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CASE REPORT

Acantotoxic accident cellulite and its distinctiveness: a case report

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Abstract

Introduction: Acantotoxic accidents caused by skates (fish) are routinely caught in Brazil. It is more common in the northern region, especially from June to August, due to the season of river beaches and greater contact with rivers, dams and freshwater lakes: natural habitat of those species. It has an intense and also late inflammatory character, being a poison composed of polypeptides with thermolabile properties. There is no antivenom for those cases in Brazil. The treatment is based on symptom control and prevention of secondary infection, with status for the late effects of the poison. **Objectives:** To review emergency management and medical follow-up of an acantotoxic accident case in a pediatric patient and report the singularities related to this variety of accidents. **Methods:** A case report of a 9-year-old boy admitted to a pediatric emergency department of a Federal District School Hospital, with a history of freshwater stingray injury, a clinical presentation of cellulitis and a dragged course. **Results:** Regarded evolution compared to usual cellulitis patterns, requiring the antibiotic change and late signs of a form of necrotic formation. **Conclusion:** The approach to cellulitis was redirected due to the etiological factor correlated to the acantotoxic accident, implying to broaden the spectrum for gram-negative and anaerobic bacteria. It was then allowed to resolve and prevent more serious complications, such as late necrosis.

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INTRODUCTION

Brazil is a country with very rich water density and formidable aquatic flora. The contact of populations with environments such as: marine beaches, freshwater beaches, rivers, dams and lakes is very common. In this context, venomous aquatic animals are inserted, a topic little known by populations whose daily life does not involve fishing and related activities. The most common accidents in the described scenario are those caused by catfish, stingrays and scorpion fish[1].

Stingray accidents are the most common cause of fish-related stings in the world[2,3]. According to a study that reviewed information from the Notifiable Diseases Information System (SINAN), most accidents involving venomous aquatic animals in Brazil were caused by stingrays (69%)[4]. It is also worth mentioning that many of these accidents are not reported due to the difficulty of the riverside and indigenous population to have access to health services[5,3]. The main reports of accidents caused by stingrays (acantoxic) in Brazil are in the basins of the Paraná, Paraguay, Araguaia and Amazon rivers.

Stingrays feed on small invertebrates and fish, and are often partially buried in sand or mud. They have one to three stingers, which are used as a form of defense and, for this reason, most acantoxic accidents occur on the feet, ankles or legs, in addition to also occurring on the hands and arms, mainly of fishermen[6]. The stingers are covered in mucus, which contains immune system cells and bacteria. Its venom has secretory cells that produce proteins with necrotizing, edematous, proteolytic, neurotoxic and myotoxic action[5]. Stingray venom causes intense pain, and can cause serious trauma to nerves and blood vessels, both by the stinger and by the venom and mucus. In addition, secondary infection of the lesion involving gram-negative bacteria is common[6].

CASE REPORT

RSS, 9 years old, male, from Planaltina DF, accompanied by his aunt, sought the emergency department of a pediatric emergency service of a secondary care teaching hospital in the Federal District 3 days after suffering a sting on the back of his right foot, caused by a stingray (Figure 1, 2). of a river in the Midwest region. Cephalexin was prescribed, used for 4 days, but there was no improvement. He returned to the emergency room with worsening of the phlogistic signs in the right foot, characterized by redness, heat, swelling and significant pain, in addition to some limitation to ambulation. The patient was hospitalized for intravenous antibiotic therapy, and Ampicillin+Sulbacta was initiated in a symptomatic SOS, with dipyrone of sufficient time for analgesia. On admission, he had a WBC of 8,600/mm^3 and an ESR of 10mm/h, with no changes in the red series; up-to-date dT vaccine. The patient showed significant improvement in the phlogistic signs, however, on the sixth day of treatment with Ampicillin+Sulbactam, the child evolved with a worsening of the clinical picture, with two peaks of fever measured at 39.2 and 38.5ºC associated with a violet color in the center of the lesion and appearance



Figure 1. Freshwater stingray of the genus potamotrygon in a photo taken by the patient's family in the area of the accident.



Figure 2. Photograph showing inoculation lesion of the stingray stinger 12 hours after the accident.

small vesicle; at this moment, leukogram of 10,400/mm^3. In view of the clinical worsening, Clindamycin was added to the therapy for better coverage of anaerobic germs. No local treatment was required. The patient evolved with an improvement in the condition, without new fever peaks or worsening of phlogistic signs. He underwent 13 days of antibiotic therapy with Ampicillin+Sulbactam and 7 days of Clindamycin. He was discharged after 14 days of hospitalization. Cultures were not performed during hospitalization or blood count at medical discharge.

ETHICAL CONSIDERATIONS

The legal guardian signed an informed consent form, authorizing the case report. The report was submitted and approved by the Research Ethics Committee of the Fundação de Ensino e Pesquisa em Ciências da Saúde do Distrito Federal, under registration CAAE 36397920.6.0000.5650.

DISCUSSION

Freshwater stingrays have sharp, retroserrated stingers at the base of the tail, surrounded by an epithelium rich in venom-producing glandular cells[7]. These cells, when compressed during penetration, release their contents into the victim's body. The venom is composed of high molecular weight polypeptides, serotonin, phosphodiesterase and 5-nucleotidase. It is a thermolabile venom, so the only acute therapy indicated is immersion of the injured limb in warm running water, which can inactivate some of the venom's proteins.

The condition of an acanthotoxic accident is usually marked by a punctate (or lacerating) lesion on the lower limb, usually on the dorsum of the foot, accompanied by intense pain of immediate onset, associated with local erythema and edema[3,8]. With the evolution of the condition, lymphangitis and necrosis of local tissues may appear, and this may have an acute or late course. Some patients may also experience systemic symptoms such as fever, nausea, vomiting, and agitation. Pain usually peaks 30-60 minutes after the accident and can last for more than 48 hours[9]. The venom initially induces a neurogenic response phase (first 0 to 5 minutes) and then a painful inflammatory phase (due to proteolytic activity, endothelial injury and activation of the inflammatory cascade, whose main mediators are: IL-1b, IL-6, cytokines and chemo)[10].

Necrosis appears in most patients, with a mostly typical presentation (75%) of onset in the center of the lesion followed by formation of concentric circles of necrotic areas, early or late.

It was noticed that the sex and the maturation of the animal would have an effect on the composition of the toxins, being this mainly due to the specific eating habits of each age group. Young females up to 2 years old, for example, produce substances with greater nociceptive potential, such as peptides with neuroactive action. Adult stingrays, on the other hand, have a venom composed mainly of molecules that are effective in causing protein exudation and triggering tissue necrosis. The patient presented, as the main symptom, pain, which radiated to part of the right lower limb, without signs of necrosis in the first days. As pain was reported as the most prominent symptom, the accident was probably caused by a stingray bite (frequent at this time of year, when spawning).

Wound complications caused by acanthotoxic fish can occur, with secondary infections being the most common, followed by late necrosis[11]. The risk factors for complications are still not well defined in the literature, but the virulence of the bacterial species, area and depth of the lesion, in addition to poor wound hygiene and delay in starting treatment should be considered[11].

Many gram negative bacteria have been identified in the mucus that coats the stingrays' stingers and in the waters where these fish inhabit. Studies show that gram negative bacterial species such as *Acinetobacter spp*., *Pseudomonas aeruginosa* , *Klebsiella pneumoniae*, *Klebsiella oxytoca*, *Serratia* spp., *Shigella spp*. and *Enterobacter spp*. are found only in mucus, whereas *Plesiomonas shigelloides* and *Citrobacter koseri* are found only in water. Bacteria found in both water and mucus are *Aeromonas hydrophila*, *Aeromonas sobria*, *Pseudomonas putida*, *Clostridium freundii* , *Escherichia coli* and *Enterobacter cloacae*[12]. Of these bacteria, some are more likely to cause infection due to the proteases produced that influence their virulence. *Aeromonas hydrophila*, *Pseudomonas spp*. and *Vibrio spp*. are species cited in the literature as isolated agents in secondary infections caused by freshwater stingrays, and these are the bacteria that produce the highest amount of proteases - hemolysin, gelatinase and caseinase[12]. Antimicrobial resistance is also documented, showing that up to 70% of bacteria found in mucus and river water have some resistance. The species with resistance to more types of antimicrobials are *Pseudomonas aeruginosa*, *Pseudomonas putida* and *Enterobacter cloacae* . The antimicrobials with the most resistant bacteria are ampicillin, amoxicillin/clavulanic acid and cephalothin; therefore, they should not be used as a first choice[11,12].

These characteristics justify the failure of the patient's initial treatment with first-generation cephalosporin (1st choice for cellulitis) due to probable resistance of some gram-negative bacteria specific to the acanthotoxic accident. Switching from the antibiotic regimen to Ampicillin+Sulbactam expanded coverage to gram negatives; the patient showed clinical improvement in pain and wound appearance. The extemporaneous worsening of the condition (6 days after a new regimen) may be related to late necrosis caused by the cytotoxic venom or by the activity of bacteria resistant to the treatment. The expansion of coverage for anaerobes with clindamycin showed a favorable result.

CONCLUSION

Acanthotoxic accidents are a subject of little knowledge and lack of protocols for proper management, with medical centers still unprepared for the peculiarities involved. Only reports of this type of accident in adults are found in the

literature; That said, this article would like to contribute to the management of this type of accident in the pediatric age group. Immediate immersion in hot water, pain management, intensive cleaning of the wound with removal of stinger fragments, use of antibiotics also covering gram-negatives at the first sign of infection and tetanus prophylaxis are measures recommended by some authors[11]; Surveillance of late signs of local necrosis is also added as an important aspect to be evaluated. Despite the lack of protocols, the management of an apparent case of cellulitis was redirected due to the etiological factor related to the acanthotoxic accident, which allowed the resolution and prevention of more serious complications.

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