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Case Report

Intraosseous Catfish Barb Treated With Cannulated Drill in a Pediatric Patient

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Catfish injuries to the upper extremity following fishing activities are common in the southern United States, especially because noodling is commonplace in this region. Noodling is when a fisher will stick their hand into an area where a catfish is guarding its eggs and grab the catfish by its mouth. Different mechanisms of injury, including envenomation and spine embedment, can occur and ultimately lead to different patient presentations, including the retention of foreign bodies or infection. Literature reviews of catfish injuries primarily report the retention of foreign bodies within soft tissues, infection, and envenomation. We present the first case report of a patient who sustained a ring finger proximal phalangeal physeal injury involving the growth cartilage caused by a penetration injury from a catfish barb. A novel method for safely extracting these barbs with no subsequent growth arrest or range of motion limitation is also presented.

Catfish are the most prevalent poisonous fish in North America.[1] The incidence of catfish injuries compared with all aquatic sources of injuries approaches approximately 70% in marine aquatic injuries and approximately 90% in freshwater aquatic injuries.[2] Catfish injuries that occur to the hand are common and occur by differing mechanisms, ranging from traumatic bites to envenomation.[3] Understanding the anatomy of a catfish also provides insight into the aforementioned mechanism of injury. Catfish contain multiple areas of barbels (also referred to as barbs) on their head and spines on their dorsal and pectoral fins, as shown in Figure 1.[3] Envenomation occurs when the spines are disturbed and become erect. Barbs do not cause envenomation. Within the spines are venomous glands that release their contents when the fin is traumatized, causing severe inflammatory reactions.[2] Another source of toxin is crinotoxin released by epidermal cells of the catfish, which causes local inflammatory reactions.[2] Catfish toxins are typically heat labile and are treated with a combination of hot water soaks and antibiotics.[4] It is also common for the spines to separate from the catfish and become embedded in the soft tissue of the hand, leading to the inoculation of freshwater bacteria, increasing the risk of soft tissue infection and, in some cases, tenosynovitis. These catfish injuries vary not only in mechanism but also in the type of bacteria inoculated, toxin envenomated, and treatments. Wounds caused by catfish have been reported to include *Micrococcus*, *Hydrophila*, *Staphylococcus,* and *Streptococcus* species.[4] An activity that predisposes an individual to catfish injury,

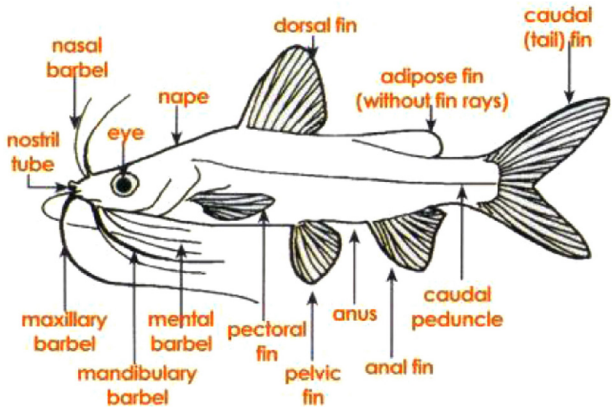

Figure 1. General anatomy of a catfish.

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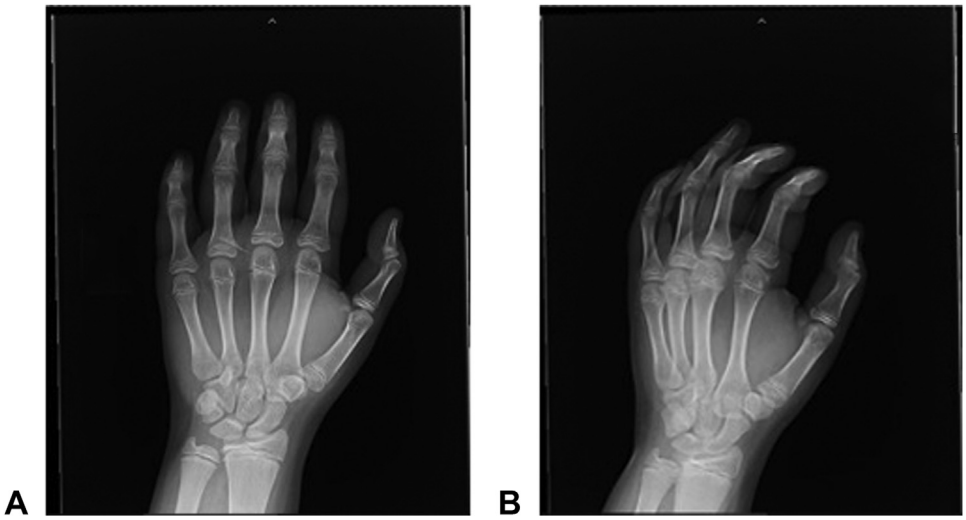

Figure 2. **A** Posteroanterior view of the left hand showing intraosseous catfish barb of the RF proximal phalanx. **B** Oblique view of the left hand showing intraosseous catfish barb of the RF proximal phalanx.

Figure 3. Intraoperative fluoroscopic image of the left RF showing an intraosseous catfish barb.

especially in the southern United States, is noodling. Noodling is described as fishing for catfish with one's bare hands. A fisher sticks their hand into an area where a catfish is guarding its eggs and grabs the catfish by its mouth. Typically, the catfish bite down on the hand and forearm, and the fisher subsequently brings the fish to the surface.[3] Therefore, noodling is a notable contributor to injuries of the upper extremity, specifically with regard to catfish. We present, to our knowledge, the first case report in which a catfish barb violated the proximal phalangeal physis of the ring finger of a boy who was noodling and was surgically removed without subsequent growth arrest or restriction in range of motion.

Case Report

We obtained written informed consent before writing this case report. A 13-year-old boy presented to the emergency department after running on a wet surface and falling onto the catfish that he was carrying; the boy subsequently landed on one of the barbs located on the catfish. He had immediate pain localized to the metacarpophalangeal (MCP) and proximal phalanx of the left ring finger (RF). On initial examination, the patient had a 1-cm laceration to the palmar aspect of his left hand radial to the crease of the RF. This was initially cleaned with a betadine solution. There were no obvious signs of the barb at this time. The patient had considerable tenderness to palpation to the RF at the MCP and proximal phalanx and pain with flexion and extension of the RF. The patient had a mechanical block to motion and could not flex his RF MCP joint past 30°. At the time, he denied any numbness or tingling. X-rays taken in the emergency department (Fig. 2) did not show any fractures but did show the retention of a foreign body at the RF MCP and proximal phalanx. The patient was administered tetanus vaccine and appropriate antibiotics, including oral cefalexin and trimethoprim/sulfamethoxazole, for 10 days to cover freshwater and catfish bacteria. It was decided that the patient would be taken to surgery for the removal of the foreign body.

In the operating room, the laceration was extended proximally and distally in a Brunner-style incision. Careful dissection was used to identify the neurovascular bundle, which was then protected throughout the procedure. Fluoroscopy was used to identify the barb, at which point the combination of anatomical dissection and radiographic localization provided evidence of the intraphyseal location (Fig. 3). The barb was also irritating the lumbrical tendon. A small portion of the lumbrical tendon was released, leaving the tendon >50% intact. The barb was then localized, as shown in Figure 4, but it could not be removed using forceps because of its brittle structure. Continued attempts at removal would have only left the barb intraphyseal with no surface to grasp. Subsequently, a 2.7-mm cannulated drill bit was used to perform a corticotomy using the barb as a guide wire.

After the formation of the corticotomy, we removed the barb and confirmed this with fluoroscopy. The barb in its entirety can be seen in Figure 5. Following removal, we irrigated the wound with normal saline and closed the skin. The patient was discharged with a resting volar hand orthosis with oral cefalexin and trimethoprim/sulfamethoxazole for 2 weeks and was seen for follow-up at 2 weeks (during which he began early range of motion), 6 weeks, and 6 months. The final follow-up imaging studies of his left hand are shown in Figure 6 without any radiographic complications. The final 6-month range of motion at the MCP joint is shown in Figure 7, measuring approximately 0 to 90°.

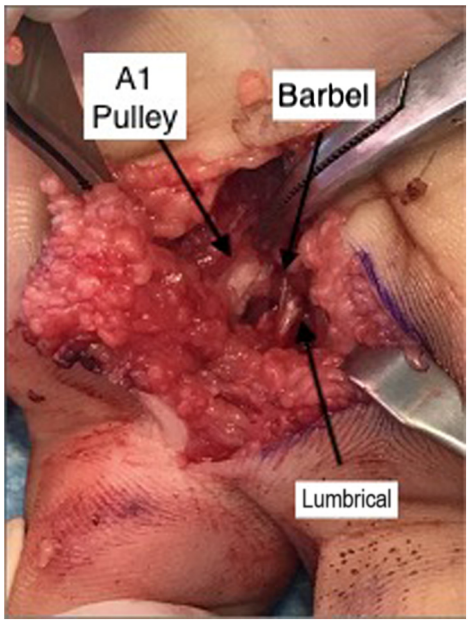

Figure 4. Intraoperative clinical image of the left RF with relevant anatomy labeled.

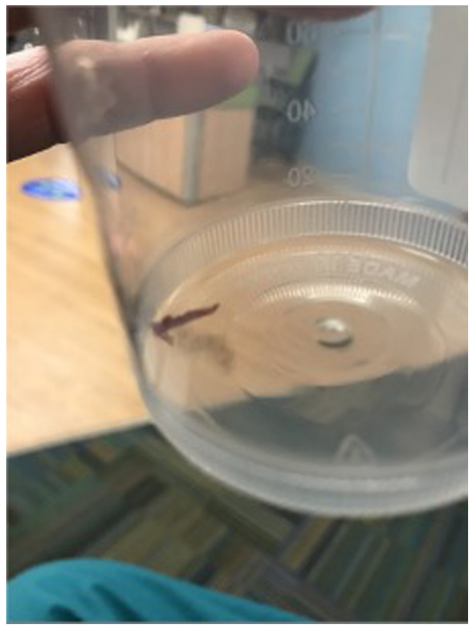

Figure 5. Clinical image of the catfish barb after removal from the RF proximal phalanx.

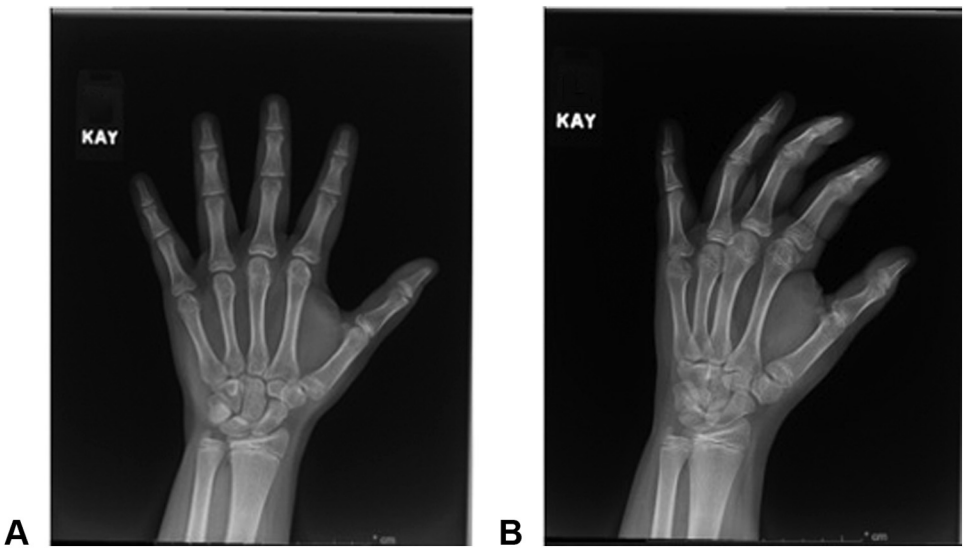

Figure 6. **A** Six-month postoperative posteroanterior view of the left hand without evidence of physeal bar. **B** Oblique view of the left hand without evidence of physeal bar.

Discussion

Catfish injuries can occur through different mechanisms. These mechanisms include bites, envenomation, stings, and puncture wounds. Acute sequelae of these injuries include abscesses, cellulitis, tenosynovitis, septic arthritis, and retention of foreign bodies and chronic sequelae include arthritis, osteomyelitis, and stiffness, and as our case shows, physeal injuries.[4–7] As seen in our patient, a catfish barb may not in itself envenomate the soft tissue, but they do have the capability to penetrate growth cartilage. When this injury presented to the emergency department, it was important to address the possibility that the injury could become inoculated with freshwater bacteria. Detailed reviews of other reports of catfish injuries show that many of these injuries lead to worse outcomes.[4–7] This highlighted the importance of prompt treatment because of our patient's soft tissue and bony involvement. This was avoided by placing the patient on appropriate freshwater bacterial coverage with amoxicillin and clavulanate in a timely manner. Additional concern surrounded this case because this patient had considerable pain and mechanically limited RF motion. Once we confirmed the intraosseous nature of the foreign body, surgical attention became the primary focus. It is important to use radiographs to evaluate these injuries, as catfish barbs are radiopaque. The surgical removal became more complicated as the case progressed, as it became apparent that we would be unable to remove the barb in a normal fashion. As with Salter-Harris fracture patterns, the physeal damage caused by the barb made close follow-up necessary to avoid physeal arrest. This risk was increased by the corticotomy performed to

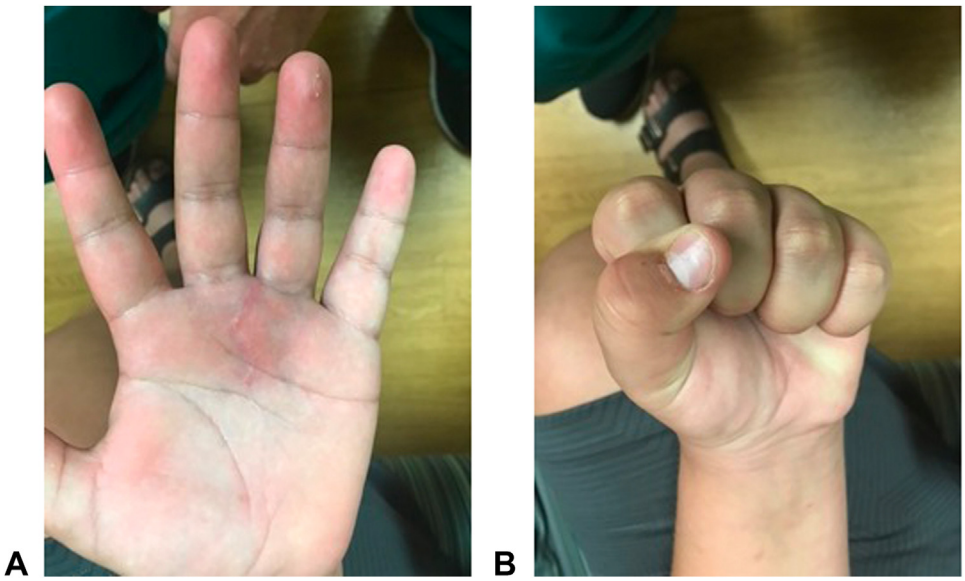

Figure 7. **A** Final range of motion of the MCP and proximal interphalangeal joints in full extension at 6 month post-operative visit. **B** Final range of motion of the MCP and proximal interphalangeal joints in full flexion at 6 month post-operative visit.

adequately and completely remove the barb. We performed a novel procedure to remove the catfish barb, and this proved to be adequate in not only removing the barb but also preventing any subsequent postoperative complications.

In conclusion, although catfish injuries can occur through similar mechanisms, the sequelae of the injury can differ greatly.[4–7] In our case, a barbel penetrated the proximal phalangeal physis of a pediatric patient. The treatment for catfish injuries includes the removal of foreign bodies, submersion of the affected extremity in hot water, and antibiotic therapy. However, physeal embedment is not reported in the literature. Our case demonstrates that safe removal of a catfish barbel with a corticotomy can lead to a successful outcome.

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