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Research Article

Fish Hook Injuries in Children

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Abstract

Introduction: Fishing is a common recreational activity among the children and young adults all over the world. This study was done to determine the efficacy of various techniques used for fish hook removal, the anatomical areas involved in fish hook injuries, type of injuries, types of analgesia used, need for tetanus prophylaxis and complications associated with fish hook injuries.

Methodology: This was a single-center retrospective study based on data collected at the Children's Emergency department at KK Women's and Children's Hospital (KKH) between 2006 and 2016.

Results: There were 37 fish hook injuries in the study period. Puncture wounds (81.1%) caused by fish hooks were the most common type of injuries seen followed by lacerations (18.9%). Advance and cut technique of fish hook removal was used in 70.3% of patients with retrograde removal technique being used in remaining patients. 13.5% patients developed features of wound infection requiring interventions like wound toileting, change in antibiotics and multiple follow up visits for wound care.

Conclusion: Our study demonstrated that the predominant types of injuries associated with fish hook are superficial injuries like puncture wounds and lacerations. Bystander use of fish hook resulted in majority of injuries in children. Advance and cut technique of fish hook removal was the most common type of method used for fish hooks removal and had the highest success rate. The commonest complication related to fish hook injury is infection and this occurred despite the use of prophylactic antibiotics in all the patients.

Keywords: Fish Hook Injuries; Children

Introduction

Fishing is a common recreational activity among the children and young adults all over the world [1]. Fish hook injuries can occur while casting the hook into the river or pond, while grasping the hook to attach bait or while trying to retrieve the hook from the fish [1–3]. Injuries to foot can occur while walking bare footed near the fishing areas. The uses of barbed fish hooks have become popular because of the anticipated increased efficacy in retaining the catch [4]. Fish hooks can be classified as single barbed fish hooks and multiple barbed fish hook [5]. Fish hook related injuries have been described in various anatomical areas like hands, face, eye, lower limbs, oral cavity and back [3,5]. Management of fish hook related injuries should begin with a focused history followed by careful examination of the wound and the surrounding tissues [2,6]. A specialist opinion should be sought at the earliest in case of complex wounds involving eye and suspected injury to underlying blood vessels, nerves or tendons [6] because the external injuries can look deceivingly minimal [4].

There are five techniques that can be used for removing fish hooks embedded in the tissues. These include simple retrograde technique, string-pull technique, needle cover technique, advance and cut technique (for single barb and multiple barb fish hooks) and cut-it-out technique [3,5,6] (Figures 1-5). The choice of technique depends on the type of fish hook embedded, anatomical location of the injury, depth of injury and the experience of the treating physician [6,7]. Retrograde technique and string-pull method are associated with the least trauma during removal and is generally used for removal of simple hooks without barbs [6]. The presence of multiple barbs can make the removal of the embedded fish hook difficult due to entanglement into the vital underlying anatomical structures [5]. This study was done to determine the anatomical areas involved in fish hook injuries, type of injuries, the efficacy of various techniques used for fish hook removal, types of analgesia used, prevalence of antibiotics use, need for tetanus prophylaxis and the complications associated with fish hook injuries.

Methodology

This was a single-center retrospective study based on the data collected at the Children's Emergency department at KK Women's and Children's Hospital (KKH) between 2006 and 2016. This study was approved by the Sing health central institutional review board hospital ethics committee. The data collection was started by initially identifying all the patients with fish hook injuries with a keyword search of "fish hook" from the discharge diagnosis from the hospital database. All data recorded were keyed in by the investigators and these included the following information:

- Demographic information - age, gender, month of injury
- Injury description - location of injury, fishing equipment handler, site of injury (anatomical areas), type of injury – superficial *vs* deep, type of fish hook - simple *vs* complex, whether removal attempted by by-stander

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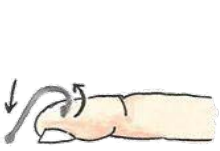

Figure 1: Retrograde technique

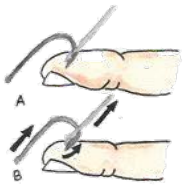

Figure 3: Needle cover method

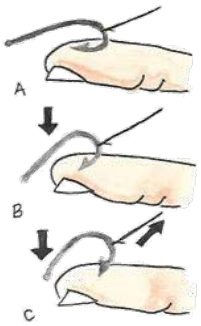

Figure 2: String-yang technique

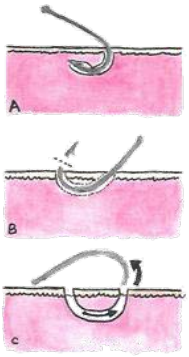

Figure 4: Advance and cut method: single-barbed fishhook

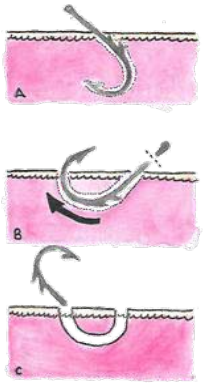

Figure 5: Advance and cut method: multiple-barbed fishhook

Figures 1-5: Techniques of fish hook removal from embedded tissues.

- Treatment information – need for X-ray, type of analgesia used, type of technique used for fish hook removal, number of attempts at removal, need for alternative technique, removing persons (emergency department doctor *vs* specialist), need for in-patient admission

- Post procedure care – need for antibiotics, tetanus prophylaxis, complications –visual loss, uncontrolled bleeding and endophthalmitis.

Data was entered on a Microsoft Excel spreadsheet (version 2016). SPSS (version 22) was used to generate descriptive data for reporting. Data was shown as number of cases and in those cases' percentages.

Results

There were 37 fish hook injuries in the study period. Most children were males (83.8%) (Table 1). The distribution of the fish hook injuries was seen throughout the year. Majority of the fish hook injuries happened while fishing in the public area rivers (48.7%). The other common areas of occurrence of injury were recreational ponds (27.3%) followed by apartment ponds and beaches. The mean age of patients with fish hook injuries was 11 years. The youngest patient in the study population was 4.5 years old and the oldest patient was 15.8 years old.

Puncture wounds (81.1%) caused by fish hooks were the most common type of injuries seen followed by lacerations (18.9%) (Table 2). The fingers (37.8%) were the most common anatomical area injured by the fish hook (Figure 6). The next common areas included eyelids, legs, face and scalp. In majority of cases the fish hook injury happened while the fish hook was being handled by the bystander (59.5%) and the patient handled the fish hook in 40.5% of instances (Table 2). Multiple barbed fish hooks (91.9%) were used during most of the cases of fish hook injuries that occurred. Attempts to remove the fish hook by the bystanders were done in 29.7% of the patients

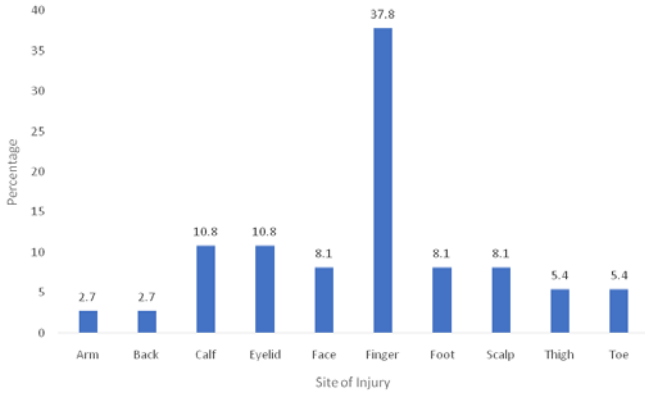

Figure 6: Anatomical sites of fish hook injury.

and in all but one case, the removal was unsuccessful.

X rays were done in 62.2% of patients during the emergency department evaluation to assess the depth and type of fish hook. The type of analgesia used for fish hook removal included lignocaine local anesthesia in 70.3% of cases and ketamine in 27%. Advance and cut technique of fish hook removal was used in 70.3% of patients with retrograde removal technique being used in remaining 29.7% patients. Majority of fish hook removal (91.9%) was done successfully with a single attempt at removal, with 8.1% requiring additional attempts at removal. Advance and cut technique was the only technique used during additional attempts at removal and all of these were successful. The removal of fish hook was done by the emergency department physician in 86.5% of patients; ophthalmologist in 10.8% and for one patient, the removal was done by the bystander. None of the patients had to go to the operating theatre for fish hook removal or needed inpatient treatment after fish hook removal. As a hospital protocol, all the patients received oral antibiotics after the removal of fish hook in

Table 1: Demographics of children with fish hook injuries.

Variables	Numbers (percentages)
Gender	
Male	31 (83.8)
Female	6 (16.2)
Month of injury	
Jan	6 (16.2)
Feb	2 (5.4)
Mar	3 (8.1)
Apr	1 (2.7)
May	3 (8.1)
Jun	2 (5.4)
Jul	2 (5.4)
Aug	5 (13.5)
Sep	3 (8.1)
Oct	2 (5.4)
Nov	2 (5.4)
Dec	6 (16.2)
Location of injury	
Private ponds (in apartments)	5 (13.5)
Public area river	18 (48.7)
Recreational area pond	10 (27.3)
Public beach	4 (10.8)

Table 2: Mechanism and injury description.

Variables	Numbers (percentages)
Type of injury	
Laceration	7 (18.9)
Puncture wound	30 (81.1)
Fishing equipment handler	
Bystander	22 (59.5)
Self	15 (40.5)
Type of fishhook	
Multiple barb	34 (91.9)
Sing barb	3 (8.1)
Whether removal attempt by bystander	
Yes	11 (29.7)
No	26 (70.3)

Table 3: Treatment details of the fish hook injuries.

Variables	Numbers (percentages)
X ray done in ED	
Yes	23 (62.2)
No	14 (37.8)
Type of analgesia used	
Ketamine	10 (27.0)
LA	26 (70.3)
Nil	1 (2.7)
Technique of removal of fish hook	
Advance and cut	26 (70.3)
Retrograde	11 (29.7)
Attempts at removal of fish hook	
Single	34 (91.9)
Multiple	3 (8.1)
Alternative technique used for removal	
Advance and cut	3 (8.1)
Nil	34 (91.9)
Removal done by (personnel)	
Bystander	1 (2.7)
Emergency physician	32 (86.5)
Ophthalmologist	4 (10.8)
Whether needed procedure in operation theatre	
Yes	0 (0)
No	100 (0)
Whether inpatient admission needed	
Yes	0 (0)
No	37 (100)
Whether antibiotics used post removal	
Yes	37 (100.0)
No	0 (0.0)
Whether Tetanus prophylaxis given	
Yes	19 (51.4)
No	18 (48.7)
Complications after removal	
Infection	5 (13.5)
Nil	32 (86.5)

the emergency department. Tetanus prophylaxis was needed in 51.4% of patients after the injury. Despite starting all the patients on oral antibiotic prophylaxis, 13.5% patients developed features of wound infection requiring interventions like wound toileting, change in antibiotics and multiple follow up visits for wound care.

Discussion

Fish hook injuries occurred throughout the year among the study population indicating the prevalence of fishing activity all year round. The predominance of males in the group can be explained by higher fishing related activities among boys and increased risk-taking behavior with disproportionate engagement in outdoor activity. The higher proportion of public areas as the location of injury in our study can be explained by higher level of fishing activities in these areas and Singapore National water agency's initiative to try and restrict fishing to these areas [8]. Older children (mean injury age 11 years) were predominantly injured because these age group comprised of the fishing person and bystander in majority of cases. The involvement of the hands and face in majority of our patients is similar to studies reported previously [3,5]. This could be explained because of the increased chance of exposure of these areas to the fish hook. These injuries can be prevented by maintaining safe distance by

the bystanders and using protective gloves by the fishing personnel [3]. The predominance of superficial injuries like puncture wounds and lacerations due to fish hook injury in our study is similar to that reported in previous studies [5]. In our series of patients, no patient had ocular trauma but had injuries to the eyelid. Eye injuries caused by fish hook can result in severe ocular trauma [1,9]. This can result in corneal scars, traumatic cataracts, vitreous hemorrhage and endophthalmitis [10,11]. Use of protective eye glasses by the fishing rod user and bystander can help prevent eye injuries [1,3].

Fish hook injuries happened in majority of instances while the fishing rod was being handled by the bystander. This places emphasis on the part of fish hook handler, parents and the children to maintain utmost vigilance while watching fishing activity. Multiple barbed fish hook was the most popular type of fish hook that were used. Unlike popular thinking, multiple barbed hooks do not result in more landed fish [6]. Hence the use of single barbed hooks are to be encouraged as these are equally effective in retaining catch and if embedded in human tissues can be removed relatively easily [6]. In our study, the fish hook removal by the bystanders prior to arrival in the emergency department was successful in only one patient. Attempted removal of the fish hook by the bystanders can result in the hook becoming more fixed into the deeper tissues and aggravation of the injuries [2,12]. Prior to the removal of any fish hook, careful evaluation of the surrounding tissues is necessary [5]. Good direct lighting to the wound must be ensured [5]. Also, before the removal of the fish hook, removal of accessory parts like fish-line and the bait can make the removal of the hook easier [6]. Removal of fish hook needed use of additional medical infrastructure like x ray and procedural sedation in some patients. This again places emphasis on the fact that, if in doubt these patients must be urgently referred to specialized Pediatric emergency medicine departments and attempted removal by the bystanders must be strongly discouraged.

In our series of patients, majority of the fish hooks were removed by the advance and cut techniques, which is similar to previous reports where 60% of the embedded hooks were successfully removed using advance and cut technique [3]. This can be explained by the fact that the choice of technique of removal also depends on the experience of the treating physicians in addition to the type of fish hook embedded, anatomical location of the injury and depth of injury [6,7]. The success of advance and cut technique in all the patients, who had an initial failed attempt at fish hook removal, can be explained by higher successful removal rates associated with this technique in the literature [5]. However, advance and cut technique should not be used in ocular fish hook injuries because of increased likelihood of iatrogenic injuries to intra-ocular structures [10]. Similarly string-pull technique should not be used in body parts that are not fixed like the ear lobe [5]. After removal of the fish hook, the wound has to be thoroughly explored for the presence of foreign bodies (bait, fish scales) [5]. The wound must be copiously irrigated.

Majority of embedded fish hooks in our patients were removed by emergency medicine physicians indicating that need to involve the specialist in wound care will arise only in specific instances. Patients with fish hook embedded on the eye globe has to be urgently referred to the Ophthalmologist due to the potential complications that can be associated with these injuries [10,11]. Also, involvement of vital structures like nerves, vessels and tendons will need specialist care. As a hospital protocol, all our patients received prophylactic oral antibiotics post fish hook removal. Despite this some patients developed wound infection. This places emphasis on copious irrigation of wound after fish hook removal [5]. The use of prophylactic antibiotics is debatable, with a previous study not recommending the routine use of prophylactic oral antibiotics [3]. The fish hook injuries occurring in premises of fresh water bodies can be contaminated with aeromonas and pseudomonas species that can result in serious wound infection [6]. Tetanus vaccination status should be checked and adequate immunization must be ensured prior to discharge as half of our patients had inadequate immunization for tetanus. Following removal of the fish hook, a follow-up care must be arranged to look for evidence of infection and adequate healing [5,6]. The patient also must be informed about the signs of wound infection to watch out at home and advised to return to emergency department if any signs are present.

Conclusion

Our study demonstrated that the predominant types of injuries associated with fish hook are superficial injuries like puncture wounds and lacerations. Bystander use of fish hook resulted in majority of injuries in children. Advance and cut technique of fish hook removal was the most common type of method used for fish hooks removal and had the highest success rate. The commonest complication related to fish hook injury is infection and this occurred despite the use of prophylactic antibiotics in all the patients. It is important to counsel the parents and caregivers to stress the use of protective eye wears, maintain a safe distance while watching fishing activities and to use protective gloves while handling fish hooks.

Limitations

Our findings may not be representative of the real number of fish hook injuries, as those patients treated in other healthcare settings or those that did not receive medical attention are not included in the surveillance database. It would have been useful to find out the exact timing of injury and lag time to presentation in the emergency department to assess the relation with occurrence of complications, but this data was not consistently available.

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