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Injury to an Atlantic White-Sided Dolphin (*Lagenorhynchus acutus*) Caused by Needlefish Impalement

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Abstract

Specific interactions between dolphins and other marine species may result in the injury or death of the individuals involved. This case report describes a perforating injury to an Atlantic white-sided dolphin, *Lagenorhynchus acutus*, by a garpike, *Belone belone gracilis*, of the family Belonidae (needlefishes) in Asturias, Spain. On postmortem examination, the dolphin had a full-thickness perforation of its right thoracic wall, with penetration and abscess formation in the right lung due to a needlefish's lower jaw. The wound appeared to be recently acquired, based on the absence of reactive fibrosis. No other gross abnormalities were identified. Results from bacterial and viral analysis on the spleen, liver, kidney, and left lung were negative. Most likely, death occurred as a result of an open pneumothorax produced by the traumatic penetrating injury to the right lung.

Key Words: Atlantic white-sided dolphin, *Lagenorhynchus acutus*, garpike, *Belone belone gracilis*, needlefish, Belonidae, impalement, pneumothorax

Introduction

Data and material collected from stranded cetaceans provide valuable information on the causes of morbidity and mortality in marine mammals. In dolphins, there are published reports of disease and mortality from stingray-inflicted wounds (Walsh et al., 1988) and ingestion of a needlefish beak (Carrasquillo-Casado et al., 2002). Injuries or death by a needlefish beak have been reported in humans (Barss, 1982, 1985), but not in dolphins.

Materials and Methods

On 5 May 1991, an Atlantic white-sided dolphin, *Lagenorhynchus acutus* (Delphinidae), was found recently dead on Peñarronda Beach, Asturias, northern Spain (44º 33' N, 06º 59' W). The carcass was measured and examined for external lesions. The nutritional state was judged by blubber thickness, as measured in three different locations, and muscle mass. Major organs were examined, and representative tissue samples were taken for histology according to a standard protocol (Kuiken & García Hartmann, 1991). Lungs, kidney, liver, and spleen were submitted for bacterial and viral analysis. Columbia blood agar, McConkey agar, and Sabouraud agar, all under aerobic conditions, were used. For anaerobic bacteria, nalidixic acid agar was employed. The presence of virus was tested by looking for the cytopathic effect in secondary cell cultures of bovine embryo kidney. The stomach contents also were examined.

Results

The specimen was a 235-cm total length (L_T), pregnant female with a 90-cm L_T fetus. The dolphin was in good nutritional condition and, with the exception of ten fish otoliths in the first stomach chamber, the entire gastrointestinal tract was free of any food matter. Many specimens of the nematode *Anisakis* spp. were found in the first chamber of the stomach. Externally, apart from a few scars, the only skin lesion was a 2.5-cm diameter puncture wound on the cranial right thorax. The wound communicated with the thoracic cavity and contained a bone fragment of 9.3 cm in length and 0.94 cm in diameter at its widest point (Figure 1). This fragment had penetrated the 2.0-cm blubber layer between the third and fourth ribs and above its right scapula, pierced the costal pleura, and entered 2.5 to 3 cm into the anterior portion of the right parenchyma lung. The bone was identified as the lower jaw of a garpike, *Belone belone gracilis* (Osteichthyes, Belonidae). There was inflammatory tissue response. The beak made an open communication between the thoracic cavity and outside.

The jaw was not encapsulated by fibrous tissue, indicating that this was a recent wound. The right

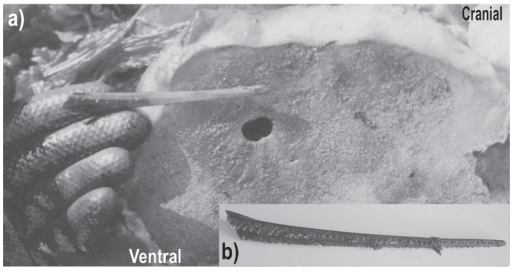

Figure 1. (a) Penetrating injury to the thorax produced in a female Atlantic white-sided dolphin, *Lagenorhynchus acutus*, by the lower jaw of a garpike, *Belone belone gracilis*; (b) detail of the 9.3-cm long garpike jaw

lung had a small abscess around the wound. Dark red, non-aerated areas in the right lung were observed, but there was no evidence of hypoxic effects in the left lung surface. A small amount of dark pink, serosanguineous exudate between the lung pleura and lung parenchyma was collected. No gross lesions were present in other organs. Results from bacterial and viral analysis on the left lung, kidney, spleen, and liver were negative. Unfortunately, contamination germs were observed on the right lung, making it difficult to interpret both the bacterial and viral culture results. Histological examination of the right lung showed alveolar lumens with infiltrates of neutrophils, eosinophils, plasma cells, and alveolar macrophages. The right lateral lung pleura had moderate infiltration with inflammatory cell infiltrates. Other tissues were within normal limits.

Discussion

Garpike (*Belone belone gracilis*) is restricted to the southern area of the northeast Atlantic and the Mediterranean and grows up to 70-cm standard length (Collete & Parin, 1986). Belonids are capable of both jumping and moving at high speeds when frightened by predators or when attracted by lights (Collete, 1978). Moreover, the species possess a strong, pointed beak that is long enough to reach internal organs and can cause significant injuries. Although needlefish may cause a penetrating injury that is nonpoisonous, there is risk of secondary bacterial infection given that belonids are carnivorous and have microbial organisms associated with their dentition (Labbe et al., 1995).

The probable cause of death resulted from traumatic perforation of the cranial right thorax and penetration of the lung by a needlefish jaw. The beak maintained an open wound, and the opening in the chest wall allowed for equilibrium between the atmospheric pressure and the negative intrathoracic pressure, causing a collapse of the lung on the affected side, subsequently causing an open pneumothorax. Because the dolphin could not fully rid the thorax of this air, an increase in the volume of air within the chest cavity ensued, which led to a progressive loss of negative pressure, with subsequent collapse of the right lung and positive buoyancy. This positive buoyancy likely hindered diving (Reidarson et al., 2002) and, thus, feeding ability, as supported by the absence of food throughout the gastrointestinal tract in this dolphin. Other dolphins and terrestrial animals with unilateral pneumothorax can survive given the proper conditions (Kramek & Caywood, 1987; Reidarson et al., 2002). In this case, the presence of the fetus may have limited diaphragmatic movement, reducing the respiratory ability. This would have placed greater demands on diving physiology and metabolic requirements, leading to death instead of resolution of the pneumothorax. This case report of a fatal perforating wound to the thoracic cavity in a pregnant Atlantic white-sided dolphin documents another type of injury that can be sustained by dolphins from encounters with needlefish.

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