

Lessons from practice

Possum bites man: case of Buruli ulcer following possum bite

Clinical record

In June 2021, a previously well 81-year-old man, resident on the Mornington Peninsula, Victoria, presented to his general practitioner with a shallow, red ulcer on the dorsum of his left index finger over the distal interphalangeal joint, progressive over the previous 3 weeks. He recalled acquiring a small single-tooth puncture wound at this exact site from a ringtail possum (*Pseudocheirus peregrinus*) about 6 months previously at his home. No other finger injuries were recalled during those months.

The bite occurred after the animal appeared to be ailing and the patient attempted to catch it for wildlife carers. While no lesions were observed on this possum, he had noticed other possums around his home with skin lesions. After immediately washing with soap and eucalyptus oil, the wound fully healed in 2 weeks without apparent complication.

The ulcer with which the patient presented to his GP gradually started 6 months later, with induration, erythema and minor pain (Box, A). No fever, night sweats, lymphadenopathy or myalgia were reported. After failure to respond to one week of oral cephalexin, a referral was made to an infectious diseases physician (DPO) who suspected Buruli ulcer and organised a swab. *Mycobacterium ulcerans* infection was confirmed immediately by polymerase chain reaction (PCR) and subsequently by culture. The patient began an 8-week course of rifampicin and clarithromycin, complicated midway by a paradoxical flare of pain and swelling (Box, B), which settled with a course of oral prednisolone (0.4 mg/kg weaned over 11 weeks). Healing has progressed well since antibiotics were completed.

Faecal pellets from common ringtail and common brushtail possums (*Trichosurus vulpecula*) were collected from two sites in the patient's garden in July 2021. Eight pellets from each site were screened for the presence of *M. ulcerans* using IS2404 qPCR.¹ All 16 samples were qPCR-negative. It is unknown whether any of the collected samples were from the implicated possum.

The patient's only travel outside his town of residence in the 6 months before ulcer development was to north-east Melbourne, not known to be endemic. He has not left Australia for over 20 years. His only regular outdoor activity is cycling.

Discussion

Buruli ulcer is a destructive skin and soft tissue infection caused by *M. ulcerans*. It is endemic in tropical sub-Saharan Africa, coastal areas of temperate south-east Victoria, and tropical Far North

Queensland.² The mode of transmission to humans remains controversial; however, compelling evidence exists for mosquitoes as the major vectors in temperate Australia, likely acting mechanically by carrying the pathogen on external body surfaces rather than biologically where the pathogen reproduces inside the host. Small marsupials are a likely environmental reservoir and amplifier in southern Australia, but no equivalent reservoir-vector pair has yet been identified overseas.^{1,2}

M. ulcerans has been identified in skin lesions and faeces of both ringtail and brushtail possums in south-east Victoria. The proportion of *M. ulcerans*-positive possum faeces in environmental surveys correlates closely with risk of Buruli ulcer in humans, suggesting a significant role for possums in the transmission cycle.^{1,2}

We present a case of an apparent *M. ulcerans* infection directly from a possum rather than indirectly from a mechanically contaminated mosquito.² Notably, the possum's observed "sickly" demeanour suggests it was unwell, but we have not been able to retrieve the affected individual. Possible transmission modes include contamination of saliva with *M. ulcerans* from the environment or from licking *M. ulcerans*-positive wounds. A paradoxical reaction, as featured in this case, is an inflammatory flare-up after commencing antibiotics, presumably from liberated antigenic material from the infection site stimulating the local immune system, which was initially suppressed by *M. ulcerans*' immunosuppressive toxin, mycolactone.

The proposed transmission event fits within the known incubation period range for Buruli ulcer of 2–10 months. Buruli ulcer lesions are more common on surfaces that are indirectly, not necessarily directly, exposed to the environment, such as forearms and legs rather than fingers,² supporting transmission via an insect vector. Unusually, the lesion in this case occurred at a site where a mosquito is less likely to successfully bite, providing further circumstantial evidence supporting the possum bite itself as the transmission event. Lesion-free possums may still harbour *M. ulcerans*, as lesion-free possums with *M. ulcerans*-positive gut and faecal samples have been noted.¹ The negative PCR results from the faecal samples may be explained by the collection occurring over 6 months after the biting incident, after which the animal may have died.

Possums have been implicated in the transmission of other infections. Three cases of tularaemia in humans after bites or scratches from unwell ringtail possums have been reported in Australia, most recently in Sydney in 2020.³ Brushtail possums are a key reservoir species in the zoonotic transmission of Ross River virus in Australia⁴ and *Mycobacterium bovis* in New Zealand.⁵

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Lesion before beginning the 8-week course of rifampicin and clarithromycin (A). Paradoxical flare of pain and swelling midway through antibiotic course (B)



This demonstrates the capabilities of possums to maintain pathogens in the environment and facilitate their spread to humans. Our case serves as another potential piece of the growing body of evidence that implicates possums as a major environmental reservoir

of *M. ulcerans* in Buruli ulcer endemic areas of south-east Australia.

Lessons from practice

- Possums are implicated in the zoonotic transmission of various infectious diseases, now including Buruli ulcer, with strong evidence suggesting they are implicated with mosquitoes as a major reservoir-vector pair in south-east Victoria.
- Buruli ulcer lesions occur on exposed body surfaces in a distribution that supports a biting insect vector as a likely major mechanism of transmission to humans in south-east Victoria.
- Consider enquiring about environmental contact, in particular previous mosquito or other animal bites at the lesion site, up to 10 months before the appearance of the lesion.
- A paradoxical flare of increased pain and swelling, relating to the immunosuppressive effects of *Mycobacterium ulcerans*, can occur on initiation of antibiotics and can be treated with prednisolone.

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