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Necrotizing Fasciitis: Expect the unexpected

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ABSTRACT

INTRODUCTION: Necrotizing fasciitis is a rapidly progressive and potentially fatal soft tissue infection. A wide spectrum of aerobic and nonaerobic organisms has been implicated as the causative pathogen. Necrotizing Fasciitis due to *Salmonella* serovars have previously been implicated both with and without a prodromal diarrheal illness, but mono-microbial *Salmonella* NF is very rare.

CASE PRESENTATION: We have discussed the case of a 67-year-old man who presented with necrotizing fasciitis of the perianal region in the emergency department of our hospital. He underwent serial debridement and a defunctioning colostomy, tissue and blood cultures revealed *Salmonella Newport* as the culprit microorganism. He received antibiotic therapy tailored to the organism and was discharged on recovery. He currently awaits a reversal of his colostomy.

DISCUSSION: Necrotizing fasciitis infections are rapidly progressive and potentially lethal, a high index of suspicion and aggressive surgical debridement supplemented with culture sensitive antibiotics is essential. *Salmonella Newport* has recently been implicated in diarrheal illness, associated with consumption of minced beef in the US. To the best of our knowledge, no previous reports of NF have been published related to *Salmonella newport*. The unexpected growth of this organism from tissue cultures and the excellent response to treatment prompted us to highlight this case as the first report of its type in the medical literature.

CONCLUSION: Necrotizing soft tissue infections are associated with considerable morbidity and mortality, and delayed recognition and treatment can have severe implications. Necrotizing fasciitis due to Salmonella serovars has been reported with Group B and C however no previous reports of NF have been reported with this serovar.

1. Introduction

Necrotizing Fasciitis (NF) is a potentially fatal soft tissue infection characterized by rapidly progressive fascial necrosis, recognized since the death of the diabetic King Herod the Great of Judea approximately 2000 years ago [1]. NF may be caused by a single species of bacteria, or by a polymicrobial variety of microrganisms [2]. A high index of suspicion is essential as aggressive surgical debridement may be necessary to save life [3]. NF can develop at sites of skin puncture, surgical wounds, chronic ulcers or insect bites [2]. Predisposing factors include old age, diabetes mellitus, malnutrition, obesity, chronic alcoholism, steroid use, and autoimmune deficiency syndromes; yet about one half of reported cases occur in otherwise healthy individuals [4,5]. Among the various species involved in the pathogenesis of NF, *Salmonella newport* has not been previously reported.

This case report highlights the rare occurrence of *Salmonella Newport* infection in an individual who presented in the emergency department of a multidisciplinary teaching hospital.

This case report has been reported in line with the SCARE criteria [6].

2. Patient information

A 67-year-old male presented to Emergency Department, with history of progressive pain and swelling in the left perineal region, accompanied by loss of appetite and general malaise, having recently returned from a 5-week trip to Mauritius. He had initially attributed the swelling to a reaction to prolonged sitting on the long-haul flight. Pre-hospital providers suspected sepsis and he was alerted to the ED.

The patient had a prior history of myocardial infarction with cardiac stenting, and cerebrovascular disease. He did not have any history of genetic disease. Medication included antiplatelet agents, beta blockers and a statin. He had quit smoking 6 weeks previously after a 40 years habit of 12 cigarettes per day.

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The patient was unmarried, lived alone and was a frequent traveler. He was independent, fully mobile and did not have any limiting disabilities.

3. Clinical findings

On arrival, pulse was 135 bpm; blood pressure: 105/74 mmHg; temperature 39.3 °C. A 10 × 10 cm swelling of the left perineal region was identified with erythema, tenderness and with a thin, greyish discharge. Initial laboratory investigations demonstrated a CRP > 350 mg/l, WCC 35×10^9/l and lactate of 3.5 mmol/l. The attending doctor attempted digital rectal examination, and this proved extremely painful and the attempt was abandoned.

A provisional diagnosis of simple perianal abscess was made, and patient was booked for routine incision and drainage; antibiotics were not prescribed.

4. Timeline

Thirteen hours after arrival at hospital, he arrived in the operating room to undergo debridement.

5. Diagnostic assessment

A Full Blood Count, Urea and electrolytes and clotting function were initially obtained at patient's arrival in the ED.

An attempt at a digital rectal examination was made, however it proved painful and comfortable for the patient and the attending doctor decided to not go ahead with the it.

This gentleman was mis assessed in the ED as a 'simple' perianal abscess when the diagnosis was Necrotizing fasciitis.

At the time of debridement, tissue and pus were sent for microbiological analysis.

6. Therpeutic intervention

The ED was alerted of a possible case of sepsis by the pre-hospital providers who brought the patient to the hospital.

After initial assessment, the patient was resuscitated with intravenous fluids. He was administered analgesics and antipyretics for symptomatic relief, antibiotics were prescribed and patient was transferred to the operating theatres for debridement.

A senior registrar supervised by the on call surgical consultant performed the procedure.

The skin and soft tissue in the perineal region was found to be necrotic with putrid matter and gas bubbling in an extensive cavity; a diagnosis of necrotizing fasciitis was made. Radical debridement was undertaken, and the patient was managed in ICU with ventilator support, inotropes, mechanical and pharmacological VTE prophylaxis and provision of meropenem and vancomycin. Tissue cultures grew *Salmonella* species and the antimicrobial treatment was changed to ceftriaxone and metronidazole. Reference laboratory characterization of the organism was confirmed as: *Salmonella newport*, I 6, 8:e, h:1.

The patient returned to theatres for serial debridement; a laparoscopic defunctioning colostomy was raised. Topical negative pressure dressings were applied, and patient was fit enough to be discharged on postoperative day 20.

The team arranged the patient to see a plastic surgeon for further management of his wound. A general surgical follow up was arranged for him, with a view to reverse his colostomy, when appropriate.

7. Followup and outcomes

The patient was safely discharged on the 20th postoperative day. He had repeated dressings in the community and was followed up by both a general and a plastic surgeon consultant in view of his wound healing. He currently awaits reversal of his colostomy.

8. Discussion

Necrotizing fasciitis is a rapidly spreading, infectious process of soft tissues with a high mortality rate, especially in the immunocompromised population [7].The infective process involves a wide spectrum of both aerobic and aerobic organisms, with the most commonly implicated organisms including the Group A *Streptococci*, *Staphylococci* and the *Enterobacteriaceae* [8,9]. Necrotizing soft tissue infections are frequently polymicrobial, and the initial antibiotic regimen should be broad spectrum with further treatment guided by cultures obtained at initial debridement [10]. The most frequently encountered organisms include gram positive and gram-negative aerobes, the most common being Group A beta hemolytic S*treptococci*. Polymicrobial infections typically consist of anaerobic and facultative bacteria acting in synergy [11].

Mono-microbial necrotizing fasciitis due to *Salmonella* serovars is extremely rare [12,13]; although it has been reported both with and without a prodromal diarrheal illness. There have been no previous reports of human NF due to *Salmonella newport* [14,11].

Salmonella is a gram-negative bacillus comprising >50 serogroups and >2,500 different strains or serovars. *Salmonella* serovars are characterized by distinct combinations of their H and O surface antigens; this contributes to the ability of the microorganism to cause varying degree of illnesses [15]. In 2010, the World Health Organization (WHO) estimated that non-typhoidal *Salmonella* was the leading cause of foodborne deaths worldwide [16]. *Salmonella* species typically causes a diarrhea illness in humans that lasts 4–7 days, with most people recovering without treatment; occasionally convalescent patients develop a lifetime carrier state; such as chronic gallbladder colonization. Such was the case with Mary Mallon, a cook in the United States in the early 1900, who went on to infect hundreds of individuals with *Salmonella typhi*, the organism residing in her gallbladder, which she refused to have removed, until her death in 1938 [17].

Extra-intestinal focal infections from *Salmonella* can include aortitis, meningitis, pneumonia, soft tissue infections and pyomyositis [18]. Skin and soft tissue infections due to non-typhoidal S*almonella* species typically present as subcutaneous abscesses in the vicinity of the gastrointestinal tract or as a wound infection after surgery on a contaminated organ [14]. While the incidence of nontyphoid salmonellosis is estimated at over 2 million cases annually, extraintestinal manifestations account in less than 1% of these cases [8].

Salmonella newport is a zoonosis, typically associated with equine disease. Infected horses shed large numbers of organisms in their feaces and can do so for weeks to months without developing clinical disease. *Salmonella newport* has been reported as the cause of human enteritis; a severe outbreak of diarrheal illness affected 78 people in the United States in 1999, due to contaminated mangoes, with 15/78 patients admitted to hospital and two deaths [19]. In 2019, an outbreak of *Salmonella newport* was linked to ground (minced) beef involving 403 people was reported from 30 states in the US; 117 people were hospitalized but no deaths were reported [20].

Our patient had no history of gastrointestinal symptoms or trauma to suggest local inoculation of bacteria. In this instance, the diagnosis was not considered by the first hospital doctor and this report acts as a reminder that health workers must remain alert to the features of NF in order that prompt surgical debridement can occur.

9. Patient perspective

This case has highlighted the unusual involvement of a rare Salmonella serovar in the pathogenesis of a commonly encountered surgical emergency. Our patient was an otherwise healthy man, who had no other symptoms of a potentially fatal infection, except for some discomfort in the perianal region which he attributed to the prolonged sitting on a long flight.

For him, the prospect of ending up in the ITU for what he suspected as "an ordinary infection of the bottom", was frightening, but he trusted the surgical team with the treatment plan and was patient and cooperative with the team and the nursing staff throughout his hospital stay.

He was kept informed of all the developments in his case and he was particularly keen on the team's idea of writing up the unusual findings pertaining to his disease.

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Ethical approval

This case report is exempted from ethnical approval in our institute.

Patient consent

A written and informed consent was obtained from the patient for publication of this case report and accompanying images.

Registration of research studies

N/A.

Guarantor

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Maha Khalid: Writing - original draft. **Mit Dattani:** Writing - review & editing. **Douglas Bowley:** Supervision, Writing - review & editing.

Declaration of Competing Interest

There are no conflicts of interest.

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