

# Retrieval of an Esophageal Foreign Body (Fish Hook) Using Esophagostomy in an Olive Ridley Turtle, *Lepidochelys olivacea*

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**Abstract:** We report the clinical treatment and surgery of an olive ridley turtle, *Lepidochelys olivacea*, that had been accidentally captured by a fisherman. Using radiography, we discovered a fishing hook lodged in the middle third of the esophagus. Following unsuccessful initial attempts to retrieve the hook using flexible endoscopy, we performed an esophagostomy, incising through the skin on the ventral neck aligned caudal to the occiput of the skull to the top of the intergular scute of the plastron. After 2 m of recuperation in captivity, the turtle was judged fully recovered and released to the sea.

**KEY WORDS:** olive ridley turtle, *Lepidochelys olivacea*, endoscopy, surgery, chelonian, reptile.

## INTRODUCTION

Worldwide, there are seven species of marine sea turtles. Five of these are found in coastal areas and oceanic islands of Brazil, and all are protected by national legislation (Marcovaldi and Marcovaldi, 1999). Threats to sea turtles in Brazil include collection of eggs and nesting females on the beaches, destruction of habitat, pollution, and accidental capture by fisheries (Marcovaldi, *et al*, 2001). The latter threat is widely spread throughout the coastal regions, and ranges from by catch of industrial fishing operations to capture by individual anglers. Accidental capture in trawl nets can be mitigated by the use of turtle excluder devices (TEDs) which allow escape of turtles and other large marine animals from the interior of trawling nets (Lutcavage, *et al*, 1996). Accidental capture by hooks is more difficult to avoid, and without quick treatment, can result in death (Bolten, *et al*, 1996).

The ingestion of fishing hooks is a common injury of sea turtles, accounting for about 35% of patients brought to our clinic for treatment. Treatment ranges from simple extrusion to more complicated invasive surgery. We recently treated a sea turtle with a deeply ingested fishing hook, and given the relatively high incidence of accidental capture, we wish to discuss the case in the hope that it will be of use to other veterinarians who treat similarly injured sea turtles.

On 30 September 1998, we received a mature female olive ridley sea turtle, *Lepidochelys olivacea*, with a curved carapace length of 73 cm and a weight of 25 kg. It was reported that 10 d earlier, this turtle had ingested a baited hook just off the beach of Boa Viagem in the city of Salvador, Bahia, in Brazil. The fisherman tried without success to retrieve the hook by pulling repeatedly on the line. He brought the turtle to the Arembepe station of Projeto TAMAR-IBAMA, the national sea turtle conservation program in Brazil, which in turn contacted our clinic for treatment. An initial examination revealed the turtle was severely dehydrated and underweight with sunken opaque eyes, halitosis, and with various small infected abrasions on the flippers, some of which were in the initial stages of necrosis, with sections of bone visible. The animal's skin was extremely dry, and there were several deep wounds on the lower half of the plastron. An initial examination of the oral cavity revealed no other lesions.

## EXAMINATIONS PERFORMED

**Radiography** – The animal was positioned in ventral recumbency, with its head on the edge of the stand, in order to radiograph an area from the upper esophagus to the stomach. The dorsal ventral radiographic view revealed a 5 cm barbed hook lodged in the middle third of the esophagus within the coelomic cavity, adjacent to the entoplastron bone (Figure 1).



**Figure 1.** Dorsoventral radiograph of an olive ridley turtle, *Lepidochelys olivacea*, with a fish hook lodged in the esophagus. As removal of the hook with an endoscope was not possible, we conducted a successful esophagostomy.

**Endoscopy of the upper digestive tract** – The esophagus of a sea turtle is normally lined with papillae, which compose a natural obstacle to endoscopic exploration. Introduction and movement of the endoscope is difficult, and the field of view is largely obscured by these papillae. Nevertheless, following sedation of the turtle (Ketamine 12.5 mg/kg mixed with Xylazine 2.0 mg/kg and administered intra-muscularly, Whitaker and Krum, 1997), an 8 mm diameter flexible endoscope was introduced into the esophagus as far as the cardium of the stomach. The endoscope was slowly removed to facilitate the visualization of the hook. This action was repeated several times until the embedded hook was located and attempts were made to remove it using the endoscope as a probe.

**Anesthesia and surgery** – All attempts to retrieve the hook via endoscopy were unsuccessful, even with insufflation of the esophagus. It was decided to conduct an esophagostomy to locate and remove the hook. In preparation, an additional 50% in volume of the anesthetic mixture (Ketamine/Xylazine) was injected in order to generally anesthetize the turtle for surgery. Next, the animal was placed in dorsal recumbency, exposing its plastron, with its head supported by a cushion, and angled to extend and fully reveal the gular region of the throat. Xylocaine 2%, three layers deep, was locally applied to desensitize the skin and musculature in the incision area. A metallic tube (3.5 cm diameter) was introduced through the mouth up to the final cervical segment of the esophagus, thereby helping to locate the correct location (via palpation) for the surgery. Following antiseptic preparation (1% iodine, diluted in 70% ethyl alcohol) and placement of surgical drapes, a 6 cm incision was made in the skin transverse to the esophagus, close to the cranial edge of the plastron. The seventh cervical vertebra was used as a landmark to locate the adjacent middle region of the esophagus.

After esophageal exposure, a flexible endoscope (6 mm diameter) was inserted into the esophagus via a 4 cm longitudinal esophageal incision. The fishing hook was successfully visualized approximately 15 cm posterior this incision. Holding the esophageal mucosa in place with a Halis clamp, the hook was slowly freed and removed using a Kelly clamp. Additionally, a 0.5 x 0.5 cm necrotic fragment of the mucosa was excised, from where the hook had been embedded. The esophageal incision was closed with four simple interrupted sutures (mononylon 4-0 Ethicon), and over sewn with a continuous inverted Cushing suture (mononylon 4-0 Ethicon) with a noncutting needle (Atralog). The musculature and subcutaneous tissue layers were closed with a continuous suture pattern (mononylon 3-0 Ethicon). The constrictor colli muscle and skin were closed with simple interrupted sutures (mononylon 2-0 Ethicon).

**Post surgical treatment** – Immediately postoperatively, but prior to discontinuation of anesthesia, the turtle's initial dehydration and hypoglycemia were treated by inserting a catheter in a digital vein and using a 5% glucose solution in a quantity of 1 to 3% of the total mass of the turtle (Whitaker and Krum, 1997). Both a 100 ml glucose solution (5%) and 150 ml Ringer's lactate solution were administered with a drip adjusted to 0.34 ml/kg/min. In response, the turtle demonstrated signs of rapid recovery from initial hypoglycemia and dehydration.

During the first 24 hr post operation, the turtle was maintained in a moistened foam-lined tank but out of water to avoid any risk of drowning. After this first day, the turtle was placed in a 1000-liter capacity tank (120 cm diameter x 80 cm depth) with roughly 600 liters fresh water maintained between 23 and 27°C (73 and 81°F) for 10 d. Temporary maintenance of sea turtles in fresh water can be therapeutic (Higgins, 2002). The elevated temperature augmented the metabolic rate of the turtle, activating the peripheral circulation. Daily injections of enrofloxacin (Flotril 5.0 mg/Kg) once daily for 10 d were given intramuscularly (Whitaker and Krum, 1997). On the 11th day following surgery, the water in the recovery tank was replaced with brackish water (50% salt and 50% fresh water), and allowed to return to ambient temperature. On day 12, the water in the tank was replaced with 100% salt water, and the following day the turtle was transferred to an outdoor tank at the Praia do Forte base of Projeto TAMAR.

As the fore flippers had numerous small lesions with a fetid odor, post-operative treatment was complemented by glucocorticoid application (dexamethasone injection, 2 mg/kg), with three doses per day on alternating days. Hydrocortisone was also administered in small doses (less than 5 mg/kg), to treat the necrotic areas of the flippers without compromising the healing of the surgical wound (Elisson, 1996). The animal was removed once a day from the recovery tank and placed on a moist foam pad in order to further treat the flipper lesions. The wounds were cleaned and the edges of all wounds debrided with a solution of potassium permanganate (2%), in order to facilitate the formation of granulation tissue and eventual healing. In addition, once a day the wounds were irrigated with 1% solution of iodine (in 70% ethyl alcohol) and Terra-Cortril® spray. For each treatment, the turtle was kept out of the water for approximately 30 min to ensure

that the topical treatment of the medication reached the deeper tissues. The irrigation treatments were continued for 15 d.

Food was withheld from the turtle for the first six days following surgery. This was to reduce the chances of post-operative complications caused by the disturbance of the recovering esophageal mucosa by the transit of food. On day seven, the turtle was offered fresh fish several times a day, although it refused to eat. On day nine after the surgery, a feeding tube was gently introduced into the mouth and esophagus of the turtle and the turtle was force-fed with a blend of raw sardines. By day 15 after the surgery, the wounds on the front flippers were well granulated and the turtle was eating on its own.

The turtle was maintained in the recovery tank of fresh seawater until it was completely recovered. On 12 December 1998, the animal's weight had increased to 38 kg and it was decided to release it into the ocean. Just before release, the turtle was treated with an anthelmintic (Praziquantel, 20 mg/kg), because the turtle had been exposed to other captive turtles during rehabilitation, and received uniquely numbered monel tags (model 681, National Band Company, KY) on each of its front flippers. The turtle was released on the beach of Arembepe on the north coast of Bahia, where it entered the surf and disappeared from view.

### CONCLUSIONS

Esophagostomy is a technique used to remove foreign bodies when less invasive methods are unsuccessful. In the present case, attempts to remove the embedded fish hook via endoscopy were unsuccessful. The presence of the papillae in the esophagus was an obstacle to visualization and extraction of the hook. Insufflation of the esophagus did not greatly increase the visualization of the hook during endoscopy, possibly due to the reduced diameter of the esophagus of olive Ridleys, relative to other species of sea turtles. Hook design, location and angle (Figure 1) also contributed to the unsuccessful attempts at removing the hook with an endoscope. The sharp point and barb were well embedded in the esophagus, making it difficult to retrieve with the endoscope. Similar difficulties with accidentally ingested hooks in freshwater turtles have required esophagostomy (Hyland, 2002). Incidental hook injury and mortality is a widespread problem not only for turtles but also other wildlife, particularly seabirds (Moloney, *et al.*, 1994). Efforts to reduce or eliminate accidental capture of seabirds and marine turtles include temporal changes in fishing efforts, shielding the bait with funnels, or altering hook design (Belda and Sanchez, 2001, Ryan and Watkins, 2002, Bolten, *et al.*, in press).

The post-operative treatment proceeded without difficulties, and the animal was successfully released into the wild after complete recovery. We benefited from the presence of the tanks available at the Praia do Forte station of Projeto TAMAR-IBAMA. Although the tanks are primarily used to maintain turtles for education purposes, they also serve for the quarantine and treatment of injured wild turtles. It is likely that other educational facilities can also facilitate the rehabilitation of injured sea turtles, if there is space available.

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