the literature

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ABSTRACT

Bacillus anthracis is an aerobic, gram-positive, and spore-forming *Bacillus* species. The most common form of anthrax infection is the cutaneous form. The infection usually develops several days after exposure to products of infected animals and manifest as black sore with severe swelling on the skin.

A 52-year-old female with a black and swollen lesion on her index finger presented to Ghaem Hospital, Mashhad, Iran, in October 2015. Biopsy and swab culture were performed immediately. Cutaneous anthrax was characterized by microscopic examination of *B. anthracis* spore using Gram staining. The patient was then treated with antibiotics after diagnosis.

According to the reports of Provincial Health Center of Khorasan Razavi, northeast of Iran, no cases of anthrax have been reported in humans since 2013. There were neither occupational risk factors, nor any routine predisposing factors for acquiring anthrax in this woman. Although this patient is the first case reported with cutaneous anthrax since the past three years, two cases of sheep anthrax have been reported in Khorasan Razavi Province during 2013-2015. This patient had a history of contact with the skull of a slaughtered sheep. The patient was treated after making correct and rapid diagnosis and sufficient antibiotic therapy.

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Introduction

Bacillus anthracis is the causative agent of the zoonotic disease of anthrax, which can appear in cutaneous, gastrointestinal, and respiratory forms in humans. The bacteria are rare in Europe and America (1-3). The disease is especially common in areas with livestock such as sheep and cattle (4-6). Cattle, horses, sheep, goats, and pigs are the most common animals affected with this disease. Transmission of this disease in humans occurs by direct contact of defective skin with animal products or blood, and rarely, through insects (2,4).

A person can develop cutaneous anthrax as soon as the anthrax spores enter the skin, usually through a sore. Therefore, handling infected animals or contaminated animal products such as wool, hides, or hair may lead to human contamination. Cutaneous anthrax is mostly observed on the head, neck, forearms, and hands. It is also considered to be the least dangerous form of anthrax. It affects the skin and tissues around the infection site. Infection usually develops 1 to 7 days after exposure. With early and appropriate antibiotic

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therapy the mortality rate is typically below 1%, but if left untreated, the fatality rate can reach 20% (7,8).

Cutaneous anthrax begins as painless, itchy, and erythematous papules, and then, turns into vesicles, which eventually forms a black lesion. The disease is often painless in the absence of secondary infections. It has been previously demonstrated that ulcers become culture-negative a few hours following intravenous penicillin injection (9). Occasionally, bacterial isolation is possible in a limited period. Therefore, antibiotic therapy for 7-10 days is recommended for cutaneous anthrax eradication.

Case report (October 2015)

In this report, the patient was a 52-year-old female, who lives in Mashhad, Iran. The patient had a black ulcer on her right hand with swelling and pruritus, and almost a week had passed since the formation of this sore. Moreover, she mentioned a cut on her finger by the skull of a slaughtered sheep. The woman was hospitalized for four days before entering the microbiology laboratory and underwent antibiotic therapy (i.e., cephalexin, ciprofloxacin [200 mg orally every 12 hours for 7 days], and clindamycin [600 mg orally every 8 hours for 14 days]). Also, she used products of natural origin such as ichthyol and ibuprofen to treat and relieve the pain caused by the sore. After being transferred to the sampling room, the lesion of her index finger was sampled under the hood using sterile swabs. One swab was used for culture on the blood agar medium and another was used for smear preparation. The plate containing the samples was transferred to the incubator for microorganism growth under aerobic conditions, and the smear was stained using Gram staining. Prior to the patient's transfer to the laboratory, antibiotic therapy was initiated in the hospital, and as a result, the *B. anthracis* spore density was low under microscope because of the few number of bacilli. Also, after 48 h of culture on blood agar medium, no growth was observed. Figure 1 exhibits the appearance of the patient's finger pre- and post-treatment.



Figure 1 a). Appearance of patient finger before treatment. **b)** Appearance of patient finger after treatment.

Discussion

The diagnosis of anthrax is critical. If a person with symptoms, such as painless papules along with pruritus that are sometimes surrounded with vesicles on affected areas of the skin, is referred to the laboratory, the disease should be suspected. The detection of any case is alarming for health systems to enforce preventive measures for this neglected disease.

This female patient was the first reported case of this condition in northeast of Iran since the past three years. There were no occupational risk factors or routine predisposing factors for acquiring anthrax in this woman. The only predisposing factor, which could justify the acquisition of the disease, is the history of contact with the skull of a slaughtered sheep. Although this patient is the only case reported with cutaneous anthrax since the past three years, but two confirmed cases of sheep anthrax were reported in Khorasan Razavi Province during 2013-2015.

To the best of our knowledge, only few studies have reported the acquisition of anthrax due to history of exposure to animal products, which makes this report relatively unique.

Investigation has been performed on Gram staining of the vesicular fluid released by *B. anthracis* organisms. Cutaneous lesions in anthrax mostly occur on the arms and hands, followed by face and neck. Infection initially appears as an itchy papule, like an insect bite. The papule enlarges during 1 to 2 days and produces a sore, which may be surrounded by vesicles. The lesions are round and regular and 1 to 3 cm in diameter. Finally, the production of toxins by bacteria causes the sore to develop a black eschar along with edema. However, the lesions and edema are painless. The lesion dries up after 1 to 2 weeks and eschar begins to loosen, shortly after which a scar is observed. Terzioglu et al. (2) reported a case of cutaneous anthrax with ulnar nerve injury in 1999. Tuncali et al. (2004) described a case of cutaneous anthrax in a 56-year-old male stock breeder who suffered from a swollen and erythematous left hand for a week (7). Bal et al. (2014) also reported a 55-year-old male patient with complaints of an itchy pimple with slight pain and inflation on his forearm and hand. The patient was infected through direct contact with a contaminated animal carcass (10). In the present case report, a 52-year-old woman was followed up in the microbiology laboratory. After sampling from the sore, culture and smear preparation were performed from this sore. After the confirmation of *B. anthracis* infection by clinical symptoms and microscopic examination, antibiotic therapy was initiated and continued until complete elimination of the bacterium.

Cutaneous anthrax with early diagnosis was treated with penicillin G, which serves as a selective drug. As reported by the Mashhad Health Center, since early 2015 until now (November, 2015), only two cases of sheep anthrax have been reported from Ghuchan, which is 150 km far from the residential location of this patient (the infected sheep carcasses were buried safely).

The prevention and management of anthrax is simple. In order to prevent the outbreak of this zoonotic disease, slaughtering the sheep must be performed in slaughterhouses under the supervision of a veterinary doctor. Moreover, because autopsy of the carcasses of infected animals provide the context for sporulation of bacteria, the infected sheep were buried safely. The reduction in the number of reported cases of anthrax demonstrate good practice in the health system, especially the veterinary system of the province.

Conclusion

Non-industrial anthrax appearing as a result of handling infected carcasses usually manifests itself as the cutaneous form; thus, the disease is considered to be seasonal and parallels the seasonal animal incidents which it is contracted.

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None.

Conflict of Interest

The authors declare no conflict of interest.

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