ONLINE FIRST

Pseudomonas oryzihabitans Cutaneous Ulceration From Octopus vulgaris Bite

A Case Report and Review of the Literature

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Background: Octopus vulgaris is a common marine animal that can be found in nearly all tropical and semitropical waters around the world. It is a peaceful sea dweller with a parrotlike beak, and its primary defense is to hide through camouflaging adjustments. Bites from animals of the class Cephalopoda are very rare. We describe a boy who was bitten on his forearm by an Octopus vulgaris.

Observation: A 9-year-old boy was bitten by an Octopus vulgaris while snorkeling. There was no strong bleeding or systemic symptoms; however, 2 days later, a cherry-sized, black, ulcerous lesion developed, surrounded by a red circle that did not heal over months and therefore had to be excised. Histologic examination showed ulceration with extensive necrosis of the dermis and the epidermis. A microbial smear revealed Pseudomonas (formerly known as Flavimonas) oryzihabitans. After excision, the wound healed within 2 weeks, without any complications or signs of infection.

Conclusions: To the best of our knowledge, this case represents the first report of an Octopus vulgaris bite resulting in an ulcerative lesion with slow wound healing owing to P oryzihabitans infection. We recommend greater vigilance regarding bacterial contamination when treating skin lesions caused by marine animals.


Octopus vulgaris is a marine animal of the order Octopoda and part of the class Cephalopoda, which means “head foot.” This class also includes calamari and cuttlefish.1,2 The term octopus originates from the Greek word oktapous, which means “eight-footed.” Octopus vulgaris is a common sea dweller that can be found in nearly all tropical and semitropical waters around the world, including the Mediterranean Sea. The common octopus is a mollusk; its body consists of an enormous head and 4 pairs of arms with 2 rows of suction cups. Its arms are symmetrically situated along the length of its body, enabling it to move very agilely and quickly in water. It has a radula and a very small parrotlike beak at the center point of its arms. It is an intelligent peaceful marine animal and normally a loner. If the octopus feels threatened, it squirts ink—with melanin as the main coloring agent—to obscure its attacker’s view, giving it time to swim away. Also, the ink contains a substance that dulls the attacker’s sense of smell, making it harder to track the fleeing octopus and thus further hindering pursuit. The primary defense of the octopus is to hide in plain view through camouflaging adjustments in posture, texture, and color. Most octopuses have a span of about 60 cm. However, the biggest known octopus, Enteroctopus dofleini, can have a diameter as large as 7 m.1,2

Most lesions caused by marine animals are harmless, but a variety of marine animals can cause significant injuries, to the point of death.3,4 Bites from animals of the class Cephalopoda are very rare.5 There have been single reports of octopus bites resulting in cutaneous ulceration,6 severe systemic reactions due to envenomation,7,8 and giant cell-rich granulomatous dermatitis/panniculitis.9 Wounds in healthy people normally heal within days. To the best of our knowledge, the present report is the first of an O vulgaris bite resulting in a chronic skin ulcer that did not heal for months, probably as a result of infection with Pseudomonas (formerly known as Flavimonas) oryzihabitans.

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REPORT OF A CASE

A 9-year-old white boy was snorkeling and fishing in the Adriatic Sea in Croatia in August 2010. His uncle, a skilled fisherman, had been living in Croatia for many years and was therefore well informed about marine life in the region and its risks. One day, the boy's uncle was swimming in the sea, with an octopus sitting on his shoulder. The boy got very excited and grabbed the octopus (Figure 1). Presumably, the octopus felt threatened, so it squirted its ink and bit the boy’s right forearm with its parrotlike beak. It immediately swam away. At the time, the boy did not experience pain, and the wound was not bleeding strongly. It was never itchy, purulent, or weeping. The boy did not feel nauseous or have to vomit, and he showed no systemic reactions. No medical treatment was required. Two days later, the boy noticed a cherry-sized, red, erythematous wound with a hemorrhagic nodus in the center. His uncle identified the animal as an *Octopus vulgaris* with a length of approximately 30 cm.

In September 2010, the boy presented with a badly healing wound on his right forearm. The wound was a the size of a cherry and had a black, seemingly necrotic, ulcerous zone in the center, surrounded by bright-red erythema (Figure 2). The boy had no pain, and his arm was not swollen or rough, yet the ulcer showed no tendency to heal. His blood cell count was normal, and routine serum testing, including measurement of liver enzyme levels, revealed no abnormalities. Antitetanic prophylaxis was administered. The skin lesion was treated topically with betamethasone, fusidic acid, and retapamulin. During the following week, the erythema faded slightly, but the black central lesion remained, which was suggestive of other possible causal factors. The patient was otherwise in good health, with no other medical history or history of immunosuppression, and took no medication. Neither a thorough personal history nor a family history revealed any wound-healing deficits. After 8 weeks, we decided to excise the tissue.

A microscopic examination of the wound smear yielded no pathologic finding. However, *Poryzihabitans*, a gram-negative, aerobic, facultative pathogenic organism, was found in the bacteriologic culture. No other organisms, including anaerobic bacteria, were found. Therefore, we performed an assessment of antibiotic sensitivity for *Poryzihabitans*, which revealed a resistance to aztreonam but a sensitivity to piperacillin, cefepime, ciprofloxacin, tobramycin, amikacin, imipenem, and ceftazidime. Microscopic examination of the excised material showed circumscribed ulceration and extensive necrosis of the upper connective tissue layer (Figure 3). The adjoining connective tissue and subcutaneous tissue displayed a dense perivascular and interstitial lymphohistiocytic inflammatory response with numerous eosinophil granulocytes. Moreover, multiple multinuclear foreign body cells with foamy cytoplasm were found in the subcutaneous tissue. After excision, the wound healed within 2 weeks without any complications or signs of infection, and no further systemic antibiotic therapy was needed. At the patient’s latest follow-up visit, 4 months
after the excision, the wound had healed completely and was free of infection.

COMMENT

To the best of our knowledge, the present report describes the first case of a bite by an *O vulgaris* that resulted in an ulcerous cutaneous lesion with wound-healing deficiency apparently due to *P oryzihabitans* infection. Although bites from class Cephalopoda animals are rare, occasional cases of octopus bites were reported in the early 1960s. 

In 1998, Burnett published a review of cases involving human injuries caused by octopuses. Most species of octopuses cause only mild reactions, such as swelling or redness. However, bites by the blue-ringed octopus (*Hapalochlaena maculosa*) have been known to lead to severe systemic or even fatal reactions. Its saliva contains a neuromuscular toxin that can be released through nerve stimulation, and bradycardia. The only animal known to survive the effects of this toxin is the octopus itself, but not every bite results in intoxication.

In 1986, Burnett published a case report of a patient who presented with a giant cell–rich granuloma–like lesions and small papules on his limbs as a delayed reaction to an octopus bite. Their patient had granuloma anulare–like lesions and small papules on his limbs as a delayed reaction to an octopus bite. Their patient had granuloma anulare–like lesions and small papules on his limbs as a delayed reaction to an octopus bite.

In 2002, Taylor et al reported on injuries caused by marine animals in Australia. The injuries occurred predominantly after contact with jellyfish. Bites by cephalopods, such as the octopus, were very rare; spikes, spines, and barbs of other marine animals represented the majority of injury cases. Misago et al described a man who presented with a giant cell–rich granuloma–like lesions and small papules on his limbs as a delayed reaction to an octopus bite. Their patient had granuloma anulare–like lesions and small papules on his limbs as a delayed reaction to an octopus bite.

In 2008, Campanelli et al reported on a cutaneous ulceration that developed after an octopus bite that was caused by *Vibrio alginolyticus*, an anerobic, gram-negative bacillus. *Vibrio alginolyticus* was previously believed to be non-pathogenic in humans, but the patient who was bitten by the octopus showed a wound-healing deficit that was triggered by this bacillus. Campanelli and colleagues recommended greater vigilance for *V alginolyticus* as a cause of skin infections, especially in immunocompromised patients. *Vibrio* is a common genus that can be found in wounds acquired from marine animals.

Our intraoperative sampling confirmed a bacillus (*P oryzihabitans*), and antibiotic sensitivity was assessed. *Pseudomonas* is a genus of gram-negative, aerobic bacteria; many *Pseudomonas* species are noted for their fluorescent pigment and often show resistance to disinfectants and antibiotics. *Pseudomonas oryzihabitans* is believed to be a saprophyte of humans and various warm-blooded animals, in which it may be pathogenic; it has been isolated from rice paddy and clinical specimens. Notably, it also has been detected in marine organisms and is known to survive in water.

*Pseudomonas oryzihabitans* has been called a potential nosocomial pathogen in recent years; however, a report on community-acquired soft-tissue infections due to *Flavimonas oryzihabitans* had already appeared in 1994. Still, reports of this bacillus being pathogenic in humans are rare. *P oryzihabitans* has most often been reported in immunocompromised hosts, and the infections due to *P oryzihabitans* usually occur in cases involving catheters, peritoneal dialysis, bacteremia, or even sepsis. The presence of a foreign body and previous trauma or surgery predispose patients to contamination by *P oryzihabitans*. We believe that the superinfection by *P oryzihabitans* was the cause for the wound-healing deficit in our patient, especially as the histologic examination revealed severe ulceration and extensive necrosis. Marine animals may act as reservoirs and vectors for pathogens that are potentially harmful to humans. Every wound that occurs in the marine environment can become infected. The presence of an infection is a medical indication for debridement as well as for antibiotic therapy if necessary. Tetanus vaccination should be renewed if it is not current.

In conclusion, we recommend greater vigilance regarding bacterial contamination by *P oryzihabitans* when treating skin lesions due to marine animals.


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**Author Contributions:** All authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. 

**Study concept and design:** Aigner and Plotz. 

**Acquisition of data:** Aigner, Seifert, and Plotz. 

**Analysis and interpretation of data:** Aigner, Ollert, Ring, and Plotz. 

**Drafting of the manuscript:** Aigner, Seifert, and Plotz. 

**Critical revision of the manuscript for important intellectual content:** Ollert, Ring, and Plotz. 

**Administrative, technical, and material support:** Aigner and Seifert. 

**Study supervision:** Ollert, Ring, and Plotz.

**Financial Disclosure:** None reported.

**References**


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Top-Accessed Article: Successful Treatment of Toenail Onychomycosis


This cutting-edge article by Watanabe and colleagues describes a promising treatment option for a chronic and recalcitrant type of infection. Although studies have shown that photodynamic therapy exerts antifungal activity, very little is known regarding its clinical efficacy. Onychomycosis is of particular significance because of the limitations of current treatments. The nail is such a formidable barrier that penetration of topically applied agents is seldom achieved. Therefore, physicians resort to the use of systemic antifungal agents, which, although effective, often involve adverse effects. The penetration of 5-aminolevulinic acid was facilitated by the preapplication of urea cream, 20%. Although pain was reported, the procedure was clearly noninvasive and relatively well tolerated. A weekly dosing schedule seemed reasonable. Because of the depth of the infection, activation of protoporphyrin IX was performed using the longer wavelength (630 nm). Based on the positive clinical results induced by photodynamic therapy with 5-aminolevulinic acid, which were accompanied by clearance of the fungi by potassium hydroxide preparation examination, this therapy should be considered for onychomycosis, especially in patients who are not good candidates for systemic antifungal agents.

From August 2009 through August 2010, this article was viewed 2694 times on the Archives of Dermatology Web site.

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