Catfish-Related Injury and Infection: Report on Cases from the Marine Waters of Iraq

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Abstract In the present chapter, four catfish attack incidences were given. They vary in their severity from mild to fatal. In one of these cases, the patient was illiterate and did not follow the medical instructions on a condition that led to delay in the healing of the wound he received from a sting of a catfish. The fatal case represents contamination with one of the most dangerous pathogen *Edwardsiella tarda*. At the end of the chapter, a set of recommendations were given, so they need to be followed by government agencies and NGOs.

Keywords Dangerous fishes · Severe injuries · Contamination · Incidences · Edwardsiella

1 Introduction

Fishing for the sake getting food or as a recreational activity is common traditional around the world since the ancient times (Sahrhage 1999). Among the fish species that usually caught for both activities mentioned are the catfishes, which are commonly wanted, as a food supply commercially and by fishers for sporting events. Globally, there are more than 3000 diverse species of catfish, several of which are dangerous to people in being venomous (Ferraris 2007). These fish species are characterised in having an axillary poison glands and one dorsal and two pectoral fin barbels that enable them to inject their venom (Singletary et al. 2005; Le Blond 2019). The fins are constituted of piercing retrorse spines that can tear the skin, increasing contact and amalgamation of the venom (Jawad 2018). The aching type of such wounds has been identified for eras, but the feasibility of these fish for imposing upsetting and even fatal injuries has only been valued in the second half of the last century (Roth and Geller 2010; Le Blond 2019). The wound frequently establishes itself intensely as instant sore aching, which may extend to include the entire limb. A

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diversity of organisms not characteristically met have been intricate in the action of severe and long-lasting infection (Zeman 1989; Le Blond 2019) such as *Edwardsiella tarda*, *Citrobacter freundii*, *Morganella morganii*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Aeromonas hydrophila*, *Vibrio vulnificus*, *Streptococcus* and *Staphylococcus aureus* (Eiland and Salazar 2006).

There are several ways in which human can get catfish envenomation; they include bare-hand administering and underwater bare-hand catching which is known as catfish noodling. The former way of getting catfish infection is when fishermen usually release their catch from the net and in such an occasions, they do not usually wear gloves. Therefore, their bare hands or parts of their bodies become a target for the active fish individual that try to escape from the catch. The latter method has been spread widely around the world with the advancement of the communication technology like the internet and mobile phones. In using this technique of catching fish, the diver needs to catch fish with bare hands in their natural environment. The noodler usually searches the bottom of the area looking for fish and lures them to nibble their hands while discovering a fish's nest. The action of the fish if there is any is a certain bite from the fish side. The poacher will grasp the fish and tug it out of its hiding by its jaw (Ferraris 2007).

In the present chapter and as an issue in sea and human health aspects, cases of injuries caused by marine catfish species in the marine waters of Iraq are reported.

2 Species of Catfish Living in the Marine Waters of Iraq

In the Iraqi marine waters so far reported, there are four catfish species belonging to two families. *Plicofollis dussumieri* (Valenciennes, 1840), *Netuma bilineata* (Valenciennes, 1840) and *N. thalassina* (Rüppell, 1837) belonging to the Family Ariidae and *Plotosus lineatus* (Thunberg, 1787) contained in the family Plotosidae (Al-Faisal and Mutlak 2018).

The catfish species encountered in the marine waters of Iraq can cause severe injuries to locals and different ways (Jawad 2016).

3 Cases of Catfish-Related Injury and Infection

3.1 Case No. 1: A Delay in Reporting and Diagnosing Injury Caused by Catfish

The present case represents a noticeably late condition of venom inflecting in the body of the victim that examined 18 months following the incident. It is an exclusive case, not merely due to the enduring nature of the infection but also owing to the postponement in its examination and treatment.

A 28-year-old healthy fisherman experienced a wound to the upper side of his right arm while he was fishing in the coastal area of the marine waters of Iraq at Fao City, south of Iraq. The event occurred as the fisherman tried to free a large catfish, which the latter appeared as *Netuma thalassina*, a marine catfish that can reach to large size. He held the body of the fish with his right arm and tried to remove the net that tangled the fish body. The wound caused an instant unembellished aching and puffiness, which extended to the entire arm. Erythema was observed at the wound location.

After visiting a local doctor and treated with antibiotic for 10 days, the symptoms and pain reduced gradually. The wound was not cleaned from any foreign bodies such as parts of spine, and also no attempt was made to view the wound by X-ray. A few months later, the victim passed through repeated periods of pain and swelling, and up until 6 months later, a swelling was noted at his upper right arm, which continuously burst with fluid stained with blood. This situation continued for another few months, with the patient not pursuing a medical care. Eighteen months following the date of incident, the victim attended to a local emergency clinic with a sore inflamed arm. The X-ray showed the presence of two catfish spines entrenched in the soft tissues of the upper right arm. One spine was removed from the body of the patient in small operation, and he was discharged home after being put on a course of antibiotic. The patient continues to have wound that led to further complications, which admitted to the emergency clinic later and appeared that wound has swollen and that extended to the right arm. Later, the patient reacted well to the antibiotics and was released home and kept on antibiotic, but the symptoms stayed, with bulged area of the wound. The man admitted again to the clinic, and a surgical operation was performed on the old wound. A part of the catfish was entrenched deep in the wound, which was recognised and removed successfully. The man was free of pain, and the swelling disappeared a few months later.

3.1.1 Remarks

The injuries caused by catfish are mainly found either in the hand during the process of releasing fish from the net or in the feet during wading wearing no boots. Such injuries are a result of inflicting the either dorsal or the pectoral spines in the body of the victim when it encountered, and the poison is inserted in the wound by the spines from the poisonous glands located at the base of the spines.

The chemical constituent of the catfish venom is composed of a mixture of haemolytic, dermonecrotic, inflammatory and vasoconstrictive elements, which differ among species (Jawad 2016, 2018; Calton and Burnett 1975; Burnett et al. 1985), and with marine species of catfish is more powerful and creates severer symptoms (Blomkalns and Otten 1999). Additional resources of poisons are present in the epidermal cells of the skin of the catfish known as crinotoxins (Jawad 2016, 2018). These toxins are secreted on the surface of the spines when the fish encounters a danger and can increase the acerbity when injected inside the wound (Al-Hassan et al. 1986).

Besides the presence of venom from the poisonous glands situated at the base of the spines and the crinotoxins, victims may get severe and complicated infections due to the presence of various and serious pathogens on the skin of the catfish due to their food habit that involve debris and style of living (Ajmal et al. 2003).

In the present case of catfish poisoning, the removal of any remains of the pectoral fin and its spine should be performed, as these matters which are clear in X-ray could create inflammation and house virulent microorganisms.

3.2 Case No. 2: Injury of Noodler by Catfish Sting

The present report about a case of 20-year-old man who continued having hand scratches and an upper forearm wound while catfish poaching at the coastal area of the City Fao, south of Iraq.

A young and healthy man old, 20 years old, was admitted to an emergency clinic at Fao City, south Of Iraq, suffering a right forearm wound happened earlier in the day. The patient admitted that he watch a YouTube about fish noodling and decided to try this new fishing technique in the coastal waters of the City Fao, south Of Iraq. Therefore, he followed the instructions given in the YouTube about to noodling and went in the water catching fish with his bare hand. Just not far away from the coast, the patient was attacked by a large catfish that used to hide under a rock. The fish caused scratches to the dorsal surface of his right hand before disappearing. The young man estimated the length of the fish of about 900 mm, and it was one of the large marine catfish species *Netuma bilineata*.

The wound in the hand of the young man was serious as he developed a profound rupture to the extensor surface of his right forearm from a submerged sharp rock under which the catfish was hiding. He was unable to move his wrist when he was admitted to the clinic. During close examination of his wounded hand, shallow scrapes to the dorsum of his hand and fingers were noted. The function of the fingers of the hand was not fully operational due to the deep wound and laceration. No foreign objects were seen in the wound by X-ray, and the proper treatment was given to the young man. The results of the examination and the treatment showed that several tendons of the right hand of the young man were damaged and they were repaired. Then the patient was discharged next morning on courses of antibiotics and other medications. In 2 months' time, the young man was free of pain and symptoms and recovered his normal strength.

3.2.1 Remarks

The present case of injury represents a result of one of the dangerous sports that people are performing around the world. The serious thing about this sport that the noodler knows beforehand that he/she going to get bitten by the fish or by any other aquatic creatures no matter what it is no matter what would be the consequences.

Despite the state of injury was not damaging and repaired in short period of time, it is well possible that the next injury will be worse and could be fatal if the patient attempts to perform noodling again. In addition to gained wounds of different severity, mechanical disorder could happen, and even the whole hand of the noodler can be cut if the wrong targeted fish species is encountered. Probably, a deadly poisonous fish or aquatic organism might present in the same place where the noodler was searching. In this case, the noodler will surface dead as some of the poisonous fish does not give enough time to the victim to come to survive. In addition and in the case of the catfish species, the bite of the catfish could well be accompanied with pathogenic microorganism that is usually found between the teeth of the fish and in the decayed food remains. These microorganisms can pass easily to the wound and make complications to the victim. They can include strains of bacteria such as *Aeromonas*, *Vibrio*, *Mycobacterium marinum*, *Proteus vulgaris*, *Morganella morganii* and *Edwardsiella tarda* (Crosby et al. 2013; Huang et al. 2013). Therefore, such sport should be banned, and local people should be educated about the dangerous in performing such fishing technique.

3.3 Case No. 3: Catfish Fatal Bite

The subsequent case described designates a patient who was admitted with an extra intestinal infection from *Edwardsiella tarda* that caused in staying at the hospital until his ultimate death.

A 60-year-old fisherman was admitted and was introduced to the local emergency clinic at Khor Al-Zubair City, south of Iraq, 10 h after receiving a multiple catfish "bite" to the right hand while clearing the fishing net from about ten catfishes *Plotosus lineatus* individuals which were still alive in the net. Since the fish size was small, therefore, the fisherman tried to hold more than one fish in his hand at a time. He received five bites from removing ten fish individuals.

The victim showed a moderate pain and swelling in his hand and reduced desire for food and being ill since the event. The fisherman appeared in no severe pain, with scleral icterus and oedema and erythema to his right hand and forearm. The preliminary treatment was given to the patient at the emergency department. The examination of the patient showed the presence of dorsal soft-tissue growth but no severe break, displacement, osseous irregularity or radiopaque foreign object. He started to have a reduced mental activity, hypotension, tachycardia and tachypnea. The fisherman later established bilateral knee discharges, which were regarded for septic arthritis. He was observed to be hypothermic to 29 °C with incapability to uphold blood pressure although augmented vasopressor use. The oedema of the upper and lower limbs continued to increase. The health of the patient was deteriorated badly, and before he died, laboratory tests were obtained showing blood cultures and knee aspirate having a growth of *Edwardsiella tarda*.

3.3.1 Remarks

The causative agent in this case report is the bacterium *Edwardsiella tarda*, which is a facultative anaerobic gram-negative bacillus belonging to the family: *Enterobacteriaceae* (Slaven et al. 2001). These bacteria were found harbouring on different fish species (Ebisawa et al. 2018) and known to spread through faeces (Slaven et al. 2001). In both fish and human, *E. tarda* showed to cause diseases (Meyer and Bullock 1973). It can cause gastroenteritis to human (Slaven et al. 2001), which is usually found in immune disease-related hosts such as those with malignancy, diabetes mellitus or hepatic malfunction (Yamanoi et al. 2018).

The bacterium *E. tarda* is the commonest gram-negative microorganism producing secondary infection in catfish wounds, and this bacteria can cause severe infection even if the meat of a contaminated fishes was eaten (Kaar and Nakanishi 2017; Le Blond 2019).

3.4 Case No. 4: Deep Soft-Tissue Necrosis of the Hand and Arm due to Catfish Venom Injection

Catfish poison infection in the body of human is considered rare if no complication resulted of such attack. In the present case, a report on an unusual event causing an acute soft-tissue necrosis in a victim and his intricate injury-curing procedure. This incidence shows the possible difficulties of catfish envenomations.

A 35-year-old fisherman showed severe wound from a catfish while assisting other fishermen in clearing fishes from a net in a fishing boat in the coastal marine waters of Iraq at City of Fao, south of Iraq. The wound occurred in the middle part of the right foot. The victim was wearing soft shoes that assist in inflicting the spine of the pectoral fin of the catfish in the foot. The patient was admitted to the emergency clinic a few days after the incident, with powerful aching in his right foot and ankle.

The preliminary examination of the foot of the patient revealed a small wound on the middle part of the right midfoot. The injured site was locked, with no sign of related cut infection. Nevertheless, there was strong erythema observed along the lower dorsal side of the right foot and the anterior region of the right ankle. However, there was no sign of a foreign object.

Later, the victim has gone through operation of cut and drainage of his right foot. A small foreign object was recognised and detached from the injury area, which acknowledged to be a catfish spine. Further examination showed stern tissue necrosis in the area of the wound. The microscopic pathological of the soft tissue showed the presence of coagulase-negative *Staphylococcus*. Due to the nonfulfillment of the patient to the medical instructions, he came back to the hospital for therapy. The patient continued to not following the medical advices, and the healing of the wound took longer than it should be. Finally, the patient was discharged to home after his last visit to the hospital 10 weeks after the initial incidence.

3.4.1 Remarks

In the present case, an account of a catfish attack incidence to a victim has been discussed. The importance of this case that there was a delay in admitting the patient for medical treatment, which belated the healing of the wound. In addition, the patient was illiterate and did not consider the medical instructions, which made the status of the wound worse. The present incidence might differ from other catfish spine envenomations in having multiple surgical procedures and a lengthy postoperative development (Roth and Geller 2010). Although the only microorganism that revealed in the laboratory analysis was *Staphylococcus*, it is possible other causes might contribute to the case of tissue necrosis that the patient had, which further examination.

4 Recommendations

It has been known that catfish attack and subsequent envenomations can develop over a varied range of problems fluctuating from a modest injury to necrotizing amnesties to a gangrenous limb and, finally, to death. It is important to remind medical professionals that if these injuries are ignored, there is a great related death rate that can lead to overwhelming consequences.

Among the recommendations in the case of catfish attack are the following:

1. The wound should be well inspected for abrasions, lacerations and puncture.
2. A neurovascular check must be achieved.
3. Wound can be a result of attack of fish and environmental threats such as hooks, bacteria and viruses in the water and fish, metal and vegetation.
4. Assessment for alien objects must be assumed with X-ray.
5. Washing thoroughly the cut with normal saline and cleaning of necrotic tissue must be started with the introduction of antibiotics.
6. All external stuffs present must be surgically detached and injuries must be closed.
7. The case of tetanus prophylaxis, if showed, should be managed.
8. Wound and its adjacent area of envenomation from catfish spines must also be directly submerged in hot water (45 °C) for 30–90 min due to toxins inclined to break down the toxin that seems to be heat non-resistant.
9. Education of the locals especially the fishermen should be arranged by government agencies and NGOs about the danger of the aquatic organisms that they might encounter during their daily work, and they should wear gloves and thick boats to protect their extremities from imminent attack.

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