

The emergence of otter attacks in Singapore: A case series and strategies for management

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Dear Editor,

Singapore is experiencing an unprecedented increase in the number of smooth-coated otters (*Lutrogale perspicillata*). Since 2017, the local otter population has more than doubled to at least 170. This has led to an increase in the number of otter-human attacks since 2021.^{1,2} While common animal attacks like dog bites are well documented with established management, there is a lack of literature studying the outcomes and management of the increasingly common otter attacks in Singapore. To date, there has only been 1 published case report, which documented an attack by local river otters (*Lontra canadensis*) in Quebec, Canada.³ This letter aims to evaluate 3 relatively recent cases of otter attacks presented at Tan Tock Seng Hospital, Singapore and propose key management strategies in addressing future attacks.

The 3 cases of otter attacks are summarised in Table 1. Cases 1, 2 and 3 sustained multiple scratches and bite wounds primarily on the upper and lower limbs. No signs of systemic infections, fractures and retained foreign bodies were noted. Intraoperative tissue cultures were taken for cases 1 and 2. All were managed with same-day wound debridement, with case 1 receiving toilet and suture for facial lacerations. For pharmacological treatment, all were given intramuscular tetanus toxoid (IM TT). Case 1 was managed with intravenous (IV), per oral (PO) amoxicillin-clavulanate (Augmentin, GlaxoSmithKline) and PO doxycycline. Case 2 was managed with PO Augmentin only. Case 3 was managed with IV and PO Augmentin, PO ciprofloxacin and post-exposure rabies prophylaxis. All cases reported smooth wound healing and were clinically well within a week of discharge, with non-significantly raised infective markers and no fractures noted on X-rays. It was noted that case 3 reported continuous ankle

numbness due to sural nerve injury from the attack. Consent was obtained for the use of case details and photographs in all reported cases.

Evaluation (examination, injury pattern and complications). Despite good outcomes, the variability in investigations and management needed exemplifies the requirement for institutional guidelines to manage otter attacks in Singapore.

The initial history should focus on injuries sustained and time of presentation post-injury. Complications like neurovascular compromise must be ruled out. A comprehensive past medical history including risks of immunocompromise will also help triage patients who are at a higher risk of infection.⁴

Physical examination should differentiate between scratches (classically longer superficial linear wounds) versus bite wounds (classically elliptically shaped with 4 main puncture wounds) as seen in Table 1. Identifying wound depth, retained foreign material, injury to surrounding structures (tendon, bone, nerves and vessels) and signs of infection (purulent discharge, rapidly progressing erythema, fever and low blood pressure) are vital in determining urgency and treatment modality.

Regarding complications, the predominant smooth-coated otters have small and blunted teeth, with one of the lowest bite forces in the otter family.⁵ Unlike cat bites that cause deeper penetrating bites or dog bites that cause powerful crush injuries, otter bites are at lower risk of systemic infection and deep tissue injury or fractures.⁶ Nonetheless, for bites, or major wounds involving areas with limited soft tissue coverage (face, hands, joints and over the tibial region) or prosthetic devices (prosthetic joints and vascular grafts), an initial X-ray of the affected area can rule out retained foreign bodies (teeth and nail), fractures and involvement past the subcutaneous tissues.

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This article was first published online on 24 July 2024 at annals.edu.sg

Table 1. Summary of cases of otter attacks presented to our institution.

Case	Age (years), sex	Relevant past medical history	Date of injury ^a (time), location	Mechanism of injury	Injury list (bites/scratch wounds)	Investigations	Medical treatment	Surgical treatment	Complications (infection, neurovascular injury)	Clinical photos of injuries
1	27, female	Nil	2/11/2023 (0620H), Singapore	Unprovoked attack by >5 otters	Face: 3 full-thickness superficial lacerations Upper limbs: 2 partial-thickness and 4 full-thickness superficial lacerations; 12 full-thickness bites Lower limbs: 4 partial-thickness bites, 14 full-thickness bites Back: 1 partial-thickness superficial laceration, 2 full-thickness laceration	WBC 18.7 CRP 0.5 Intraoperative tissue cultures obtained: NAD X-rays: nil fractures or foreign bodies	IM TT IV Augmentin 1 week PO Augmentin 1 week PO doxycycline 2 weeks	1. Toilet and suture of facial lacerations 2. Wound debridement of upper and lower limb wounds 3. Wound debridement and closure of upper and lower limb wounds	Nil	
2	60, male	Type 2 diabetes mellitus, hypertension	3/11/2023 (0620H), Singapore	Unprovoked attack by >15 otters	Upper limbs: Multiple full-thickness superficial lacerations, 9 full-thickness bites Lower limbs: 1 full-thickness superficial laceration, 18 full-thickness bites	WBC 16 CRP 12.2 Intra-operative tissue cultures obtained: NAD X-rays: nil fractures or foreign bodies	IM TT PO Augmentin 3 days	1. Wound debridement of bilateral lower limb and left upper limb wounds	Nil	
3	70, male	Chronic hepatitis B, hypertension	9/4/2023 (0620H), Singapore	Provoked attacked by 20–30 otters	Lower limbs: 4 full-thickness bites, multiple small wounds	WBC 21.3 CRP not done Intraoperative tissue cultures not obtained X-rays: nil fractures or foreign bodies	IM TT Rabies prophylaxis (day 0, 3, 7 and 15) PO ciprofloxacin 3 days IV Augmentin 3 days PO Augmentin 5 days	1. Wound debridement of bilateral lower limbs	Sural nerve injury secondary to otter attack with residue numbness on follow-up	

CRP: C-reactive protein; IM TT: intramuscular tetanus toxoid; IV: intravenous; NAD: no abnormality detected; PO: per oral; WBC: white blood cells

^a day/month/year.

Infection (vaccinations and antibiotics) For fully vaccinated patients (i.e. received at least 3 doses of tetanus toxoid-containing vaccine), IM TT is recommended if the last dose was administered ≥ 5 years ago for major wounds, or ≥ 10 years ago for minor wounds.^{7,8} For patients with < 3 doses of tetanus toxoid-containing vaccine or unknown vaccination status, tetanus toxoid-containing vaccine should be administered irrespective of wound severity. Additionally, human tetanus immunoglobulin is recommended for major wounds in patients with < 3 doses or unknown vaccination status.⁷

Post-exposure rabies prophylaxis (rabies immunoglobulin and vaccination) is unnecessary for otter bites sustained in Singapore, which has been declared rabies-free since 1953.⁹ However, otter bites sustained outside of Singapore should be promptly considered for post-exposure rabies prophylaxis.

Empiric antibiotic therapy should be considered for all mammalian bites, including otters. The recommended choice of antibiotics would include PO or IV Augmentin.¹⁰ As there is limited evidence reporting the oral or claw bacteria flora of the otter population in Singapore, antibiotic choice should provide broad coverage of gram-positive and gram-negative bacteria, and bacteria commonly associated with water exposure (e.g. *Aeromonas* species and *Plesiomonas* species) and anaerobic bacteria.¹⁰ The decision between PO or IV antibiotics depends on patient clinical status and bite location to prevent complications like sepsis. IV antibiotics are preferred for patients showing signs of sepsis, rapidly progressing erythema, worsening condition despite initial oral antibiotics, immunocompromised individuals, or bites at locations that are at risk for deeper infections: near bones (e.g. anteromedial tibia with lack of soft tissue coverage), joints or prosthetic devices. In such cases, prompt surgical assessment and close in-hospital monitoring are also recommended. For uncomplicated superficial wounds in patients not meeting these criteria, consider a course of oral Augmentin with early follow-up for signs of infection progression.¹⁰

Prophylactic antibiotic treatment is typically advised for 3–5 days, while empiric treatment for established infection is usually given for 5–7 days.¹⁰ In cases of deep or complicated infections, particularly near bone and joints, obtain intraoperative tissue cultures for culture-directed antibiotics. In addition, antibiotic courses may be extended, and consultation with an infectious diseases specialist is advisable.

Surgical intervention Surgical irrigation and debridement in the operating theatre should be considered in deeper wounds with depth that cannot be fully assessed on examination or for foreign material that cannot be removed by bedside.¹¹ Intraoperative tissue cultures should also be obtained as per indicated above.

With an increasing otter population, clinicians will continue to face dilemmas in the management of otter-human attacks without an established guideline. With the limited case studies available, this letter highlights the severity of otter attacks that can occur unprovoked and in groups leading to extensive soft tissue injuries. Nonetheless, if treated with the abovementioned management strategies, we found that patients generally have good recovery outcomes without significant complications like persistent infections, sepsis and fractures. This letter hopes to serve as a guide for future management of otter attacks in primary and tertiary healthcare institutions.

Declaration

All authors have no affiliations or financial involvement with any commercial organisation with a direct financial interest in the subject or materials discussed in the manuscript.

Keywords: animal bites, infectious diseases, orthopaedic surgery, otter attacks, pharmacology, rabies, tetanus

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