

Report of a human accident caused by *Conus regius* (Gastropoda, Conidae)

Relato de um acidente em ser humano causado por *Conus regius* (Gastropoda, Conidae)

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ABSTRACT

Conus regius is a venomous mollusc in the Conidae family, which includes species responsible for severe or even fatal accidents affecting human beings. This is the first report on a clinical case involving this species. It consisted a puncture in the right hand of a diver who presented paresthesia and movement difficulty in the whole limb. The manifestations disappeared after around twelve hours, without sequelae.

Key-words: *Conus regius*. Poisoning. Brazil.

RESUMO

Conus regius é um molusco venenoso da família Conidae, que inclui espécies responsáveis por acidentes graves ou mesmo fatais em humanos. Os autores relatam pela primeira vez um caso clínico envolvendo a espécie, que inclui uma punctura na mão direita de um mergulhador submarino, que apresentou parestesias e dificuldade de movimentação do membro todo. O quadro desapareceu em cerca de doze horas, sem seqüelas.

Palavras-chaves: *Conus regius*. Envenenamento. Brazil.

Molluscs are common invertebrates in which the body is usually divided into a head, a visceral mass and a muscular foot-like structure. Among the molluscs, the genus *Conus* has medical importance. This genus is the only member of the Conidae family, and it is one of the most diverse genera in the animal kingdom, with about 500 species worldwide. Their characteristic heavy conical shell is easy to identify, and their beauty attracts attention. This high diversity also brings with it high levels of adaptation, which are certainly reflected in their morphology and biochemical yields.

Gastropods of the superfamily Conoidea include predator snails. They normally prey on invertebrates like worms, polychaetes, and other molluscs. However, a few *Conus* species prey on fish. Since fish are vertebrates, venom that is adapted to this type of prey may be dangerous to humans.

Since the prey of *Conus* species is normally quicker than they are, they have developed powerful venom that can kill or instantly paralyze their prey. A special long tubular and intensely coiled gland (the venom gland) produces the venom. A muscular bulb is found at the distal end and, through intense contraction, this forces the venom to the opposite end, which is connected to the base of

the proboscis. The proboscis is a long and muscular elongation of the oral region that is capable of substantial protrusion and exploration. The radula, which in other molluscs is just a chitinous toothed tongue used for filing down their food, is modified into the form of several hollow barbed harpoons (**Figure 1**). These harpoons are relatively free inside a sac, one of which is selected and directed towards the proboscis tip. They can be constantly replaced.

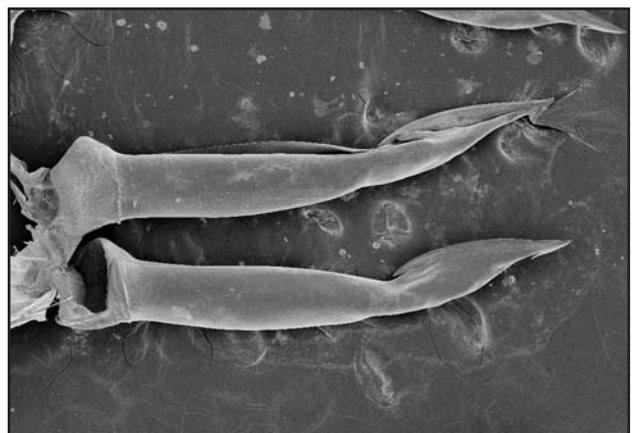


FIGURE 1

Radula apparatus of a *Conus regius* specimen, showing modification in the form of several barbed and hollow harpoons.

The attack mechanism is preceded by insertion of the proboscis tip harpoon into the prey. The muscular bulb contracts and the venom is propelled through the entire length of the proboscis, from the venom gland to the harpoon²².

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The venom of *Conus* species is composed of conotoxins, which are low molecular weight neurotoxins. The venom has two different effects. The first, the lightning-strike effect, causes immediate immobilization, and the second, which is achieved more slowly, causes complete inhibition of neuromuscular transmission^{22,23}. Poisoning by *Conus* species that feed on worms and molluscs causes mild poisoning in humans, but accidents caused by piscivorous *Conus* may be fatal^{7,14}. During the day, they are inactive under rocks, shell fragments and coral. Once collected, they must be handled with care and should not be touched at their opening. One of the most common species in Brazil is *Conus regius* Gmelin, 1791, which actively feeds on marine worms². When one specimen is collected, there are probably several in the same region, called the 'point of *Conus*'.

A typical accident caused by a *Conus* species initially shows as mild local pain and evolves to progressive muscle paralysis in about one hour, without other local signs or symptoms. A history of contact with these molluscs, associated with severe muscle weakness, raises a suspicion of such an accident. At later stages, patients may develop palpebral ptosis, blurred vision, speech and deglutition difficulty, unconsciousness and dyspnea, with possible evolution to respiratory arrest. This may be fatal and can occur between 40 minutes and five hours after the sting^{3,7,9,12,14,16,18,19}.

There are more than 30 species of the genus *Conus* along the Brazilian coast^{5,10,20}. One is known to prey on fish: *Conus ermineus* Born, 1778^{1,4,6,8,11}. However, possibly due to its rarity and deepwater environment, no human accident with this species has so far been reported.

On the other hand, *Conus regius* is a very common species that occurs all the way from the Caribbean Sea down to the coast of the State of São Paulo, Brazil. It is most abundant in warm waters, especially in northeastern Brazil (Figures 2 and 3). It is a shallow-water species, and can be collected from the intertidal zone. Adult specimens range in size from about 3cm on the coast of the State of Espírito Santo to more than 10cm in the archipelago of Fernando de Noronha. As far as is known, *Conus regius* preys



FIGURE 2

Live *Conus regius* specimen. This mollusc is a very common species found from the Caribbean Sea to the São Paulo coast, Brazil.



FIGURE 3

Detail of *Conus regius* showing the animal's body with the proboscis.

on polychaetes, which are annelid marine worms. Studies in the literature have already investigated the venom composition of this species², revealing a complex of biologically active peptides that paralyzes the prey of this species through interactions with receptors and ion channels. In addition to the well-developed venom gland, two other pairs of glands also act in the attacks. These are the salivary glands and the proboscis glands. The latter are a pair of elongated, balloon-like glands that are surrounded by the venom gland. The proboscis and venom glands are extracted together through dissection, and the proboscis gland certainly has an influence on venom action.

CASE REPORT

A 42-year-old male patient suffered an accident while scuba diving to look for shells on an intertidal rocky outcrop near Itapoan in the city of Salvador, State of Bahia, Brazil. The injury occurred around 10:00 a.m., after the victim had collected two *Conus regius* specimens. The patient was an experienced diver and shell collector and had no doubt about the identity of the specimens that he was handling. According to his report, he knew about the risks of handling *Conus* specimens in Indo-Pacific regions, having read warnings from collectors, but was unaware that the problem could also exist among Brazilian specimens. The handling procedure that the patient had been following for the specimens that he collected was to put the soft parts of the body under pressure in order to extract the operculum.

After manipulating two specimens, he noticed a very small puncture in his right hand and felt a slight itching sensation, which was followed by local tingling and numbness. These symptoms later extended to the wrist and forearm, and after a few hours, he experienced paresthesia, numbness and mild difficulty in movement in his entire upper limb. There was no sensation of pain or any systemic phenomenon such as disseminated paresthesia, perioral tingling, alteration of consciousness or muscle palsy, etc. The heavy arm feeling remained throughout the day and had disappeared by the following morning, without leaving any sequelae.

DISCUSSION

In a previous study, Haddad Jr et al raised the possibility that accidents caused by molluscs of genus *Conus* could occur in Brazil¹⁵, citing the species *Conus regius* as a likely potential agent. The major risk group would be composed of individuals who were collecting shells for scientific purposes and for collections. This has been confirmed by this report.

Conus regius is widely distributed along the Brazilian coast, and can be collected in almost all but the southernmost regions of the country²⁰. Although *Conus regius* feeds on polychaetes, which in theory reduces the severity of accidents compared with the accidents that involve piscivorous species, there is still no real estimate of the magnitude of poisoning occurrences.

Another interesting aspect of this report was the mild gravity of the accident. It had neuromuscular effects that were not associated with systemic changes, although the action by the neurotoxic venom was evident. Populations at risk (scientific researchers, divers, etc.) need to be aware of the risks of accidents in Brazil caused by *Conus regius* and other *Conus* species.

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