

## Case Report

# Cutaneous anthrax of the hand: Some clinical observations

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### ABSTRACT

**Context:** Anthrax is a very rare disease in Europe and the United States. **Aim:** A case of cutaneous anthrax of the hand with a wide skin defect is presented and some clinical observations highlighted. **Case Report:** A 56-year-old male patient with cutaneous anthrax attended our infectious diseases department with a swelling up to the upper arm. An urgent fasciotomy was undertaken with a diagnosis of compartment syndrome. A black eschar had formed on the dorsal surface of the hand. A superficial tangential escharectomy was performed. **Results:** Viable fibrous tissue, about 4 to 5 mm in thickness over the extensor tendons, was found under the eschar. At the postoperative 2-year follow-up, remarkable healing was observed *via* skin grafting. **Conclusions:** Hand surgeons should be cautious against the compartment syndrome that may accompany cutaneous anthrax of the hand. A consistent viable fibrous tissue can be found below the eschar. The mechanism for the involvement of the hand dorsum needs further concern.

### KEY WORDS

Cutaneous anthrax, hand, compartment syndrome.

### INTRODUCTION

Anthrax is an acute infectious disease caused by the bacterium *Bacillus anthracis*. It is a very rare disease in Europe and the United States.<sup>1-3</sup> On the other hand, in our country it is seen, especially in eastern regions where stock-breeding is common.<sup>4,6</sup> Although it is a zoonosis, the bacilli can also induce infection in humans. Cutaneous anthrax is the most common form and the majority of cases are seen on hands and faces where exposure is more likely.<sup>1-8</sup> *Bacillus anthracis* is a gram-positive, aerobic, spore-forming micro-organism. It can survive in soil and animal products for years, which is obviously an important factor in the spread of the disease. Humans become infected after exposure to infected animals or their

products following agricultural or industrial contact. Cattle, horses, sheep, goats, and swine are the most commonly affected animals. The disease is transmitted to humans from the infected animals by direct contact with animal products through defective skin areas, or rarely, by insects.<sup>2,4,7</sup> Cutaneous anthrax begins as a painless, pruritic, and erythematous papule that vesiculates and eventually ulcerates to form a black-colored eschar.<sup>1</sup> Lesions are relatively painless if secondary infection is not superimposed. Diagnosis is made by isolation of the organism. Cutaneous anthrax is a fatal disease (20-30%) if not treated appropriately. However, with antibiotic therapy mortality has decreased to less than 1%.<sup>8</sup> Reconstructive surgery should be postponed until the micro-organism is completely eradicated. It has been previously shown

that the lesions become culture-negative within a few hours after intravenous penicillin is used.<sup>9</sup> Hence, beyond this limited time, it is impossible to isolate the bacillus anymore. However, in order to be sure that it is eradicated, a total treatment time of 7-10 days is recommended. Nevertheless, in some cases as the one presented here, emergency fasciotomy may be needed in order to salvage the extremity.

A case of cutaneous anthrax of the hand with a wide skin defect is presented. Some interesting clinical findings will be highlighted and compared with the information found in the literature.

## CASE REPORT

A 56-year-old male patient, working as a stock breeder, attended our infectious diseases department with a swelling and erythema of his left hand, of 1 week duration. After isolation of the *Bacillus anthracis* from the skin lesions, prompt antibiotic treatment (intravenous penicillin, 2 million units every 6 h, for 10 days) was initiated. However, in about 48 hours, the swelling had progressed up to the lower third of the upper arm and the patient was referred to our department. An urgent fasciotomy was undertaken with a diagnosis of compartment syndrome. The basis for the diagnosis was purely clinical, with severe pain located in the hand disproportional to the condition of the extremity. At this time no circulatory disturbances could be detected. At the follow-up visit we confirmed that all the upper extremity functions were stable although a black eschar had formed on the dorsal surface of the hand and the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> digits (Figure 1). Following eradication of the bacilli (after 10 days of antibiotic treatment) reconstruction was planned. During surgery, a very fastidious superficial tangential escharectomy was performed. It was observed that a layer of viable fibrous tissue, about 4 to 5 mm in thickness over the extensor tendons was clearly noticeable under the eschar. A split-thickness skin graft was applied. At the postoperative 2 year follow-up, a remarkable healing of the area was encountered. However, a mild extension contraction of the 5<sup>th</sup> digit was also observed (Figure 2). This was found to be partially due to tendon adhesions, which



**Figure 1:** Preoperative view of the patient with cutaneous anthrax of the hand dorsum. Note the fasciotomy incisions (arrows).



**Figure 2:** Postoperative 2-year outcome after fastidious superficial escharectomy and split-thickness skin grafting, with good results. Note the contracture formed (arrow) which was easily released on a later date.

was successfully treated surgically. Since the skin graft was not applied directly over the paratenon, but rather on the above-mentioned fibrous tissue, surgical exploration and subsequent tenolysis did not pose any difficulty.

## DISCUSSION

The clinical presentation of cutaneous anthrax is so characteristic that the diagnosis is usually not missed. It should be suspected when an individual describes a painless, pruritic papule, sometimes surrounded by vesicles, usually on an exposed part of the body. Along with these, a history of exposure to animals or animal products usually confirms the diagnosis. Analysis of the

vesicular fluid usually reveals *Bacillus anthracis* organisms, easily seen on Gram staining. Patients usually present with lesions on exposed skin areas, mostly on the arms and hands followed by the face and neck. The infection initially presents itself as a pruritic papule that resembles an insect bite. The papule enlarges and within 1 or 2 days develops into an ulcer surrounded by vesicles. The lesion is round and regular and 1 to 3 cms in diameter. A characteristic black necrotic central eschar develops later (due to the bacterial toxin) with associated edema. However, neither the lesion itself nor the edema produces pain. If the patient develops disproportional pain, which becomes the dominant clinical presentation, then the clinician should be alert to the development of the compartment syndrome. After 1-2 weeks the lesion dries, and the eschar begins to loosen and shortly thereafter, separates. If it is small enough, then the lesion heals with a permanent scar. Antibiotic therapy does not appear to change the natural progression of the lesion itself into an unsightly scar. An ulnar nerve lesion due to cutaneous anthrax has been reported.<sup>2</sup>

Cutaneous anthrax, involving the upper extremity, is rarely reported in literature.<sup>2-6,8</sup> However, to the best of our knowledge, this is one of the most extensive necrosis ever reported on the dorsum of the hand<sup>6</sup> as well as the first report of anthrax causing compartment syndrome in the upper extremity which required surgical fasciotomy.

Skin flaps, full- and split-thickness skin grafts and leaving the wound to heal by secondary intention are the recommended reconstruction procedures.<sup>1-8</sup> Unfortunately, if the escharectomy is roughly made, it is easy to excise the precious subcutis layer explained earlier. Thus, the use of skin flaps will be inevitable in such cases to resurface the defect over the extensor tendons. However, as seen in the case presented here as well as previous reports,<sup>2,4</sup> no matter how dramatic the destruction seems to be, a viable layer of thick fibrous tissue is usually encountered under the eschar, both on the dorsum of the hand as well as the fingers and a simple split-thickness skin graft can easily be applied with good results. This is also beneficial in cases with

extensive skin necrosis which may preclude the chance of obtaining a sufficient full-thickness skin graft easily.

It is interesting to note that cutaneous anthrax of the hand, involves the dorsum of the hand in the majority of the cases reported in literature as well as in the case presented here<sup>4,6,8</sup> although the gripping surface of the hand is the palmar side. A satisfactory explanation for this finding cannot be readily suggested. We can make the following suggestions: (i) the palmar skin is thicker than the dorsal (ii) the function of the eccrine glands may protect the palmar skin more than the dorsal or (iii) cracking of the dorsal skin due to weather conditions is more common, thus rendering it more vulnerable than the palmar skin. The actual reason behind this observation needs further research.

Hand surgeons should be cautious against the compartment syndrome that may accompany cutaneous anthrax of the hand. The deformity created by the infection can easily be reconstructed by a superficial escharectomy and split-thickness skin grafting. A consistent viable fibrous tissue can be found below the eschar that can be grafted with good results. The mechanism for the involvement of the hand dorsum, which is observed in a majority of cases in the literature, needs further research.

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