Case Report

A description and illustration of a necrotizing fasciitis by John Bell in 1801, hypothetically caused by *Vibrio vulnificus*

Robert-Jan Hassing a,*, Yorick J. de Groot b, Erwin J. Kompanjeb

a Internal Medicine Department, Erasmus MC University Medical Center Rotterdam, Rotterdam the Netherlands

b Intensive Care Department, Erasmus MC University Medical Center Rotterdam, Rotterdam, the Netherlands

1. Introduction

Necrotizing fasciitis is a fulminating soft tissue infection, usually caused by toxin-producing, virulent bacteria, which is characterized by widespread fascial necrosis with systemic toxicity and high mortality.1 Necrotizing fasciitis is often associated with a Lancefield group A beta-hemolytic Streptococcus, *Streptococcus pyogenes*. A particular saltwater-related necrotizing fasciitis is caused by the species *Vibrio vulnificus*. The typical clinical course of a rapidly progressive illness preceded by saltwater exposure shortly followed by the development of a hemorrhagic skin lesion, with a fatal outcome, should strongly suggest a *V. vulnificus* infection. To our knowledge, there are few historical case reports with illustrations included describing cases of necrotizing fasciitis, particularly with *V. vulnificus* as the suggested pathogen.

Passage 1

Joiner, a boy belonging to the Triumph, whose ulcer I have drawn (Figure 1), received but a very slight and superficial wound, and from time after the battle he continued in health, and the wound healed rapidly. But while it was to all appearance florid and healthy, with no threatening of ulceration, the boy in full spirits and strength, walking about on crutches, guilty of no irregularity, it began to look ill; a sure presage of some change of health. There came on a cough, with symptoms of a common cold, which he imputed to his bed being placed near a door, lately open and now shut, but no walled up; then his health failed, his spirits became oppressed; he had occasional attacks of fever, frequent vomiting, and a continual loathing of food. With these slight and seemingly unimportant symptoms (but the tendency of such symptoms when they appear in a foul hospital is easily understood), his sore, which is no bigger than the palm of a hand, became in two days as big as a crown of a hat, in one week it grew as large as represented in the drawing. The whole skin of the thigh was destroyed, the muscles were stripped of skin and fascia from the hip to the knee, the trochanter was almost laid bare, the hamstring muscles exposed to a considerable extent, and all the muscles of the thigh defected in a manner which no drawing can express.

Passage 2

If the patient is to die, the gangrene or wasting of the cellular sheets proceeds; the skin first sloughs off; then the fascia is destroyed;
those divisions and lamelea of the fascia, which dive betwixt the muscles to enclose, protect and nourish them are next affected; the matter continues slimy and thick, and in prodigious quantities; the muscles are divided from each other more and more. In many who suffered under the disease at the same time with Joiner (the boy above mentioned), you could have laid your hand edgeways betwixt the several muscles of the thigh. Then the vomiting, diarrhea and nervous symptoms increase, the pain is dreadful; the cries of the sufferers are the same in the night as in the day-time; they are exhausted in the course of a week, and die: or if they survive, and the ulcers continue to eat down and disjoin the muscles, the great vessels are at last exposed and eroded, and they bleed to death.

2. Discussion

V. vulnificus is a Gram-negative, lactose-fermenting, marine bacterium and is usually present in coastal waters worldwide when water temperatures are above 20 °C, consequently peaking during the summer months. Wound infections caused by V. vulnificus were first described in 1979 by Blake.3 The bacterium is a member of the Vibrio family, so closely related to cholera. Infections are extremely virulent and present themselves in two clinical manifestations. Ingestion of contaminated undercooked seafood, especially shellfish, can lead to a primary septicaemia with a fatality rate of 50–60%. The second clinical presentation is a wound infection acquired during handling of shellfish or due to infection in saltwater of a pre-existing wound. This results in an infection with variable character from mild to severe inflammation with septicaemia, often with a necrotizing fasciitis. The infection causes related symptoms like fever, hypotension, bullae, ecchymosis, and changes of mental state. Other signs of infection are vomiting and diarrhea.4 Individuals with a chronic underlying illness, especially with liver diseases and alcoholism, are at increased risk of infection.

A Japanese case series5 demonstrated that V. vulnificus was the pathogen responsible in 29% of necrotizing fasciitis cases. Infections with V. vulnificus particularly occurred in the warmer half of the year and appeared to have more typical skin lesions with edema and subcutaneous bleeding, such as ecchymosis and purpura. Although cases of necrotizing fasciitis in V. vulnificus infection have a very high fatality rate, it seems that the time interval between infection and death is slightly longer (median time 4.5 days, range 3–9 days, despite antibiotic treatment and debridement3), compared to the classic necrotizing fasciitis.

Bell describes typical symptoms of necrotizing fasciitis. The onset of the illness was preceded by a “slight and superficial wound”, one of the predisposing factors for necrotizing fasciitis. The following excerpt of the case report made the diagnosis of necrotizing fasciitis more definite: “The whole skin of the thigh was destroyed, the muscles were stripped of skin and fascia from the hip to the knee”. In the combination of the drawing by Bell and the symptoms described we recognize the clear symptoms of necrotizing fasciitis.

We speculate that the pathogen responsible for the fatal necrotizing fasciitis was V. vulnificus. It is very likely that the boy’s pre-existing wound was exposed to seawater, probably of a temperature sufficient for the presence of V. vulnificus, during his stay aboard the ship. The Triumph, a British merchant sail ship, was used for global trade. In the illustration, Joiner is lightly clothed, so we can assume that this event took place in a warm environment. Illness accompanied by vomiting and diarrhea at an early stage is relatively common in V. vulnificus infections. In a further passage the skin lesion is described in more detail: “The wound swells, the skin retracts, wastes, has a dark erysipelatous redness verging to black, the cellular membrane is melted down into a foetid mucus, and the fascia is exposed”. The typical clinical course of a rapidly progressive illness preceded by saltwater exposure shortly followed by the development of a hemorrhagic skin lesion, with a fatal outcome, should strongly suggest a V. vulnificus infection.

It is certainly remarkable that Bell reports that others “suffered under the disease at the same time”, which is very uncommon in cases of necrotizing fasciitis. However, small outbreaks of V. vulnificus have been described after natural disasters with saltwater exposure, for example following Hurricane Katrina6 in 2005 and the Tsunami7 in 2004. An 18th century sea battle would have had similar consequences.

Few authors have previously reported on a possible V. vulnificus infection found in the historical literature. Baethge and West hypothesized that Hippocrates had described a fatal illness caused by V. vulnificus in the 5th century B.C. in a man who lived on an island in the Aegean Sea.8 What makes Bell’s report noteworthy is that it has been overlooked by every historical review of necrotizing fasciitis. It is a clear description of a severe case of necrotizing fasciitis accompanied by an illustration of the patient described in the case report. To our knowledge, there are few historical case reports with illustrations included describing cases of necrotizing fasciitis, particularly with V. vulnificus as the suggested pathogen.

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References


Figure 1. Joiner the patient described with necrotizing fasciitis, depicted by John Bell (from The principles of surgery, 1801).


