ORIGINAL ARTICLE

Fishhook injury in Eastern Newfoundland: Retrospective review

Christopher Patey, MD, CFPC, FCFP, FRRMS[1], Thomas Heeley, MASP[2], Kris Aubrey-Bassler, MD, CFPC, FCFP[3]

[1]Carbonear Institute for Rural Research and Innovation by the Sea, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, [2]Centre for Rural Health Studies, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, [3]Primary Healthcare Research Unit, Discipline of Family Medicine, Memorial University of Newfoundland, St. John's, Newfoundland, Canada

Correspondence to: Christopher Patey, pateycp@gmail.com

This article has been peer reviewed.

Abstract

Introduction: The Canadian island of Newfoundland has a long history of fishing; however, no study to date has developed a regional profile of fishhook injuries on its east coast.

Methods: To this end, we conducted a retrospective review of fishhook injuries at all Newfoundland East coast emergency departments from 2013 to 2015. Patient presentations were reviewed for the date of arrival, sex of the patient, location of fishhook injury, tetanus immunisation status, anaesthetic utilisation, diagnostic imaging, antibiotic management and technique of removal.

Results: Information was retrieved for 165 patients. Most injuries occurred to the hand (80.6%), and out of five documented techniques, "advance and cut" was the most common extraction method (55.5%). There was a high percentage of prophylactic oral antibiotics prescribed (57%) and X-ray imaging (20%) utilised. Consultation was required for 4.2% of the fishhook injuries including consultation to a local fire department service.

Conclusions: On the east coast of Newfoundland, fishhook injuries are addressed inconsistently, with potentially suboptimal methods for removal, coupled with unnecessary imaging and antibiotics. We believe that there is a role for education and other initiatives to improve the care delivered.

Keywords: Fishhook removal, embedded fishhook, fishhook injuries

Blessures d'hameçons dans l'est de Terre-Neuve: Un examen rétrospectif

Résumé

Introduction: L'île canadienne de Terre-Neuve a une longue histoire de pêche. Cependant, à date, aucun profil régional sur les blessures d'hameçons de la côte est à été décrit.

Méthodes: À cette fin, nous avons mené une étude rétrospective sur les blessures d'hameçons répertoriées de 2013 à 2015 dans l'ensemble des départements d'urgence de la côte est de Terre-Neuve. Les données retenues dans cette étude incluent la date d'arrivée, le sexe du patient, lieu deblessure d'hameçon, l'état de l'immunisation antitétanique, l'utilisation d'anesthésie, l'utilisation d'imagerie, la gestion des antibiotiques et les techniques utilisées pour retirer l'hameçon.

Résultats: Les informations ont été répertoriées sur 165 patients. La plupart des blessures s'est produites aux mains (80,6%) et sur cinq techniques documentées, la méthode d'extraction « Avancer et couper » a étéla plus couramment utilisée (55,5%). Il y a eu un pourcentage élevé de prescriptions d'antibiotiques oraux données par prophylaxie (57%) ainsi que et de radiographies (20%) faites. Une consultation était requise pour 4,2% des blessures d'hameçons, incluant une consultation auprès d'un service d'incendie local.

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Quick Response Code:

Website: www.cjrm.ca

DOI: 10.4103/CJRM.CJRM_2_18

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How to cite this article: Patey C, Heeley T, Aubrey-Bassler K. Fishhook injury in eastern Newfoundland: retrospective review. Can J Rural Med 2019;24:7-12.

Conclusion: Sur la côte est de Terre-Neuve, les blessures d'hameçons semblent être géréesde manière inconsistante, avec des méthodes d'extraction potentiellement sous-optimales et surutilisation d'antibiotiques et d'imagerie. Nous estimons qu'il y a un rôle d'éducation ainsi que d'autres initiatives pour améliorer les soins octroyés aux patients ayant des blessures d'hameçon.

Keywords: Retrait d'hameçon, hameçon accroché, blessures d'hameçons

INTRODUCTION

Newfoundlanders have been entwined with the sea for their livelihood and as a food source for generations. Along with Labrador, the province's rate of recreational fishing is second only to Yukon in Canada.[1] Unfortunately, fishhook injuries are common among recreational anglers;[2] hooks can catch in the skin (most commonly the hands and head),[3] and are challenging and painful to remove since the barb is designed to stay lodged in prey.[2] While the existing medical literature contains comprehensive reviews highlighting fishhook removal techniques and expectant management,[4] and several case reports documenting individual fishhook removal,[2,5,6] few comprehensive reviews of the emergency department (ED) medical management of fishhook injuries exist. In fact, a librarian-guided literature search for all English language articles from 1990 to 2016 using the following search string found only one: (fishhook*[tw] OR "fish hook"[tw] OR "fish hooks"[tw] OR (Fisheries[Mesh] AND hook* [tw])) AND ("Wounds and Injuries"[Mesh] OR wound* [tw] OR injur* [tw] OR remov* [tw]). In 1991, Doser *et al.*[7] completed a prospective review of the Alaskan sport and commercial fishery with respect to fishhook injuries. In 100 non-randomised, consecutive patients, it was determined that the majority of injuries involved the hand or head, where antibiotic therapy was not deemed essential.

The goals of this study were twofold: (1) to document the management of embedded fishhooks in Newfoundland EDs and (2) to determine if there is an increase in the incidence of fishhook injuries during the limited times when recreational cod fishing ("Recreational Groundfish Fishery") is permitted. Opening dates and duration for the commercial and recreational cod fisheries have been regulated and sporadically approved since the closure of the commercial cod fishery in 1992. More recently, there is a consistent 3-week summer and 1-week fall recreational food fishery. The goal of this review is to increase physician education surrounding the usage of other (less invasive) fishhook removal techniques and decrease the use of prophylactic antibiotics.

METHODS

Study setting

Newfoundland is the island portion of the easternmost province in Canada, of Newfoundland and Labrador. This study specifically focused on a southeast area of Newfoundland known as the Avalon Peninsula. Healthcare in this area is delivered by the Eastern Health Regional Health Authority.

Study design

This was a retrospective review.

Data retrieval

We extracted patient records from all hospital ED within eastern health for the 3-year period from January 1st, 2013 to December 31st, 2015 inclusive. The area includes the entire Avalon, Burin and Bonavista Peninsulas as well as Bell Island on the east coast of Newfoundland. Records were located by searching Meditech under discharge diagnosis for any one of the following keywords: fish, hook, fishhook and jigger. Date of arrival, sex of patient, location of fishhook injury, tetanus immunisation status, anaesthetic use, diagnostic imaging utilisation, antibiotic management and technique of removal were extracted from the chart and simple descriptive statistics were calculated.

Ethics

This study was approved by the Health Research Ethics Authority and the Research Proposals Approval Committee of the Eastern Health Regional Health Authority.

RESULTS

The records of 173 patients with an ED presentation for fishhook injury, from January 1st, 2013 to December 31st, 2015 were extracted from hospital electronic records. Eight charts were unavailable, leaving 165 or 95.4% available for review.

Age and sex

Average age of patients was 51.2 years with an age range of 6–87 years. 126 (76.4%) males and 39 (26.6%) females presented with fishhook injuries.

Time of injury

The majority of ED presentations (54.5%) for fishhook injuries occurred during the recreational groundfish food fishery. The peak ED presentation for fishhook injuries (47.2%) occurred during the 3-week summer recreational fishery. The 1-week fall recreational fishery accounted for 7.2% of the total of fishhook injuries.

Location of injury

Locations of the 165-fishhook injuries are seen in Table 1. Other specifics to highlight included an absence of fishhook injuries to the eye. Fishhook injuries were bilateral with 86 being right sided and 78 being left sided, with one occurring in the centre of the body. Furthermore, there were four individuals with a fishhook involved in two separate fingers at once.

Table 1: Location of fishhook injuries

Fishhook injury location	*n* (%)
One finger (excluding thumb)	72 (43.6)
Thumb	33 (20.0)
Hand	28 (17.0)
Arm	8 (4.8)
Face	6 (3.6)
Leg	5 (3.0)
Ear	3 (1.8)
Head	2 (1.2)
Lip	2 (1.2)
Nose	2 (1.2)
Neck	1 (0.6)
Back	1 (0.6)
Foot	1 (0.6)
Finger tendon	1 (0.6)
Total	165

n=165.

Treatment before and after fishhook removal

Table 2 outlines the treatments fishhook patients received. Appropriate tetanus management was noted in a high proportion of patients. None of the patients had documented cellulitis from the fishhook injury, and there was no emergency follow-up by any patient for cellulitis. There was a high rate of X-ray completion (20%) and antibiotic utilisation (56.9%). There were nine different oral antibiotics prescribed with cephalexin being the most commonly prescribed in 68 patients (72.3%). Duration of oral antibiotic was for 1 day to 2 weeks with 1-week duration being the most common in 33 patients. Polysporin was the most commonly prescribed topical in 15 patients. Ketorolac was prescribed to 9 (5.5%) patients and was the most commonly prescribed analgesic. No patients were discharged with prescriptions for narcotics.

Fishhook removal technique

Table 3 outlines the techniques that were used to treat the fishhook injuries as well as their

Table 2: Documented treatments before and after fishhook removal

	n (%)
Tetanus immunisation status	
Given tetanus toxoid booster	111 (67.3)
Not given despite requirement	2 (1.2)
Tetanus up to date	41 (24.8)
Not documented or specified	11 (6.7)
Anaesthetic status	
Given 1% or 2% lidocaine with or without epinephrine	121 (73.3)
Not documented	37 (22.4)
Did not require/declined anaesthetic	7 (4.2)
Additional procedural sedation with intranasal midazolam	1 (0.6)
Diagnostic imaging	
Sent for diagnostic X-ray	33 (20)
Antibiotic usage	
Oral	94 (56.9)
Topical	18 (10.9)
Intravenous	3 (1.8)
Prior to or on discharge	
Given pain medication	19 (11.5)
Sutured	7 (4.2)
Given sling	2 (1.2)
Further consultation	
General surgeon	2 (1.2)
Pediatric surgeon	1 (0.6)
Plastic surgeon	1 (0.6)
Fire department	1 (0.6)

Table 3: Frequency of use of different fishhook removal techniques

Technique	Number of times used (%)
Advance and cut	61 (55.5)
Surgical excision/cut it out	25 (22.7)
Simple retrograde	14 (12.7)
String-yank	9 (8.2)
Needle cover	1 (0.9)

Operational definitions - **Advance:** A method of advancing the hook all the way out through the skin without making an incision. **Advance-and-cut:** The tip of the hook is advanced up through the skin so that the barb can be cut with wire cutters. Once cut, the hook is removed backward through its original path. **Cut it out:** A method in which an incision is made in the skin over the location of the barb, after which the hook is pulled through the incision. **Simple retrograde:** The bend of the hook is held with pliers, and then, a downward pressure is applied to the hook. It is then pulled out parallel to the shank in one swift motion. **The string-yank or string-pull:** A method in which a string is wrapped around the bend in the hook and is pulled parallel to the shank. At the same time, downward pressure is applied perpendicular to the shank at the other end, which disengages the barb and produces a tension that allows the hook to come back through its original path. **Needle cover:** An 18 gauge needle is inserted into the wound with the bevel facing down to cover the barb, after which the needle is slowly removed.

frequency of use. For the 165 patient visits, there were 110 documented removal techniques specified. It is relevant to note that two of the string-yank techniques failed, with one of those failures progressing to retrograde technique and one to advance and cut. Forty-nine (29.7%) of the patients did not have a documented removal technique. The remaining patients were consulted or had fishhooks removed before arrival to the emergency or by the triage nurse.

DISCUSSION

This 3-year retrospective review documented the incidence, specifics and medical management of fishhook injuries on the east coast of Newfoundland (Avalon Peninsula), Canada.

Timing

There was a notable higher incidence of fishhook injuries during the summer recreational ground fish fishery. Since the closure of the inshore commercial cod fishery in 1992, there has likely been a loss of fishing experience and skill. The seasonal recreational ground fish fishery has thankfully continued the legacy and fashioned a sport to a new generation of fishers. The tackle traditionally used, commonly referred to as a "jigger" consisted of two barbed hooks held by lead body; however, current regulations permit only a single hook. Consequently, the preferred



Figure 1: A Potential Culprit! 'General Practitioner' fly hook and photo by Gary P. Tanner.

angling gear for most recreational fishers is a hand line or casting rod which includes artificial lures, baited hooks and/or feathered hooks to a maximum of three hooks per line. The significant and increasing number of inexperienced, recreational participants using new gear with multiple erratic hooks may explain the high rate of fishhook injuries documented here. See Figure 1 above displaying traditional fly-fishing hook that may cause fishhook injury.

Location of injury

We documented a similarly high rate of hand injuries; however, a lower percentage of facial injuries than a prospective review of injuries in Alaskan fishery where 80% were commercial salmon fishhooks.[7] This inconsistency in the proportion of facial injuries may be due a higher risk of facial injuries in commercial fishing activity versus the high proportion of recreational fishers reviewed in this study.

Methods of removal

Multiple methods of fishhook removal techniques are documented in the literature.[4,8-10] The most common techniques include advance and cut,[2,7,11] simple retrograde,[11] string-yank[2,10-12] and needle cover.[2,8,11] Consistent with other studies,[7] the most common technique documented here was advance and cut. In 1961, Cooke[12] first described the string-yank technique being used by fisherman on St. Vincent's Gulf in Australia in 1961. This unique and satisfying technique is very dramatic, less traumatic and appears to be underutilised in our catchment area.

With many different techniques, it is generally up to the physician to decide which

may be the best. Choice of the technique is rarely clarified, however, some have recommended that advancing the hook and cutting the barb as the simplest and safest.[5] The presentation of case reports has attempted to educate practising emergency physicians in the appropriate method and management based on the location, type and depth of the embedded fishhook.[2,6]

Fishhook removal education and preferences have been evaluated following a simulation-training program for uncomplicated fishhook removal.[11] After receiving education on the four most common techniques (simple retrograde, advance and cut, string-yank and needle cover), 88% of physician learners demonstrated successful fishhook removals using all of the techniques except needle cover (47%). Simple retrograde and string-yank technique were respectively ranked first and second as easiest to learn, easiest to perform, causing the least tissue damage and as the overall preferred technique. In this review, both techniques, despite being highly ranked, were the least used. This knowledge will be useful for future physician educational sessions in the catchment areas.

Although retrograde methods seem to be preferred, there may be a higher rate of failure with these methods. In this review, there were two failed attempts with the string-yank method documented. Physicians choosing this method should inform patients of the potential for failure and the need to progress to another more invasive procedure.

Antibiotic usage

In comparison to fishbone injuries,[13] studies show a very low rate of infectious complications after a fishhook injury. Thus, although postremoval wound care is probably a reasonable precaution, oral antibiotics may not be necessary for uncomplicated fishhook injuries to soft tissues as they are less likely to progress to cellulitis.[7] Despite this observation, in this study, 94 or 57% of patients presenting to ED in Eastern Newfoundland received oral antibiotics. This overprescribing of antibiotics may explain a recent increase in antimicrobial resistance in Newfoundland and Labrador.[14] Further work is essential to educate emergency physicians about the unnecessary prescribing of antibiotics for uncomplicated fishhook injuries.

Diagnostic imaging

Imaging is generally not necessary for foreign body removal if the object is visible such as in the case of fishhooks.[13] In this review, 20% of presenting patients had an X-ray completed that was likely not indicated. There is, therefore, an opportunity to educate clinicians about the limited role for imaging to save health system resources.

Limitations

As this is a retrospective chart review, we were limited to recording information that was recorded in the medical chart. Information relevant to our study was at times missing, most notably the fishhook removal technique in 29.7% of the patient charts. Finally, although we strongly believe that the high rate of imaging and antibiotic use suggests a degree of inappropriate use, we made no attempt to judge the appropriateness of treatment and investigations ordered for individual patients.

CONCLUSIONS

We observed a high rate of use of potentially suboptimal methods for embedded fishhook removal, and rates of diagnostic imaging and antibiotic use that also suggests unnecessary use. We believe there is a role for education and other initiatives to improve the care delivered.

Acknowledgements: We would like to thank Memorial University's 6for6 program, the Health Science Library, and librarian Michelle Swab for supporting this article.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

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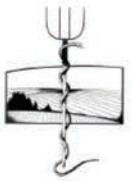
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