WILDERNESS & ENVIRONMENTAL MEDICINE, **25,** 416–424 (2014)

ORIGINAL RESEARCH

Evaluation of a Simulation Training Program for Uncomplicated Fishhook Removal

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Objective.—The aim of this study was to evaluate the effectiveness of a fishhook removal simulation workshop using investigator-developed diagrams, practice models, and a teaching video.

Methods.—This was a descriptive, prospective educational study with Institutional Review Board approval. The primary outcomes were the learner's perception of ease of learning, performance ability, and amount of tissue damage for each technique. A 2¾-minute educational video, instructional visual diagrams, and a simulated model were created to teach 4 techniques: simple retrograde, string pull, advance and cut, and needle cover. Learners performed each technique on a model to assess whether they could remove the hook on the first attempt for each technique. They then rank ordered their technique preferences for ease of learning, performance, perceived tissue damage, and overall choice.

Results.—Of a total of 34 participants who completed the study, 71% of learners were emergency medicine residents or faculty, 65% were male, 42% were recreational fishers, and 68% had previous fishhook removal experience. On first attempt, more than 88% of participants demonstrated successful fishhook removal using all techniques except needle cover (47%). Simple retrograde was rated easiest to learn (74%) and perform (59%), was perceived to cause the least tissue damage (44%), and was the overall preferred technique. Needle cover was ranked hardest to learn (88%) and perform (82%), was perceived to cause the worst tissue damage (41%), and was the overall least preferred technique.

Conclusions.—This study is the first to describe a simulation training program for uncomplicated fishhook removal, and to experimentally evaluate physician learning and preferences for fishhook removal techniques. After a brief educational session, physicians could effectively use all techniques except needle cover. Simple retrograde was the overall preferred technique.

Key words: fishhook removal, simulation, emergency medicine, residents, education, simulation training

Introduction

The purpose of this study was to develop, implement, and evaluate the instructional effectiveness of a simulation workshop for uncomplicated single-barb fishhook removal. The authors developed visual diagrams and a video demonstration that were shown to participants, followed by an immediate hands-on opportunity to try to remove an embedded fishhook from an investigator-developed simulation model on the first attempt for each of 4 removal techniques.

This study was designed to offer evidence-based practice tips for uncomplicated removal of single-barbed fishhooks that could be used to train emergency medical personal for use in the field or clinical setting.

Presented at the Wilderness Medicine Society National Meeting, February 18, 2013, Park City, UT.

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BACKGROUND

Recreational fishing is a very popular sport worldwide. In 2012, 47 million Americans, or 16.4% of all Americans over 6 years of age, participated in fishing.[1] Fishing participants made 1 billion annual outings, with an average of 21.3 days spent fishing per participant annually. The eastern north-central area of the United States, which includes Ohio, Michigan, Indiana, Illinois, and Wisconsin, has the second largest number of fishing participants (15.6%), exceeded only by the South Atlantic region (19%).[1] Freshwater fishing is most common at 39.1 million participants, followed by saltwater fishing (12 million) and fly fishing (6.0 million).[1] There is no

information on the incidence of fishhook injuries, but experience and anecdote suggest they may be common. It is unknown what percentage of fishhook injuries present to the emergency department or other healthcare facilities and how many injuries are self-treated in the field.

Our institution is located in northwest Ohio near Lake Erie, where walleye fishing is a year-round hobby. The winter provides numerous opportunities for ice fishing, and with early spring comes walleye spawning. Numerous national professional and amateur fishing tournaments are scheduled throughout the summer and fall. Consequently, fishhook injuries are frequently seen in area emergency departments.

There is a paucity of literature related to research studies determining the best technique for routine fishhook removal. The majority of articles located were case reports, which primarily described management of eye injuries in adults or oropharyngeal/hypopharyngeal injuries in children who ingested fishhooks.[2–7] Review articles by Thommasen and Thommasen[8] and Prats et al[7] describe use of the same 5 techniques: simple retrograde, string-pull, advance and cut, needle cover, and cut it out. Similarly, Gammons and Jackson[9] suggested simple retrograde, string-pull, advance and cut, or needle cover for family physicians to use in the office setting. A letter to the editor[10] describes use of an advance and cut technique using needle holders to cut off the barb and then withdrawing the barbless hook retrograde, whereas another practice tip article advocates the string pull technique.[11] Another letter to the editor[12] describes the use of orthopedic pin cutters to separate treble hooks into single hooks when 2 or 3 barbs are simultaneously imbedded; other instruments such as ring cutters, pliers, or trauma scissors are not heavy enough to cut through nickel-plated bases on treble hooks.

The single prospective study specific to evaluating various techniques for fishhook removal was conducted in Alaska in 1990.[13] Of 100 subjects who incurred a fishhook injury, 97 were able to be treated in the emergency setting, with 3 requiring operative care. Of the 97 fishhooks, 82 were salmon hooks, which are larger than most of the recreational fishhooks used in other parts of the United States; 2 of the hooks were for halibut fishing and can cause serious injury owing to their large size; and the remaining 13 were trout hooks. Of the 97 fishhook removals done in the emergency room, successful removal occurred with simple retrograde (17), needle cover (7), string-pull (17) or advance and cut (56). Forty-seven fishhooks were in the hand, 32 in the face, 9 in the scalp, 8 in the forearms, and 1 in the leg. None was on the trunk or neck. Local or digital anesthetics were used at the physician's discretion before removal for all but 2 patients.[13]

A retrospective study looked at all-cause penetrating injuries that were treated in the emergency department over a 2-year period.[14] Of a total of 300 injuries, 33 were related to fishing. The study investigators recommended the use of appropriate imaging modalities if needed to be fully aware of the location, the contours, and the complexity of the fishhook when planning extraction. With a single operative exception, all fishing injuries were treated in the emergency room using local anesthesia. The article did not describe the injuries by location, type of hook, size of hook, or removal technique, so it is unclear whether local anesthesia was indicated for all of the fishhook removals.[14]

We were unable to find any studies on the number of fishhooks removed on the first attempt, the average number of attempts needed to remove a fishhook using each of the various techniques, or preferences related to specific techniques due to their ease in learning, ease in performing, or the amount of tissue damage. Little is known about removal practices outside the emergency department. Given that most embedded fishhook wounds are small and can be treated in the field, it is estimated that the majority of these injuries never present to the hospital for treatment unless they are particularly deeply embedded, embedded in a complicated or sensitive part of the anatomy, or infected. We were unable to locate any studies related to fishhook removal in the field or home setting.

There are several recreational fishing media resources that provide a wide range of information on fishing but did not specifically address fishhook injuries.[15] Also readily available are "how to" instruction sheets complete with diagrams from sites such as British Columbia HealthLink[16] and WebMD[17] that describe how to treat fishhook injuries at home. Of greater interest, and sometimes greater amusement, are the amateur videos made and posted on the popular Internet site YouTube[18] that demonstrate fish hook removal in the field and in the emergency department with varying degrees of success and sobriety.

Our intent was to develop and eventually distribute concise, practical, and accurate information sources for uncomplicated fishhook removal that could be safely used in the field. If first responders can be taught basic removal techniques for embedded fishhooks that do not require diagnostic imaging or local anesthesia, knowing the correct technique could save patients time and money by not having to go to the emergency department. The literature does not describe any method for training physicians in fishhook removal, nor does any article describe the use of a simulated laboratory setting to teach and evaluate fishhook removal.