A case of cutaneous diphtheria in New Zealand

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Abstract

We report the case of an adult male who contracted cutaneous diphtheria after receiving a tattoo in Samoa. The infection required hospital admission. The Regional Public Health Service conducted urgent contact tracing. We review the techniques employed in traditional tattooing and highlight the importance of considering C. diphtheriae as a causative organism in cutaneous infection acquired in the tropics.

Diphtheria is an acute bacterial disease caused by infection with toxin-producing strains of Corynebacterium diphtheriae (C. diphtheriae). Upper respiratory tract infection is the most common presentation with a fatality rate of 5–10%. Sore throat, cervical lymphadenopathy (“bull neck”), a grey membrane obstructing the airway and respiratory distress predominate in severe infection. Other systemic consequences are well recognised.

The prevalence of diphtheria has changed over the last three decades. Having almost disappeared completely by the 1980s, a serious outbreak in the Newly Independent States of the former Soviet Union in the 1990s required a mass immunisation campaign to stem the outbreak. Cutaneous C. diphtheriae infection is less common but acts as a potential source of respiratory C. diphtheriae infection.

We report the case of an adult male who presented to Wellington Hospital’s Emergency Department having contracted cutaneous toxigenic C. diphtheriae whilst visiting Samoa where he acquired a tattoo.

Case report

Within days of acquiring the tattoo, the man noticed redness and swelling overlying the tattoo, spreading to his mid-calf. A week later after returning to New Zealand he presented to his medical centre with an infected lesion. Flucloxacillin was prescribed but he was non-compliant with his medication. Four days later he returned to hospital.

The doctor attending noted a coin-sized erythematous lesion discharging pus was present within the tattoo on the leg, with peau d’orange surrounds. Swabs were taken and erythromycin was prescribed. The patient was again non-compliant. One week later he again presented, with fevers and rigors where examination of his leg also showed cellulitis. Cultures had grown Staphylococcus aureus and toxigenic Corynebacterium diphtheriae var gravis. The patient was referred to our Emergency Department. He had taken only four doses of erythromycin.

He was admitted to a single negative-pressure room and nursed with “droplet” precautions. Intravenous erythromycin and high-dose flucloxacillin were commenced. Within 4 days he was well enough to be discharged on oral antibiotics.
Diphtheria-Tetanus booster was given post discharge. Contact tracing was conducted by the Public Health Service.

**Discussion**

Cutaneous *C. diphtheriae* infection is common in developing countries where chronic carriage has long been recognised.\(^4\) It should be considered in any case of tropical ulcer.

Primary cutaneous diphtheria often begins as an acutely tender pustule which breaks down and enlarges to form an oval, punched-out ulcer. This often becomes secondarily infected leading to surrounding cellulitis.\(^5\) Septicaemia and septic arthritis can occur. Myocarditis is relatively rare. Neurological complications including Guillain-Barre syndrome have been reported in 3–5% of ulcerated lesions.\(^6\)

The performance of a traditional Samoan tattoo is of great cultural significance. The techniques involved have their origins dating back thousands of years. Typically the penetrating implement is made from a pig’s tooth, sliced and fashioned into a series of sharp spikes. This is bound with nylon fishing line, for example, to a larger piece of bone or plastic, which, in turn, is bound to a wooden handle. The implement is difficult to adequately clean and, as a consequence, sterilisation cannot be achieved. Heat sterilisation using an autoclave is not performed, as the instruments would break down. At best, the “chemical” treatment of such implements can only achieve a moderate level of disinfection.

In Samoa, each tattooing session is followed by bathing in seawater, a procedure that is believed to account for the purportedly low rates of post-tattoo infections. In New Zealand the rate of post-traditional tattoo infection is unknown however cases of severe infection have been reported in the past.\(^7\)

**Learning points:**

- It is important to consider *C. diphtheriae* in any patient with a recent tattoo who presents with a wound infection.
- *C. diphtheriae* should also be considered for all cases of tropical ulcer or skin infections acquired in disease-endemic areas.
- Provision of appropriate clinical description information to the laboratory is necessary to trigger non-routine culture techniques allowing identification of uncommon organisms such as *C. diphtheriae*.

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