Rapid Communication

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Stingray envenomation and injury in a dog

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Abstract: The stingray, a seemingly harmless cartilaginous fish, is capable of causing painful injuries and envenomation in humans. There is no known peer reviewed case report involving dogs in a veterinary journal at the time of writing this case report. Poor management of the condition or overzealous attempts to remove embedded barbs has resulted in complications in humans. This case report presents an effective approach to the treatment of stingray envenomation in dogs which is likely to be reproducible in other domestic animals. Clearly elucidated are the principles behind antibiotic therapy in the treatment of stingray injuries and the benefit of lignocaine injection in cases of embedded stingers. There is a need for case reports to enhance clinical knowledge of stingray management in domestic animals. This case report, thus, serves as an impetus for future research in this area of veterinary medicine.

Keywords: stingray, envenomation, stinger, barb, venom

1 Introduction

The Stingray is an aquatic animal found worldwide; they are dorsoventrally flattened cartilaginous fishes belonging to the suborder myliobatoidei and the order myliobatiformes. There are 7 families, among which is the Dasyatidae (the whip stingrays). Stingrays are found along the west coast of Africa, the *Dasyatis margarita* and *Dasyatis chrysonota* can be found in the coast of Senegal and Gambia. They possess a distinctive tail with a barb-like stinger projecting dorso-caudally. This is used as a defensive weapon rather than an offensive one, they are usually not aggressive in nature [1-5].

In some coastal areas in Gambia, these fishes sometimes wash ashore or are caught in fishing nets. It is a common practice amongst dog owners living near the coast to walk their dogs along the beaches. These dogs encounter various marine animals while nosing around in the beach or swimming in the open sea. During this period, they sometimes encounter the stingrays and could get stung.

As reported in all published case reports, human stingray injuries and envenomation are painful, they often lead to tissue necrosis and wound sepsis. They are usually accidental during swimming or fishing, most of the injuries are sustained on the lower extremities [3,6-11]. Based on the authors' clinical experience, among the few cases encountered, the common site of envenomation in dogs in Gambia is the submandibular area. This is a logical observation, as most of these unpleasant encounters occur when they are nosing around on the beach. It must be noted that stingray envenomation in dogs is a rare clinical occurrence in Gambia likely due to poor reporting or misdiagnosis.

Almost the entire report of stingray injuries and envenomation in scientific journals are human cases, only a few reports are related to animals. These few reports are of laboratory animals in research scenarios, except for a case report involving a loggerhead turtle [5,12-14]. We present to you the first case report of stingray envenomation with thoracic injury in a dog.

2 Case

An owner presented a 6 months old mongrel male dog weighing 15.7 kg, after noticing a barb subcutaneously buried in the mid left lateral aspect of the thorax with a significant part sticking out. The point of entrance was about 6.5 cm caudal to the mid-scapular spine. The dog and its owner regularly visited the beach. According to the owner, the dog had encountered the stingray on the beach less than 8 hours before presentation. The dog showed mild discomfort when the affected area was palpated, rectal temperature was 39.4°C, respiratory rate; 28 breaths per minute and heart rate was 105 beats

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per minute, the skin or the site of insertion of the barb showed no obvious sign of infection. There were no other significant clinical findings.

The non-visible part of the barb lay parallel to the thoracic wall. It could be palpated as a subcutaneously embedded, stiff, pointed material with bilaterally serrated edges and a pointed end like a hypodermic needle in the hypodermis. The visible part of the barb (>3cm in length) tapered as it intruded cranially into the thoracic wall cephalad. The placement (as discerned through palpation) of the barb indicated there was no deeper penetration of the thorax beneath the hypodermis. A ring block was done with 4 ml of 2% lignocaine (LIGNO 2%, Kopran, Mumbai, India) injected subcutaneously around the barb, blocking all the cutaneous spinal nerve branches in the affected area. Blunt-blunt scissors were used to widen and loosen the skin at the entry point slightly in a dorsoventral direction. Using haemostatic forceps, the protruding end of the barb was grasped firmly, with caudally directed traction parallel to the thorax, the intact barb was carefully pulled out. The barb (7.3 cm in length, about 0.45 cm in width) was examined under a microscope at x10 magnification for microfractures, to ascertain if any fragment of the stinger was left embedded in the wound. The barb had no significant damage and no blood stains. The resultant wound was carefully flushed using sterile normal saline in 20G syringe. Penicillin 600000IU-Streptomycin 600mg injection (Penstrep-400, Interchemie, Holland, recommended route of administration; IM and SQ) was injected subcutaneously around and into the wound. 64 mg of Tolfenamic acid (4% Tolfedine, Vetoquinol S.A) was administered via subcutaneous injection. The wound was left to heal by secondary intention.

From day 3 to day 8 of treatment, 200 mg Amoxicillin-50 mg clavulanate (Noroclav 250 mg, Norbrook UK) tablet was administered twice daily. The dog was reassessed one week after presentation followed by 4 weeks after presentation. Recovery was uneventful and the wound healed without a major scar.

3 Discussion

As shown in figure 1 below, the stingray barb has sharp, pointed and caudally directed spines on both edges. The anatomy of the stinger makes it a mechanically efficient piercing device. An overzealous attempt to remove an embedded stinger will result in severe injury. Control of pain and infection is key in the treatment of stingray injuries. The stinger possesses a groove that is covered with venom secreting epithelial secretory cells. The venom contains certain enzymes and the neurotransmitter, serotonin. While some of these enzymes induce apoptosis, the serotonin component of the venom is likely responsible for marked muscle contraction generating the infamous pain associated with stingray envenomation [14,15]. The venom and the induced trauma set off a cascade of inflammatory responses, which need to be controlled to avoid serious tissue damage. Non-steroidal anti-inflammatories and opioids have been used successfully in the management of this inflammatory response in stingray injury [16]. Heat immersion has also been used in human cases but the mechanism of action is still debatable [10]. A single injection of tolfenamic acid, a non-steroidal anti-inflammatory drug with good safety margin (LD_{50} 200 mg – 1000 mg/Kg b.w) combined with local anaesthetic, was effective in this case. Generally, tolfenamic acid at a dose rate of 4mg/kg administered parenterally followed by a repeat treatment after 24-48 hours is recommended. A single injection might suffice depending on the clinician's assessment [17,18]. Lignocaine has antiarrhythmic and antinociceptive properties. Its ability to induce analgesia via alteration of sodium channels, reversibly blocking nerve fibre impulse propagation, and its quick action makes it a good choice of analgesic in the treatment of stingray envenomation as seen in this case. Lignocaine has anti-inflammatory and bacterial inhibitory properties [19], which makes it desirable in the symptomatic treatment of stingray envenomation. Stingray envenomation should be taken seriously no matter how insignificant the injury appears [7,20,21]. Severe wounds to the thorax have been reported in human cases [8,9].

Complete removal of a stingray barb from a wound requires much care, as the serrated edges can easily break off or create more injury when extracted [3,16]. In this case report, since a considerable portion of the tapered barb was not buried in the skin, it was possible to remove the barb by expanding the entry point dorsally and ventrally with blunt-blunt scissors. Alternatively, the barb can be removed after an incision over the embedded part. The incised skin can be closed after cleaning with intradermal suture pattern using 2-0 or 3-0 absorbable sutures. Because the wound size is larger, management and healing may take a relatively longer time. The method of removal used in this case did not result in any complication, recovery was good, cost and time of treatment was minimal. Where the entire barb can be retrieved, the embedded part should be carefully examined for the presence of macro- and microfractures with a microscope or magnifying glass of x10

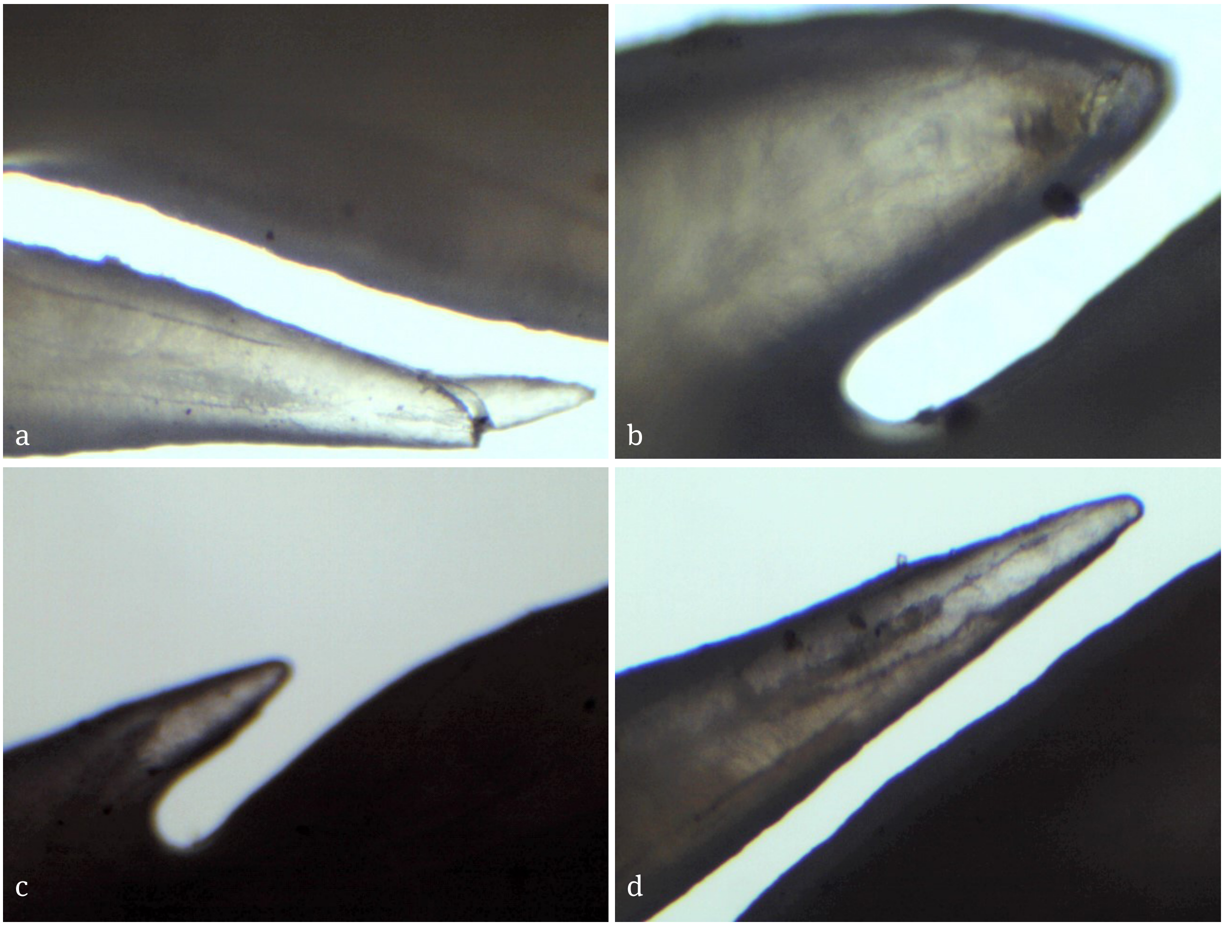

Figure 1 x10 magnification of the serrated edges of a stingray stinger removed from a dog. **a.** sharp pointed cranial spine with a broken tip, **b.** blunt caudal spines, **c.** sharp pointed mid spines, **d.** sharp pointed caudal spines.

magnification. This also allows the clinician to determine whether there is a real need for diagnostic imaging. As seen in this report, the barb had no significant fractures indicating there was no remnant fragment of clinical importance in the wound. The knowledge of the anatomy of the stingray barb was useful in this method. Diagnostic imaging, such as MRI, radiograph, and ultrasound have been useful in detecting embedded remains of stingray barbs, although diagnostic value of radiographs in some cases is still uncertain. MRI has been recommended but it is mostly expensive and less accessible for veterinary use [3,16,23,24].

A puncture wound sustained from a marine stingray is a contaminated wound with high possibility of infection, it could easily become a recalcitrant wound if not treated properly. It is pragmatic to consider broad-spectrum antibiotic prophylaxis in the management of such injury [16,23]. Bacteria such as Aeromonas, vibrios and clostridia are possible microbial contaminants of such wounds and some are resistant to routinely used antibiotics. These injuries could lead to septicaemia and osteomyelitis. Many marine infectious bacteria are sensitive to aminoglycosides and fluoroquinolones, a few, such as *Erysipelothrix rusiopathiae* are sensitive to the penicillin. [3,16,25-28]. Flushing with normal saline solution helps to remove contaminants, debris and also impact on the venom. Since the point of introduction of contaminant was the location of the barb, it is logical to conclude that microbial multiplication will commence from that point. Subcutaneous injection of a broad-spectrum antibiotic around and within the puncture wound site, increases initial antibiotic concentration in the wound site. This also decreases the possibility of rapid multiplication and assimilation of bacteria into the blood stream [29-37]. In this case, a successful treatment was achieved with the use of local subcutaneous injection of Penicillin-streptomycin and oral administration amoxicillin-clavulanate [38,39]. There is currently no research in canine stingray envenomation to support this approach.

4 Conclusion

Stingray envenomation in Africa has not been extensively studied, and there is a dearth of knowledge of the pathologies of this condition in veterinary science. Although research in this field in veterinary science is virtually non-existent, case reports such as this will provide impetus for research and a knowledge base for practicing veterinarians, vets in training and human clinicians.

Conflict of interest: Authors state no conflict of interest

Data availability: Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

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