PAPERS AND SHORT REPORTS

Injuries caused by garfish in Papua New Guinea

PETER G BARSS

Abstract

Garfish, which are found in the Indo-Pacific Ocean areas, have a long, spear-like beak with two narrow jaws and small pointed teeth. They often make sudden leaps while swimming, particularly when attracted by bright lights. In Papua New Guinea people often fish from canoes using a light at night, and serious injuries may be caused by a fish jumping and its beak piercing part of the body. The surface wound may appear deceptively small and innocent, but if the wound is on the chest or abdomen the beak may have penetrated sufficiently deeply to cause internal injuries, and death may result. Patients may have to be admitted to hospital for removal of the beak, which may remain embedded in a limb.

Introduction

Injuries caused by ocean-dwelling creatures are usually considered to be rare and exotic. Such injuries, however, are an acknowledged occupational hazard for many people who catch fish from tropical seas. One species that causes considerable concern is the garfish. This paper documents some of the serious injuries caused by garfish in Papua New Guinea. Although little has previously been published about the dangers of garfish, they can be a greater threat than the shark, particularly to people fishing in coastal waters at night with the aid of a light.

The order Belontiiformes includes several species of fish in the Indo-Pacific Ocean areas. They are known by various names, including garfish, needle-fish, long tom, alligator gar, and aiguille. They are surface predators, often congregating in large schools. Their bodies are long, tubular, and silver in colour (figure). Although they hunt close beneath the surface, they are so well camouflaged by countershading that they blend into the background.¹ Their slender, spear-like beak consists of two narrow jaws with small pointed teeth (figure). One family in the order, the Hemirhamphidae or half-beaks, differs slightly in

Garfish, showing sharp pointed teeth.

Provincial Hospital, Alotau, Milne Bay Province, Papua New Guinea

PETER G BARSS, MD, DTM&H, medical superintendent

that only the lower jaw extends forward. The largest species in the order is the giant long tom, which can be up to 120 cm long.² Garfish swim at great speed, and they make sudden leaps, especially when attracted to bright lights.³ They thus represent a hazard for canoe fishermen who use a lamp at night in coastal waters.

The beak may cause deep penetrating wounds to the limbs as well as internal injuries to the chest and abdomen. The surface wound may appear deceptively small and innocent, leading those unfamiliar with the anatomy of these fish into underestimating the depth of penetration. I report here on several patients injured by garfish in Papua New Guinea.

Case histories

The table gives details of 10 cases, showing the variety and severity of injuries caused by garfish and the circumstances under which they occurred. Case 1 is described in detail below.

Case 1—A 30-year-old man was spearing fish at night from a canoe using a lantern. A garfish jumped and he speared it. A second garfish jumped, piercing his left lower thorax. He was taken to a nearby aid post, where the small wound was sutured. His condition soon began to deteriorate, but it was several hours before a boat was found to take him to the health subcentre close by. No intravenous infusion was started there. He died while being transferred to this hospital. On arrival a 2 cm, scarcely noticeable wound was noted on the left chest. As there was a possibility of this being a stab wound the coroner was informed and necropsy performed. This showed a small puncture wound in the left diaphragm and a puncture in the anterior wall of the stomach. There was over one litre of blood in the peritoneal cavity and a large quantity inside the stomach. The fish's beak had pierced the chest, missed the lung, and passed through into the abdomen, perforating the stomach and causing death from internal haemorrhage and leakage of gastric contents.

A further 15 patients, not shown in the table, were also injured by garfish. Eight of the patients died, from injuries to the chest or

abdomen. The tip of the fish's beak was found in the thoracic aorta of one of these patients at necropsy. The other patients had injuries to the arms or legs. In some cases the beak of the garfish penetrated right through an arm or leg. Most injuries occurred at night, although a couple were reported to have taken place in the daytime. A few patients attended hospital for removal of the tip of the beak, which was still embedded in the body.

Additional information concerning the dangers of garfish came from various sources. A teacher who had been fishing at night close to shore reported that his canoe had been pierced by a garfish. This seems possible as dugout canoes in the province are often thin and light. A fisheries worker related that people had been speared while fishing with lamps and that they performed magic to protect themselves (A Colodey, personal communication). A health worker related that to avoid injury by garfish at night people in his area fished by arranging their canoes in a circle; they then speared only fish in this central pool of light. Garfish allegedly seldom jump and injure people who fish in this manner (S Kove, personal communication).

Discussion

Garfish are an occupational hazard for people who spear fish from small canoes at night in Papua New Guinea. The fishermen use a light both to illuminate fish resting near the bottom and to attract fish to the surface of the water near the canoe. Traditionally, a bunch of burning coconut leaves served as a torch; more recently, however, kerosene pressure lamps have become popular. Injuries have occurred to people using either of these light sources. There is not enough evidence at present to indicate whether such injuries are becoming more common as people switch to the very bright pressure lamps. Occasional injuries have also occurred to fishermen pulling in garfish with a hook and line, and to people fishing and wading in shallow water. Garfish can often be seen in schools, racing along close beneath the surface of the sea and leaping up, sometimes reaching a height of five or six feet. Groups of garfish or even a

Details of 10 patients injured by garfish

Case No	Site of injury	Activity when injury occurred	Outcome	Remarks
1	Thorax-abdomen	Spearing fish from canoe with light at night	Dead on arrival at hospital	See text for full description
2	Thorax	Fishing from canoe using lamp	Died	Garfish jumped from water, piercing patient's chest. He was dead on arrival at a health centre, with a small wound on his chest
3	Thorax-abdomen	Pulling in fish on line during day	Died immediately	Patient caught a garfish; while he was pulling it in it jumped, piercing him. He died rapidly
4	Abdomen	Wading in sea	Recovered after laparotomy	A 9-year-old girl was wading up to her waist and was struck suddenly by a garfish. There was some external bleeding. She was taken to a health centre 50 m away and treated for shock. Five hours later she vomited 600 ml of blood clots. She was transferred to hospital, where perforations of stomach and liver were repaired at laparotomy
5	Abdomen	Fishing with lantern in canoe at night	Recovered after laparotomy	Patient was speared by a "long tom" in left upper abdomen. Laparotomy showed large intraperitoneal haemorrhage, no other injuries. There was prolonged postoperative infection
6	Abdomen	Wading for shellfish or wading with light and spearfishing	Recovered after laparotomy	Patient speared in left abdomen; was transferred to hospital, where laparotomy showed perforations of large and small intestine. Beak had penetrated through to just beneath the skin of the back, narrowly missing the ureter
7	Eye	Fishing at night	Blinded in one eye	A "long nose" jumped and struck the victim medial to the inner canthus of right eye. At hospital he was found to have an injury to the medial canthal ligament, laceration of the lacrimal duct, and decreased vision. On follow-up optic atrophy was noted, indicating that the beak had penetrated deep into the orbit into the optic nerve
8	Eye and brain	Driving fish into net	Hemiplegia, blindness in one eye	The patient was wading along slapping the surface of the water to drive fish into a net. A garfish jumped, piercing the right lower eyelid. On admission to hospital he was blind in the right eye with paralysis of right cranial nerves 3, 4, and 6. There was complete left hemiplegia without sensory loss. He was assessed by an ophthalmologist, who thought that the beak had penetrated into the superior orbital fissure, destroying the three cranial nerves and damaging the vasculature of the optic nerve. Apparently the beak passed on into the brain damaging descending motor tracts from the right cerebral cortex. Two months later he was still severely disabled with no sign of recovery from the hemiplegia
9	Head injury (concussion)	Spearing fish at night using light	Knocked out, rescued from sea	Garfish jumped and struck the patient on the forehead. He was knocked unconscious and fell into the sea. He was pulled out by someone from a nearby canoe and survived. (Another man from the area was struck on the side of the head by a garfish and died, probably by drowning)
10	Buttock	Paddling canoe at dusk	Recovered	Garfish jumped, striking the patient. A deep wound of the buttock was treated at a nearby health centre

solitary one can sometimes be observed in shallow water close to shore. At night they are often heard jumping near the shore. These fish not infrequently leap into the canoes of people fishing at night with lights (N Wicks, personal communication). It is not surprising, therefore, that an occasional fisherman gets speared by a sharp beak and that deaths occur.

The external wound may appear deceptively trivial. It should be regarded as a stab wound and, therefore, the possibility of internal injury should be borne in mind. Patients speared in the chest or abdomen should be considered for urgent transfer to a hospital with surgical facilities. Little is known about ways of preventing injury by these fish, although placing canoes in a circle and spearing only fish in the central pool of light may lessen the risk.

I thank all those who helped by contributing case histories, including Dr R Dethlefs, ophthalmologist, who sent a detailed case history of one of his patients.

References

- 1 Fricke HW. *The coral seas*. New York: G B Putnams, 1973.
- 2 Carcasson RH. *A field guide to reef fishes of tropical Australia and the Indo-Pacific region*. Sydney: Collins, 1977.
- 3 Munro ISR. *The fishes of Papua New Guinea*. Port Moresby, Papua New Guinea: Department of Primary Industry, 1967:105-9.

(Accepted 8 September 1981)

Does the order of second-line treatment in rheumatoid arthritis matter?

M M STEVEN, J A HUNTER, R M MURDOCH, H A CAPELL

Abstract

In a prospective study 88 patients with rheumatoid arthritis who had stopped taking gold, penicillamine, or levamisole were randomly allocated to one of the alternative drugs and followed up for a minimum of one year. Concurrent studies of the effects of gold, penicillamine, and levamisole prescribed in 123 patients as the first second-line drug were used for comparison. No difference in toxicity or efficacy between primary and secondary use of gold or penicillamine was identified. Variation in the toxicity of levamisole could in part be accounted for by changes in the dose regimen over the four years of study. The length of the treatment-free interval between drugs did not influence subsequent development of toxicity.

These results suggest that an adverse reaction to one of the three second-line drugs studied should not prejudice the selection of another.

Introduction

Second-line drug treatment for rheumatoid arthritis is associated with considerable toxicity, which often prevents long-term treatment with a single agent.¹⁻³ The disease may remain active for many years, and a sequence of second-line drugs may be needed. It is therefore important to establish the effect of order of administration of second-line drugs on the development of side effects and the efficacy of individual drugs. Results of previous retrospective studies on the effect of prior gold treatment on subsequent penicillamine treatment have been contradictory.⁴⁻¹¹ We report a prospective study of patients who had stopped taking gold, penicillamine, or levamisole and were subsequently randomly allocated to one of the alternative drugs.

Patients and methods

We studied 88 patients with classical or definite rheumatoid arthritis. All had stopped taking a second-line drug because of toxicity or lack of effect (38 had previously received gold, 19 penicillamine, and 31 levamisole). A further second-line drug was indicated because of progressive inflammatory disease, and after a "wash-out" period they were randomly allocated to one of the alternative drugs. The treatment-free interval allowed was three months unless extremely active disease necessitated earlier introduction of a second or third drug. When results from concurrent studies in 123 patients showed that levamisole was less effective and more toxic than the other drugs³ levamisole was given only to patients who had stopped taking both gold and penicillamine.

No patient was receiving corticosteroids at the time of study, but all continued non-steroidal anti-inflammatory drugs and general supportive measures. Patients were encouraged to persist with the treatment for six months unless unacceptable side effects occurred. All patients continuing treatment were monitored fortnightly or monthly for a minimum of one year.

Sodium aurothiomalate (Myocrisin) was given intramuscularly as a 10 mg test dose followed by weekly injections of 50 mg until a response was achieved. Thereafter 50 mg injections were given fortnightly, then three-weekly and ultimately four-weekly. Penicillamine was started at a daily dose of 125 mg and increased by 125 mg at fortnightly or monthly intervals until response occurred or a maximum of 1000 mg daily was reached. Levamisole was given initially as 150 mg on three consecutive days weekly, but when results of multicentre studies became available this was reduced to 150 mg weekly. If patients failed to respond to the low dose after six months the dose was increased to 150 mg twice weekly and, if necessary, to 150 mg on three consecutive days. Patients stopped taking the drugs when any of the following occurred:

(1) Proteinuria greater than 300 mg/day when other causes had been excluded. If, when the proteinuria had settled, the patient agreed to a further trial reintroduction of the drug at a lower dose was tried. (2) Platelet count less than $150 \times 10^9/l$ or white cell count less than $4 \times 10^9/l$ on two consecutive occasions. In patients receiving penicillamine reintroduction of the drug at a dose of 125 mg was tried if the platelet count returned promptly to normal. (3) Rash, mouth ulceration, myalgia, or gastrointestinal upset and either the patient refused to try challenge at a lower dose or the side effect occurred when the drug was reintroduced. (4) Deterioration of arthritis and the patient was unwilling to persevere.

A third drug was given to 26 patients who had stopping taking two of the drugs and in whom continuing disease activity necessitated further second-line treatment.

Appropriate non-parametric statistics were used throughout¹² to test for significance.

Centre for Rheumatic Diseases, Glasgow G4 0EH, and Department of Medicine, Glasgow Royal Infirmary

M M STEVEN, MRCP, senior registrar
J A HUNTER, MRCP, senior registrar
R M MURDOCH, BSC, systems analyst
H A CAPELL, MRCP, consultant physician