

The occasional removal of an embedded fish hook

Harvey V. Thommasen, MD, MSc, CCFP, FCFP

Clinical Associate Professor, Department of Family Practice, Faculty of Medicine, University of British Columbia, Prince George, BC

Amy Thommasen, BSc

Second-year BSc Student, University of Northern British Columbia, Prince George, BC

Correspondence to:
Dr. Harvey V. Thommasen, Clinical Associate Professor, Faculty of Medicine, University of British Columbia, 4202 Davie Ave., Prince George BC V2M 4G7

This article has been peer reviewed.

Fishing is a popular rural recreational activity involving millions of Canadians. Rural physicians can expect to see the occasional patient presenting with penetrating tissue trauma involving fish hooks. Management of an embedded hook includes taking a careful history, doing a physical examination of the hook injury and surrounding tissue and preparing the skin with antiseptic solution before attempting removal. Local anesthetic is probably necessary for all but the most superficially embedded hooks. Radiography may provide additional information with respect to presence of internally embedded barbs, depth of penetration or bony involvement. Complicated wounds, such as those involving the eye and those deeply embedded near tendons, blood vessels and nerves should be referred to more experienced specialists.

Five fish hook techniques are described; namely, the 1) Simple Retrograde technique, 2) String-pull technique, 3) Advance-and-Cut technique, 4) Needle-Cover technique, and 5) Cut-it-Out technique. The technique chosen will depend on a number of variables, including the type of fish hook embedded, the anatomic location of the injury, the depth of tissue penetration and provider experience. The first 2 techniques result in the least amount of tissue trauma, can be performed with local anesthetic and should be attempted first, especially with barbless hooks and superficially embedded barbed hooks.

Wound care following hook removal involves flushing any open wound with saline, applying topical antibiotic ointment and covering the wound with a simple dressing. The patient should be reminded about the risk of infection and told to return if signs of infection arise — erythema, discharge, pain and swelling. A follow-up appointment is organized as needed. Consideration should be given for the use of prophylaxis antibiotics, but they are generally not indicated. Tetanus status should be addressed before discharge.

La pêche est une activité récréative rurale prisée par des millions de Canadiens. Les médecins ruraux peuvent donc parfois traiter des patients qui présentent des traumatismes des tissus causés par des hameçons. Dans de tels cas, il faut connaître les antécédents médicaux du patient, examiner la blessure causée par l'hameçon et les tissus proches de la blessure et préparer la peau avec une solution antiseptique avant de retirer l'hameçon. Une anesthésie locale s'avérera probablement nécessaire, sauf pour la plupart des hameçons pris de manière superficielle. Une radiographie peut fournir des renseignements additionnels sur la présence de barbillons, la profondeur de la pénétration ou la proximité des os. Il faut confier à des spécialistes les cas compliqués, comme les blessures à un œil ou près de tendons, de vaisseaux sanguins ou de nerfs.

Les cinq techniques de traitement sont les suivantes : 1) le mouvement rétrograde, 2) la ficelle tirée, 3) la technique «avance et coupe», 4) l'aiguille de soutien et 5) la chirurgie. Le choix de la technique dépend d'un certain nombre de facteurs, dont le type d'hameçon en cause, l'emplacement de la blessure, la profondeur de la pénétration et l'expérience du médecin. Les deux premières techniques minimisent les traumatismes des tissus et requièrent une anesthésie locale. Ce sont les premières techniques à essayer, particulièrement pour les blessures causées par des hameçons sans barbillons ou les blessures superficielles causées par des hameçons à barbillons.

Après le retrait de l'hameçon, il faut arroser la plaie ouverte avec une solution saline, appliquer un onguent topique antibiotique et protéger la plaie avec un simple pansement. Il faut mettre le patient au courant des risques d'infection et lui demander

© 2005 Society of Rural Physicians of Canada

de revenir si des symptômes suivants se manifestent : rougeurs, écoulements, douleurs et enflures. Il faut prévoir un examen de suivi au besoin. L'usage d'antibiotiques prophylactiques n'est généralement pas nécessaire. Il faut demander au patient s'il a été vacciné contre le tétanos.

Introduction

One of my passions is fly-fishing and, judging by the number of fly patterns named after physicians, I am not the only one. In fact, one year I fished only "doctor" fly patterns — e.g., General Practitioner, Lady Doctor, Dr Burke Streamer, Dr Milne Streamer, Dr Oatman, Dr Rex, Silver Doctor, Surgeon General and Doc Spratley — and all of them caught fish![1]

Recreational fishing is an extremely popular activity in Canada.[2] For example, in 2000 an estimated 3.6 million Canadian anglers fished an estimated 47.9 million days and caught an estimated 233 million fish of various species. Almost all of these fish were caught with a hook and line. Over 60% of all fish caught are released. Over 95% of these anglers fished in freshwater lakes, streams or rivers. The rest fished in ocean waters. The economic value of recreational fishing in Canada exceeds $6.5 billion dollars. Recreational fishing is more popular among rural Canadians than among urban Canadians.

Rural physicians occasionally have fishers present to the emergency department with injuries related to fishing.[3,4] One of the most common fishing-related injuries is the embedded fish hook. This article deals with the management of penetrating fish hook injuries, with a focus on ways one can retrieve hooks embedded in the skin. Many of the principles outlined here also apply to retrieval of other cutaneous foreign bodies, such as nails and splinters.[5]

Hook terminology

While it is true that fish hooks come in a variety of sizes and shapes, all hooks are made up of the same basic parts. The basic parts of a fish hook are the eye, shank, bend, barb and point (Fig. 1). Most anglers use single hooks, but 2 (also known as double hooks) and 3 (also known as treble hooks) hooks on the same shank are sometimes used.[1,6]

The point is sharp and designed for penetration of a fish's tough skin. Most hooks just have a single barb, but hooks with multiple barbs on the shank, and hooks with no barbs are also used (Fig. 2). The theoretical purpose of the barb is to prevent the hook from easily dislodging once skin penetration has taken place. This may be true for fish hooked on gear weighed down with heavy lures or lead weights, but it is my experience that the use of a barbed hook when fly-fishing does not result in more landed fish. Fly-fishers should be encouraged to remove the barbs from their hooks (simply crush it gently with pliers) or to buy flies with barbless hooks. Barbless hooks are associated with quicker and easier release of fish and easier removal from skin of an accidentally hooked angler!

History and physical examination[3–10]

Ask about how, where and when the fish hook became embedded. Ask about the size and type of hook used, and presence or absence of barbs on the shaft and near the hook point. Ask about allergies, particularly those to local anesthetics, immunizing agents and to antibiotics. Ask about tetanus status,

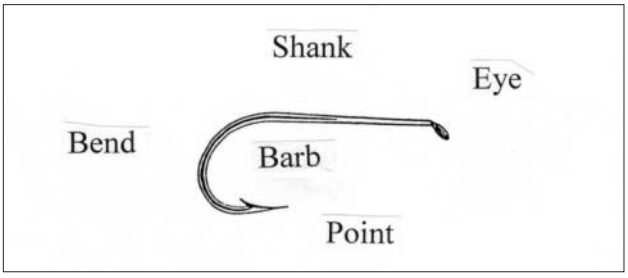


Fig. 1. Basic parts of a fish hook.

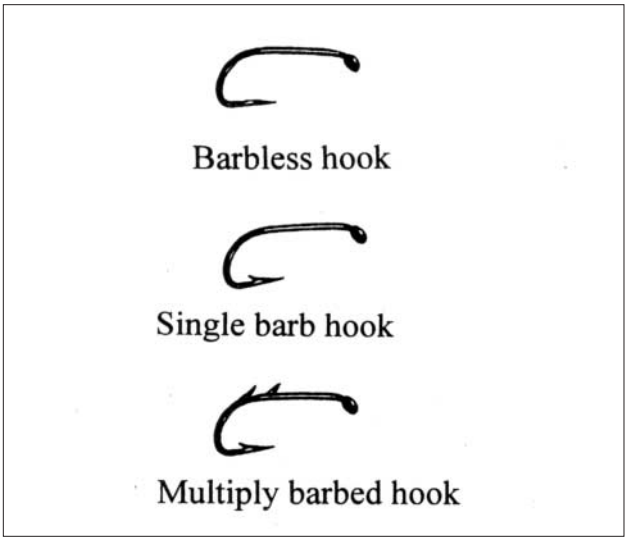


Fig. 2. Various kinds of barbed hooks.

and begin the process of deciding which tetanus immunizing agents are indicated for the patient.

Ensure the involved body part is in a secure resting position on top of a plastic-backed absorbent pad and ensure there is good direct lighting of the wound site. During examination note the size and type of hook used and presence or absence of barbs on the shaft and near the hook tip, and estimate how deep the hook penetrates into tissue. Document the neurovascular status distal to the wound before anesthetizing or attempting to remove the fish hook. Make a decision as to whether or not radiography would be helpful to identify internally embedded barbs, depth of penetration and/or bony involvement.

Review complications associated with fish hook removal including infection, bleeding and additional damage to the underlying and surrounding tissue. Explain the procedure you plan to use to extract the embedded fish hook; answer any questions the patient may have; and consider obtaining written consent as per institution policy. Tell the patient how long you estimate the procedure should last, and set a maximum time limit (e.g., 20 to 30 min) on how much time you are prepared to spend exploring and manipulating the embedded fish hook. This avoids prolonged manipulation, which can be stressful for both patient and physician and which is associated with increased risk of iatrogenic trauma.

Equipment for removal of fish hook

Equipment necessary for fish hook removal is summarized in Table 1 and consists basically of the same equipment one would use to manage any laceration (i.e., a suture set), plus wire cutters.[5]

Table 1. Equipment necessary for fish hook removal

Gloves
Antiseptic skin preparation solution
Sodium chloride (saline) solution (0.9%)
4″ × 4″ (10 cm × 10 cm) sterile gauze sponges
Anesthesia equipment:
5-cc syringe
18-gauge needle for drawing up anesthetic
30-gauge 0.5″ needle for infiltrating skin
27-gauge 1.5″ needle for deeper infiltration
Local anesthetic of choice
Suture set
Wire cutters
Scalpel with #11 blade
Optional:
Metzenbaum scissors
Tissue retractors
Sterile elastic tourniquet
Dressing materials

Wound care before hook removal

Using sterile technique, clean the wound and surrounding area with an antiseptic skin solution (e.g., chlorhexidine 2% with 4% isopropyl alcohol [e.g., Dexidin 2 Solution], antiseptic isopropyl alcohol pad [e.g., WEBCOL Alcohol Prep] or Betadine Surgical Scrub [7.5% Povidone-iodine]) and wash it off with sterile sodium chloride (saline) solution (0.9%).

Decide whether local anesthesia with 1% or 2% Lidocaine hydrochloride is required. Superficially embedded hooks often do not require anesthesia. If hemostasis is desired along with local anesthesia — and if the site is appropriate — consider using 1% or 2% Lidocaine hydrochloride with epinephrine (1:100 000). Anesthetize the entry site, and possibly also the anticipated exit site, with 1–2 mL of local anesthetic solution. Consider using a digital block if the hook is embedded in a finger. If the wound is gaping, irrigate with copious amounts of sterile saline solution until it looks clean.

Fish hook removal techniques

A number of different methods have been described for the removal of fish hooks.[3–10] The decision regarding which technique to use is based on many variables, including the location, depth of skin penetration, size of the hook and the presence or absence of barbs. Fish hooks embedded in or near the eye should be simply covered with a metal cup or patch and referred immediately to an ophthalmologist.[3–5,11] Fish hooks embedded deeply in the vicinity of arteries, tendons, nerves, or in atypical places (e.g., hypopharynx) should also be left to a physician with surgical skills.[3–5,12]

First, remove unnecessary fish-line, bait and lure parts. If the embedded hook is part of a double or treble hook or part of a lure with multiple hooks, ensure that all the barbs and tips are protected with tape or removed with a wire cutter before starting any fish hook removal techniques. There is nothing more embarrassing than to remove an embedded hook, only to find out that another hook has become embedded during the removal procedure!

Five fish hook techniques have been described; namely, the 1) Simple Retrograde technique, 2) String-pull (or String-yank) technique, 3) Advance-and-Cut (or Pull-through) technique,

4) Needle-Cover technique, and 5) Cut-it-Out technique. The techniques are listed in order of the least amount of tissue damage to the greatest amount of tissue damage caused. The first 2 techniques can be attempted without local anesthesia; all the others require local anesthesia.

1. Simple Retrograde technique

The Retrograde technique is simple and works best with barbless or superficially embedded hooks (Fig. 3). Pressure is applied downward on the shank of the hook with the index finger (1) and then the hook is backed out of the skin along the projected path of entry (2). The Retrograde technique is the least successful technique because the presence of barbs usually prevents backward movement of the hook.

2. String-Pull technique

Also known as the String-yank, Strong-yank and "Stream-side" method, the String-Pull technique is fast, relatively painless, carries a high rate of success and usually does not require any local anesthesia (Fig. 4). This technique works best with small- and medium-sized fish hooks. Do not perform this technique if the fish hook is embedded into a body part that is not fixed, for example, an ear-lobe. A piece of strong line (e.g., fishing line or 2–0 or 3–0 silk suture) is first tied to or looped around the midpoint in the hook's curve (1). At least a foot of line should extend from the hook. The other end of the string is then wrapped around a finger (e.g., the operator's right index finger), a tongue depressor or similar object, so that the operator will have a good grip when the string is pulled.

Slight downward pressure is then applied on the hook shank (e.g., with left index finger) per the Simple Retrograde technique, in an attempt to stabilize the hook against the skin surface and disengage the tip and/or barbs from the tissue (2). Slowly straighten, to take out excess slack in the line. Next, quickly, suddenly and forcefully pull/jerk the string away from the skin at about a 30° angle (3). Do not hesitate once the decision is made to yank the string. If you (and the patient!) are lucky, the hook will rapidly exit out of the skin along the projected path of entry. The use of protective eye goggles and careful positioning of operator, patient and witness is recommended so that the rapidly flying hook will not impale another body part or another person.

3. Advance-and-Cut technique

Also known as the Pull-through extraction technique, the Advance-and-Cut technique consists of grasping the fish hook shank with a needle holder, hemostat or needle-nose pliers (1) and then advancing the hook tip and barb out through the skin (Fig. 5A). Once it is through the skin (2), the fish hook is re-stabilized and then cut off behind the barb (3). Next, the barbless hook is backed out the hook's entrance wound the way it came in (4). A variant of this technique consists of cutting off the eye of the hook and then advancing the rest of the hook out through the skin without backing the hook out the way it came into the skin (Fig. 5B). This lat-

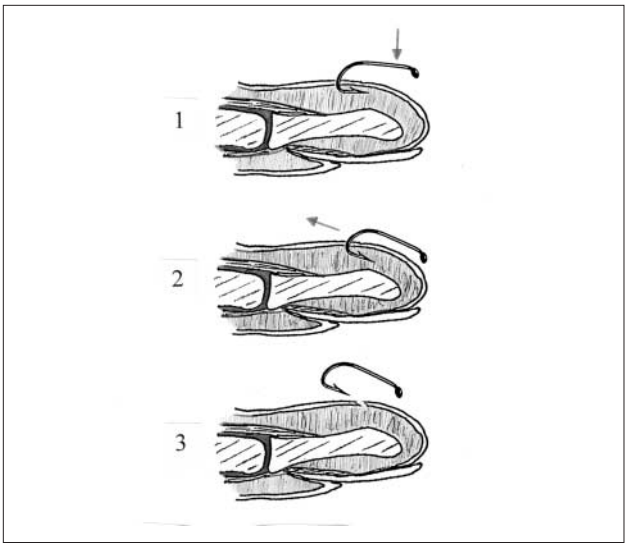


Fig. 3. Simple Retrograde technique.

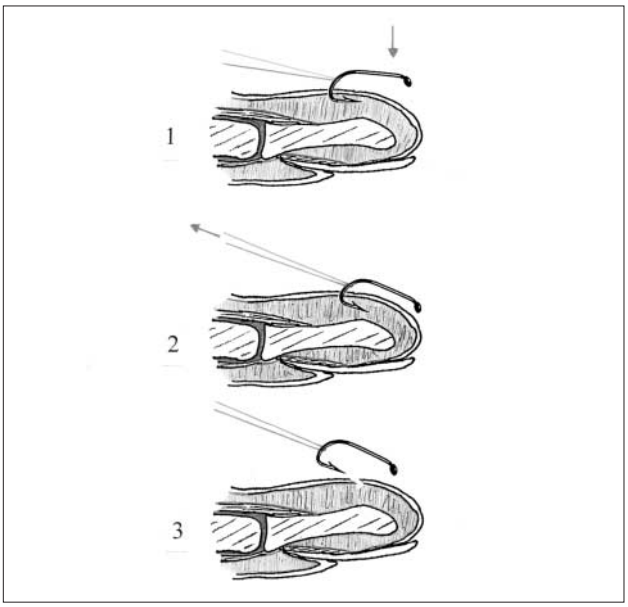


Fig. 4. String-pull (or String-yank, Strong-yank or Stream-side) technique.

ter technique is recommended for hooks with multiple barbs on the shank.

4. Needle-Cover technique

Also known as the Barb-Sheath technique, the Needle-Cover technique consists of inserting an 18-gauge (or larger) needle parallel to and along the inside curvature of the hook (Fig. 6). The needle is inserted via the entry wound so that it will incise strands of tissue that hold the barb in place, as well as cover/sheath the barb (3). Make sure that the bevel of the needle is directed downward as it is being advanced and that the barb is well engaged before pulling back the hook as per the Simple Retrograde technique (4).

5. Cut-it-Out technique

The Cut-it-Out technique consists of making a small incision with a scalpel blade at the entrance wound (2) and then sliding the scalpel blade along the hook to the point of the fish hook (Fig. 7). After this incision is made, the fish hook is simply backed out of the wound as per the Simple Retrograde technique (3). If the hook is quite deeply embedded, authorities recommend using scissors or hemostats to bluntly spread and dissect down to the hook's barb so as to avoid the risks associated with blindly cutting deep into tissue; i.e., the cutting of vital structures. The Cut-it-Out technique can also be combined with the Needle-Cover technique or even the String-Pull technique. One of the advantages of this technique is that the wound is opened up so that complete irrigation of the wound tract is possible.

Wound care after hook removal

After removing the hook, re-cleanse the wound area with saline-soaked sterile gauze. If the wound is gaping and there is concern it remains contaminated with bait fragments or dirt, irrigate copiously with sterile saline again and decide whether the wound needs to be sutured or left open. Dry off the area with sterile gauze, apply antibiotic ointment (e.g., Polytopic [Polymyxin B, Bacitracin] or Bactroban [mupirocin 2%]), and cover with a simple dressing and adhesive bandage. Useful advice includes telling the patient to elevate the affected area as much as possible for the first 24–48 hours. The patient should be reminded about the risk of infection and told to return if signs of infection arise — erythema, discharge, pain and swelling. The patient

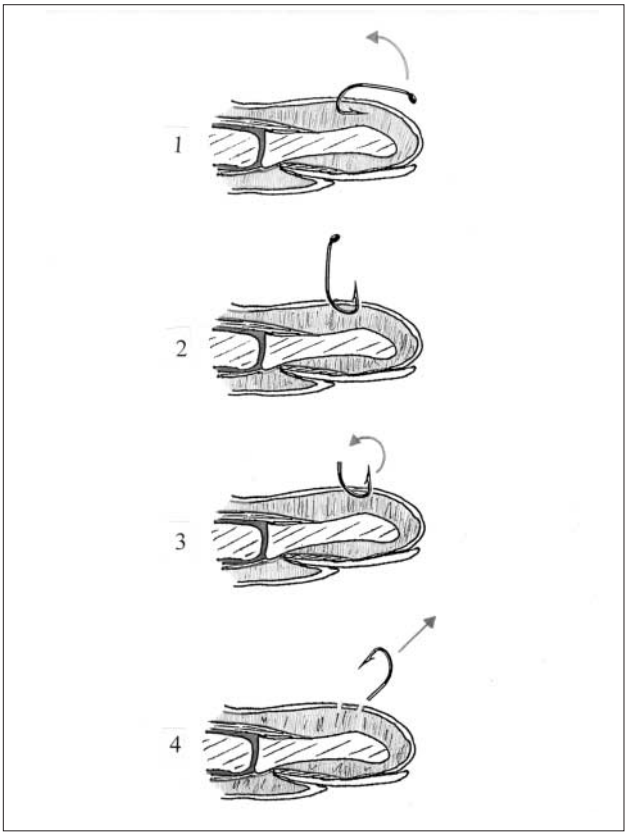


Fig. 5A. Advance-and-Cut technique (also known as the Pull-through Extraction technique).

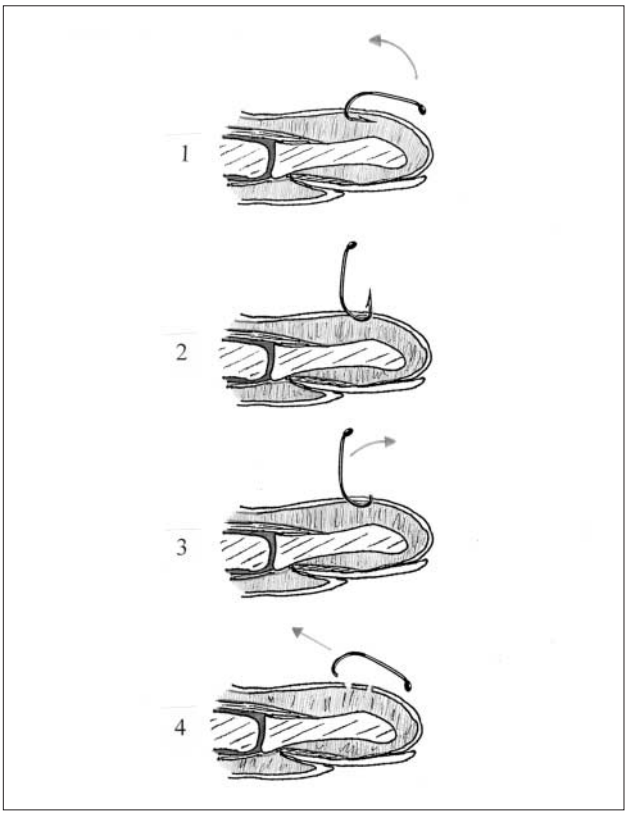


Fig. 5B. A variation of the Advance-and-Cut technique, recommended for hooks with multiple barbs on the shank.

should change the dressing daily and apply topical antibiotic ointment with each dressing change.

Tetanus toxoid and if necessary, tetanus immune globulin should be given if past tetanus immunization history suggests they are indicated. Prophylactic systemic antibiotics are generally not needed unless the hook injury is dirty and deep, or is associated with tendon, cartilage or bone injury. Patients who are immunosuppressed or prone to poor wound healings (e.g., diabetes, peripheral vascular disease) are also candidates for prophylactic antibiotic therapy. Remember that *Pseudomonas* species, *Aeromonas* species, and gram-negative bacteria are associated with freshwater fish hook injuries; and Vibrio organisms are associated with saltwater fish hook injuries. The prophylactic antibiotic chosen should cover these species.[7,13,14] I generally prescribe trimethoprim–sulfamethoxazole or ciprofloxacin for 3–5 days for fish hook injuries or fish-bite injuries, which occur while someone is fishing in freshwater in British Columbia. I would add cloxacillin or cephalexin if the wound is particularly worrisome. Unfortunately, there is little scientific data available on this aspect of wound care.

Nonsteroidal anti-inflammatory (NSAID) medication is usually all that is required for analgesia after removal of the fish hook. A routine follow-up appointment is recommended by some authorities, particularly if sutures are to be removed. Last but not least, remind your patient that fishing is a potentially sight-threatening pastime and recommend that they always wear protective eyewear.

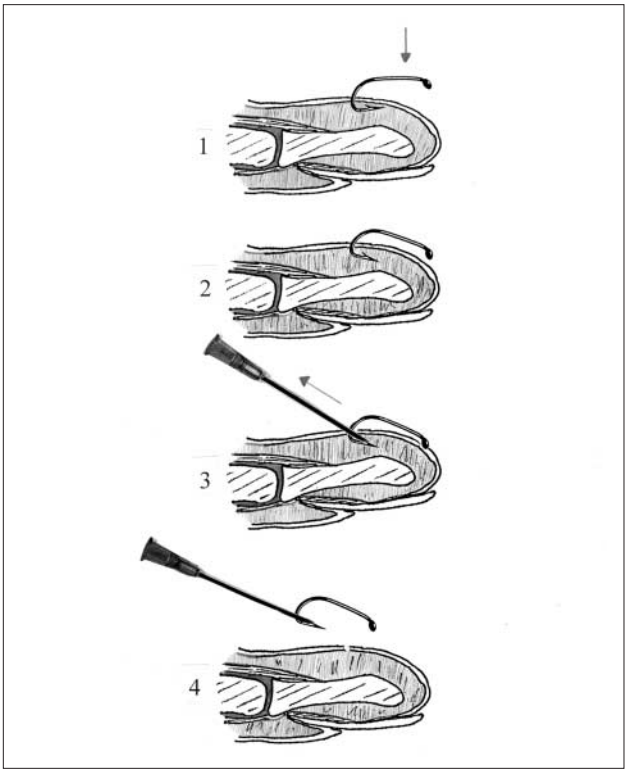


Fig. 6. Needle-Cover (or Barb-Sheath) technique.

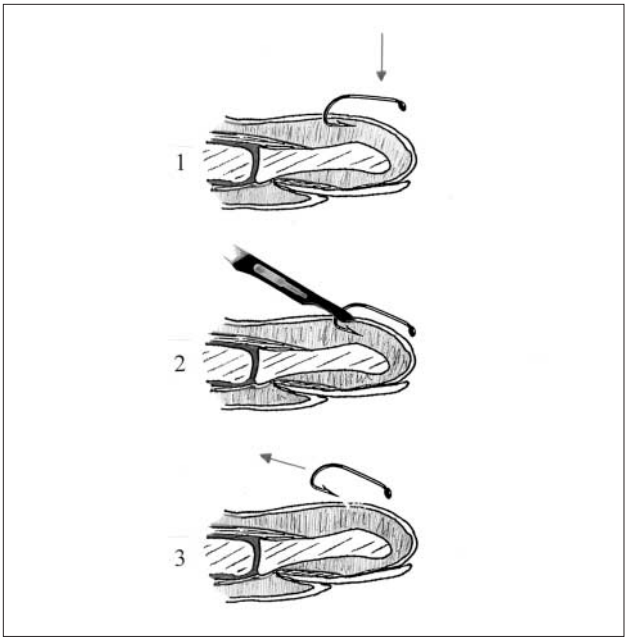


Fig. 7. Cut-it-Out technique.

Competing interests: None declared.

References

1. Hughes D. *American fly tying manual*. Frank Portland (OR): Amato Publications; 1986. p. 48.
2. Fisheries and Oceans Canada. *2000 Survey of Recreational Fishing in Canada Survey Highlights*. Available: www.dfo-mpo.gc.ca/communic/statistics/recreational/Canada/2000/index_e.htm (accessed 2005 Sept 6).
3. Eldad S, Amiram S. Embedded fishhook removal. *Am J Emerg Med* 2000;18:736-7.
4. Gammons M, Jackson E. Fishhook removal. *Am Fam Physician* 2001;63:2231-6.
5. Stewart C, Ruiz F, Winograd SM. Foreign body removal: a guide for ED physicians. *Emerg Med Rep* 1996;17:101-9.
6. Bramley A. On the sizing of hooks. *FlyTyer* 1988;Winter:76-9.
7. Scott PM. Removing a fishhook. *JAAPA* 2003;16:69-70.
8. David SS. Fish-hook removal. *Lancet* 1991;338:1463-4.
9. Reid AJ. Removal of fish-hooks. *Can Fam Physician* 1997;43:1063.
10. Graham P. Removal of embedded fish-hook. *Aust Fam Physician* 1995;24:691.
11. Kalyanasundaram TS, Depla D, Steel D. An unusual case of severe penetrating ocular injury with the shank of a triplet fish hook. *Eye* 2003;17:663-4.
12. Swanson PB, Apicella SA, Rosen CA. Removal of a triple-barbed fishhook from the hypopharynx with microlaryngoscopy. *Am J Otolaryngol* 2002;23:233-6.
13. Stephens M, Thommasen HV. Salmon-associated skin infections. *BC Med J* 1998;40:108-9.
14. Gilbert DN, Moellering RC Jr, Sande MA. *The Sanford guide to antimicrobial therapy*. 32nd ed. Hyde Park (VT): Antimicrobial Therapy, Inc.; 2002.