

Case Report

***Serratia marcescens*: an unusual pathogen associated with snakebite cellulitis**

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Abstract

This study reports a case of *Serratia marcescens* cellulitis following a snakebite in a 50-year-old woman. The bite was on the dorsum of the right hand with symptoms of envenomation. She developed swelling and cellulitis with tissue necrosis. Wound debridement was performed. Pus and tissue biopsy cultures yielded *Serratia marcescens* sensitive to fluoroquinolones, aminoglycosides, third-generation cephalosporins and carbapenems. The patient responded to anti-snake venom (ASV) therapy, ciprofloxacin, local wound management and recovered uneventfully.

Key words: snake bite; cellulitis; *Serratia marcescens*

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Introduction

Serratia marcescens is a Gram-negative bacillus that has been recognised as a human pathogen since 1960 [1]. It is a ubiquitous organism found in soil and water and is commonly found as a contaminant in ventilation equipment, tracheotomy tubes, peritoneal dialysis fluid, and indwelling catheters [2]. It is a common pathogen isolated in health-care associated infections of the respiratory and urinary tracts [2]. However, community-acquired infections may occur in patients with risk factors such as trauma, renal failure, diabetes, and chronic leg ulceration. Here we describe a rare case of bullous cellulitis and necrotising fasciitis due to *Serratia marcescens* following snakebite. The patient in this case did not have any clinical or immunological factors that predisposed to cellulitis and necrotising fasciitis.

Case report

A woman aged 50 years old was brought to casualty with history of snakebite and bite marks on the dorsum of her right hand. She was disoriented and restless. Her symptoms included blurring of vision, slurring of speech and ptosis suggestive of envenomation; she was therefore treated with anti-snake venom. She had one episode of cardiac arrest and was revived. She was resuscitated and hospitalised

within half an hour following the snakebite. Three days later the patient developed swelling of the right hand with tenderness and decreased mobility at the wrist joint which was diagnosed as cellulitis following snakebite. She was treated conservatively with amoxycyclav and gentamicin.

By the fifth day the swelling had increased in size extending up to the lower third of her right hand and forearm with a bullous lesion over the dorsum of the hand. The patient also suffered with spikes of fever. Local examination showed signs of inflammation. X-ray did not reveal any bone involvement. Thorough debridement was performed under anaesthesia. The skin, subcutaneous tissue, and deep tissue were found to be necrosed (Figure 1). Necrotic tissue with pus was sent to the microbiology laboratory for culture and sensitivity. Gram stain of the sample revealed inflammatory cells with numerous short, Gram-negative bacilli. Culture yielded pure growth of red pigmented, circular, convex colonies on blood agar and MacConkey agar. Gram staining of the colonies revealed the presence of Gram-negative bacilli.

The organism was motile, catalase positive, and oxidase negative. Further tests revealed that it was saccharolytic and positive for urease production. It utilised citrate and reduced nitrate to nitrite. The organism was positive for DNase and liquefied

Figure 1. Forearm showing snakebite wound with necrotic tissue



gelatin, and negative for the fermentation of raffinose, arabinose and indole production. Based on the above characteristics the isolate was identified as *Serratia marcescens* [3]. The organism was repeatedly isolated from a second sample of pus and deep tissue biopsy, thus showing its clinical significance. Histopathological examination of the tissue revealed features suggestive of an acute inflammatory lesion. Laboratory investigations included a haemoglobin level of 6.5gm/dl, total leucocyte count of 6900/mm³, and platelet count of 350,000 per mm³. Peripheral blood smear showed features suggestive of microcytic hypochromic anaemia. A blood transfusion was done and the patient's haemoglobin levels improved to 10.4mg/dl.

Discussion

We report a case of bullous cellulitis caused by *Serratia marcescens* following snakebite. The species of the snake could not be established; however, snakebite is a serious problem in tropical and subtropical countries, with an estimated 5 million cases and one hundred thousand deaths occurring worldwide annually [4]. One of the major complications that occurs following snakebite is soft tissue infection due to local envenomation. The proteolytic enzymes present in the venom result in extensive tissue destruction and devitalisation predisposing the wound to infection from the oral flora of the snake [4]. The oral flora of snake comprises a wide range of aerobic and anaerobic bacteria, especially Gram-negative bacteria belonging to the Enterobacteriaceae family of which *Escherichia coli*, *Morganella* and *Proteus* species are common [4].

To our knowledge this is the first case of bullous cellulitis caused by *Serratia marcescens* following snakebite. However, a case of *Serratia marcescens* cellulitis following an iguana bite has been reported [5]. Studies regarding the oral flora of snakes or culture from snakebite wounds showed that, although *Serratia* forms the normal oral flora of snakes, it is not commonly reported in snake bite cellulitis [6].

Serratia marcescens is a Gram-negative bacillus which belongs to the Enterobacteriaceae family. Most of the infections caused by this organism are health-care associated. It is an uncommon cause of soft tissue infections and necrotising fasciitis. In our case it was isolated as a pure growth on repeated culture from pus, discharge and tissue biopsy specimen. The isolate was sensitive to fluoroquinolones, aminoglycosides, third-generation cephalosporins, betalactam/betalactam inhibitors, and carbapenems. The patient responded well with early wound debridement (Figure 2), ciprofloxacin/piperacillin/tazobactam, and skin grafting. The patient recovered uneventfully and was discharged from the hospital.

Conclusion

Secondary bacterial infections complicate snake bite wounds. The World Health Organization (WHO) has recommended a prophylactic course of betalactam and gentamicin in cases of snakebite [7]. However, in the case of necrotising infections, it is ideal to perform culture and sensitivity tests before commencing antibiotic therapy [8]. This emphasizes the fact that appropriate antibiotic therapy will reduce the bioburden and therefore the production of toxins. In patients with other co-factors such as diabetes, renal

Figure 2. Forearm showing healthy granulation tissue following treatment



