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Case Report

Diagnostic imaging of injuries caused by venomous and traumatogenic catfish

***Marcos Mendes de Barros Negreiros*[1], *Seizo Yamashita*[1], *Trajano Sardenberg*[2], *Edson Luiz Fávero Junior*[3], *Felipe Augusto Horácio Ribeiro*[3], *William Teixeira Haddad Junior*[4] and *Vidal Haddad Junior*[5]**

[1]. Departamento de Doenças Tropicais e Diagnóstico por Imagem, Faculdade de Medicina de Botucatu, Universidade Estadual Paulista, São Paulo, Brasil.
[2]. Departamento de Cirurgia e Ortopedia, Faculdade de Medicina de Botucatu, Universidade Estadual Paulista, São Paulo, Brasil.
[3]. Departamento de Clínica Médica, Faculdade de Medicina de Botucatu, Universidade Estadual Paulista, São Paulo, Brasil.
[4]. Centro de Ciências da Imagem e Física Médica, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, São Paulo, Brasil.
[5]. Departamento de Dermatologia e Radioterapia, Faculdade de Medicina de Botucatu, Universidade Estadual Paulista, São Paulo, Brasil.

Abstract

Injuries caused by fish are common in marine and freshwater environments. Catfish of the Ariidae and Pimelodidae families cause about 80% of those injuries. One of the complications of injuries caused by fish is the retention of fragments of the stinger in the wounds. Here we report five cases (of a total of 127 injuries caused by catfish in the Brazilian coast) in which the retained fragments were detected by radiological examination. Retained fragments should be considered in patients stung by catfish. A simple X-ray is sufficient to detect fragments of stingers in the wounds.

Keywords: Bites and Stings. Catfish. Computed tomography.

INTRODUCTION

The incidence of injuries caused by marine animals in Brazil is 0.1% (1 in 1,000 emergency cases)[1]. Marine catfish alone are responsible for about 80% of those injuries[1,2,3,4]. The Ariidae (distributed worldwide) and Plotosidae (found in the Indo-Pacific region) are the most important families of catfish. Many marine catfish have three serrated stingers at the dorsal and pectoral fins that are used as a defense against predators (**Figure 1**). The stings of some species have venomous glands that can cause serious injuries with lacerations and envenomation in humans, often occurring in the hands and feet of fishermen or beachgoers[2].

The venom causes severe pain, swelling, erythema, pallor, and occasionally skin necrosis[1,2,3,4]. Systemic manifestations do not occur during the acute phase of injury. Complications include extensive lacerations, vascular injury, tenosynovitis, abscesses, and retention of fragments in the wound that are recognized as foreign bodies[1,2,3,4].

Here, we review the cases of five patients who were stung by catfish. This paper establishes a relationship between their clinical outcomes and the radiological findings of retained fragments of the stinger, and discusses the importance of diagnostic imaging tools in injuries caused by venomous and traumatogenic catfish.

CASE REPORT

A series of 127 cases of injuries caused by catfish were registered in a ten-year period in the Brazilian coast: they occurred in Ubatuba town (Southeastern Brazil), Aracaju and Salvador Cities (Northeast region), and Salinópolis town (North region)[2]. Of the 127 cases, five (3.9%) had retention of fragments of the stinger in the wounds. All 127 cases presented envenomation, manifested by intense local pain and inflammation; they were treated with immersion of the affected member in hot water, with improvement of symptoms[1,2,3]. However, in the five cases with retained fragments of the stinger, local inflammation and pain persisted for more than 24 hours - the time when the venom of catfish typically ceases its action. The patients returned to the hospital 1-5 days after the initial envenomation. Three patients had been stung in the feet, and two had been stung in the hands.

Due the late-stage edema, erythema and pain, the patients were submitted to conventional X-ray examination. The X-rays revealed fragments of the stinger and areas of inflammation (**Figure 1** and **Figure 2**). All five patients underwent surgery for extracting the stingers, with complete resolution of late inflammation (**Figure 3**).

We found 36 reports of injuries caused by catfish in the literature from 1970 to January 2014, of which

Corresponding author: Dr. Vidal Haddad Junior.
e-mail: haddadjr@fmb.unesp.br
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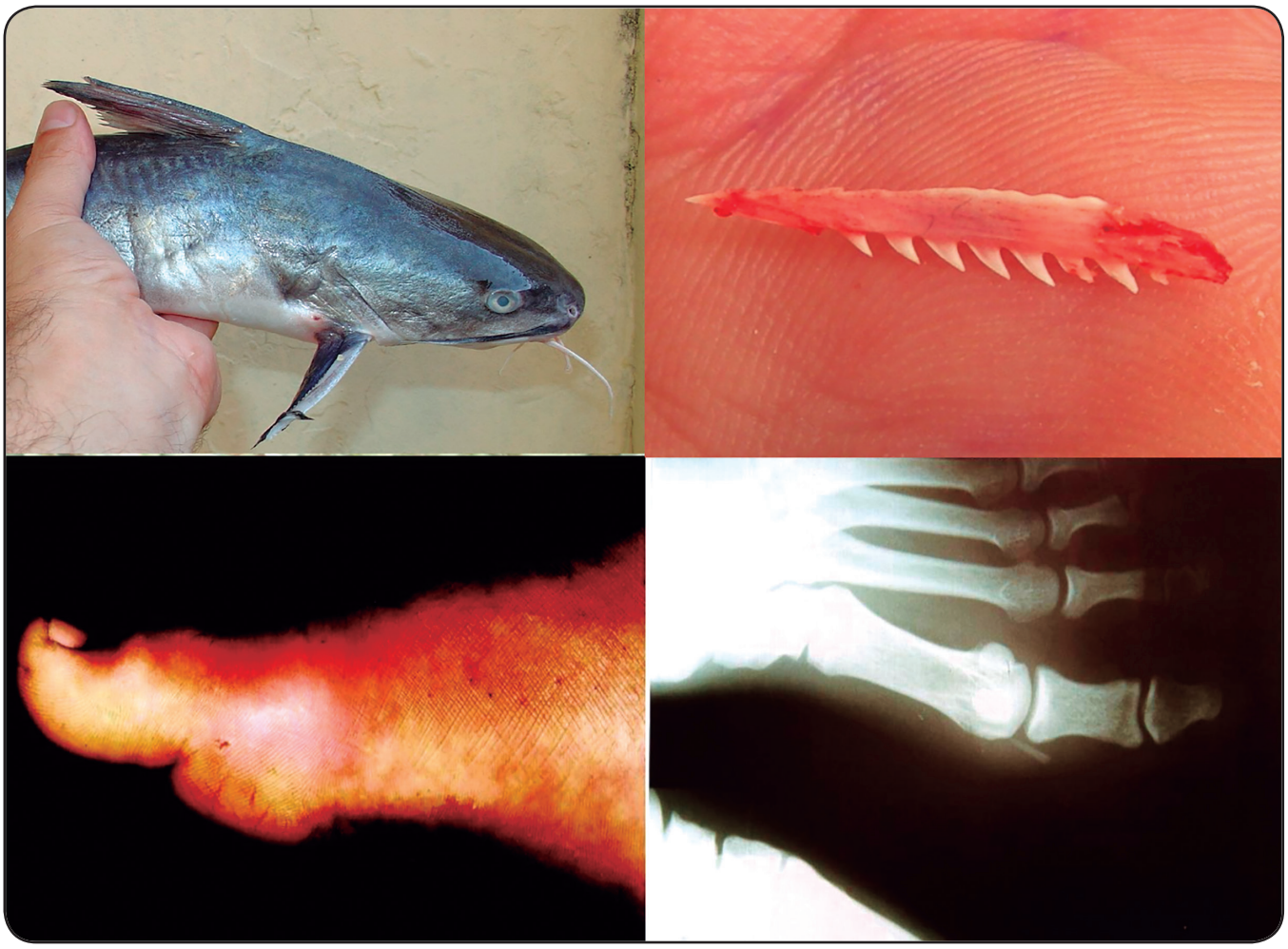

FIGURE 1. Marine catfish (Top left). Pectoral Sting in detail (Top right). Persisting inflammation three days after an injury caused by a catfish (Bottom left). Conventional radiography of the injured left foot (Bottom right). Increased radiographic density is seen around the first metatarsophalangeal joint (soft-tissue swelling). Note the sharp radiopaque structure near the first metatarsal head (fragment of the stinger).

nine (25%) described the presence of stinger fragments based on radiological findings[5][6][7][8][9][10][11]. Other fish (e.g., stingrays) can cause injuries in fishermen, divers, and beachgoers[1][8] and similar complications to those seen in injuries caused by catfish (e.g., abscesses, retention of fragments of the stingers, tissue necrosis, gangrene, osteomyelitis, necrotizing fasciitis, sepsis, and even death)[1][2][3][4].

Ethical considerations

The cases presented in this report are a part of previous studies that have been approved by the Ethics Committee of the Botucatu School of Medicine (São Paulo State University, São Paulo, Brazil).

DISCUSSION

Conventional radiography is often the first test to be performed in the investigation of foreign bodies. In appropriate circumstances, this exam allows us to assess the location, size, and number of foreign bodies[5][6][7]. A simple X-ray examination shows 98% sensitivity in detecting metal fragments and other radiopaque substances such as the stinger of catfish[7][10][11].

FIGURE 2. Radiographic evaluation of a patient with significant inflammation in the right hallux two days after an injury caused by a catfish. The fragment of the stinger is visible next to the first metatarsophalangeal joint, and is surrounded by soft tissue swelling (Left). Radiographic evaluation shows a large stinger fragment that projects into the right foot cuboid bone, resulting in inflammation (Right).

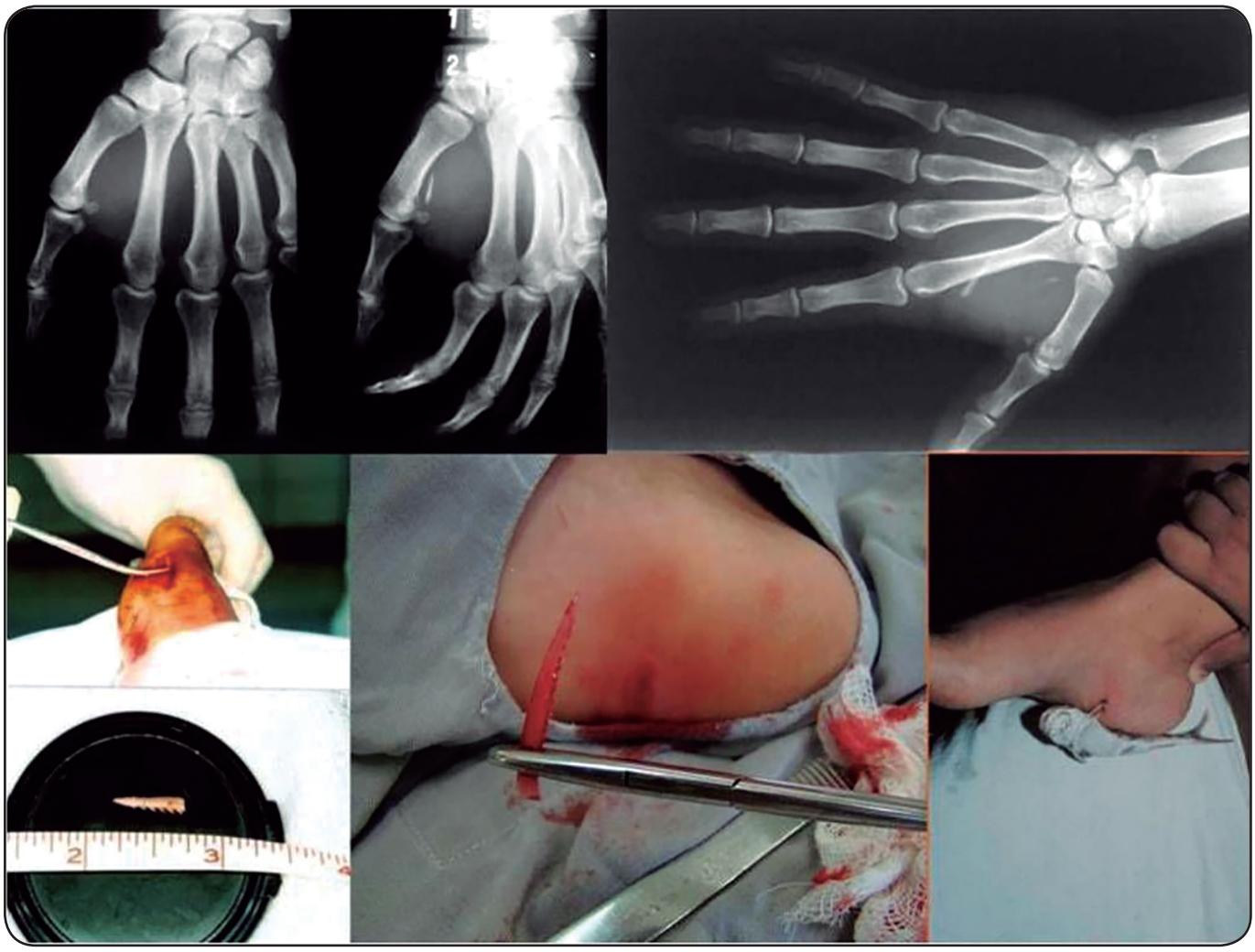

FIGURE 3. Conventional radiography of the hand showing embedded portions of the stinger near the first metacarpal bone that project over the second metacarpal bone. The breaking of stingers/barbs led to persisting inflammation and pain in the hands (Top). The only definitive treatment consisted of surgical removal of the fragments, The penetration of the sting is highly traumatic and the break in the wound is always possible. (Bottom).

The anteroposterior, profile and oblique incidences allow not only to rule out the presence of fragments of stinger, but also gas in the soft tissues or a secondary bacterial infection, and to evaluate the depth of the sting, choice of surgical approach, and possible bone injury. Conventional radiography is a cheap and affordable method to image injuries caused by fish in cities with hospitals with limited resources. In all cases reported in this study, radiography was sufficient to diagnose the retention of stinger fragments. Surgical removal of these fragments resulted in complete resolution of inflammation.

Ultrasound can be useful to discard any radiolucent foreign bodies such as cartilage fragments of the fish. The sensitivity for detecting foreign bodies, regardless of composition, varies in the literature, with studies reporting up to 94-100%. Ultrasound is the modality of choice for detection of foreign bodies in patients who present a history of perforating wounds[(7)]. In addition, ultrasound allows the diagnosis of fluid collections and/or muscle-tendon and ligament lesions. The examination should be performed with high-frequency linear transducers that allow the visualization of small fragments of the stinger as linear hyperechoic structures, producing posterior acoustic shadowing[(6)(7)]. A hypoechoic halo often appears within the first 24 hours due to the local inflammatory response, aiding in the visualization of the foreign body[(6)(7)].

Computed tomography (CT) has limitations regarding the detection of small foreign bodies. However, thin slices acquired by multislice equipment increase its sensibility. Selective preoperative evaluation with CT can provide useful information to the surgeon and can considerably lessen the extent of the surgery[(9)(10)(11)]. Due to radiation exposure and higher costs, CT should be considered in specific cases, such as high clinical suspicion of retained fragments even after negative ultrasound evaluation or in case of chest or abdomen injuries, to evaluate and discard any visceral lesions[(7)]. Magnetic resonance imaging (MRI) detection of foreign bodies can be difficult, especially if the foreign body is small (e.g., a retained fragment of the stinger) and is not associated with complications that MRI can detect based on soft tissue contrast enhancement[(9)]. Examples of

well-characterized changes on gadolinium-enhanced MRI in the context of injuries caused by fish include chronic inflammatory reactions, abscesses, necrotizing fasciitis, myositis, and osteomyelitis[10].

Surgery is the only definitive management for this type of complication and should preferably be performed in a surgical center with regional anesthesia and bloodless surgical field, obtained with a tourniquet. The delicate tissue dissection prevents potential injuries to key anatomical structures such as tendons, nerves, and vessels. After removal of the large fragments of the stinger, the wound should be thoroughly irrigated with saline to remove smaller fragments and other contaminants[2]. Postoperative requires lifting of the extremity for a 24-hour period and smooth movement of the joints in the same day.

Complications after injuries by catfish are common in emergency centers of coastal areas. Imaging tests, especially X-rays, are effective in detecting many of the fragments, in addition to other related complications. As a result, it is important that the health teams become familiar with the imaging findings related with injuries by fish, especially catfish and stingrays.

Conflicts of Interest

The authors declare that there is no conflict of interest.

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