Epitheliocystis Disease in Cultured Amberjack Seriola dumerili in Japan

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Abstract: In October and November 2000, mass mortalities of the cultured amberjack Seriola dumerili have occurred in the southern part of Kyushu, Japan. The gross pathological signs of diseased fish were abnormal swimming with wide-opened mouth and opercula, which are typical signs of suffocation. Histopathological examination revealed definite epitheliocystis cysts accompanied by hyperplasia and fusion of epithelial cells of gills.

Key words: Epitheliocystis disease; Amberjack; Pathological sign

In Japan, epitheliocystis disease is one of serious diseases in cultured marine fishes. Epitheliocystis disease has previously been observed in juvenile red sea bream Pagrus major and tiger puffer Takifugu rubripes in Japan (Miyazaki et al. 1986; Ototake and Matsusato 1987). In October of 2000, epitheliocystis disease broke out in cultured amberjack in the southern part of Kyushu, Japan. The water temperature when mass mortalities occurred was 20 to 25°C. The cumulative mortality reached about 20 to 50% in each of four farming areas. These diseased fish showed a definite sign of epitheliocystis cysts in histopathological examinations. This is the first report of an outbreak of epitheliocystis disease in cultured amberjack in Japan.

Each five fish were sampled from four farming areas in the southern part of Kyushu, Japan. Their average body weights of the four groups ranged from 750 to 850 g, and their average body lengths ranged from 33 to 37 cm. The moribund fish usually showed a discoloration in the body, pale gill coloration and the congested liver and brain. All of the moribund fish were dissected after external and internal observation. The gills, heart, liver, spleen, kidney, digestive tract and brain were immediately fixed in phosphate-buffered, 10% formalin solution, embedded in paraffin, sectioned at 4 μm and stained with Mayer’s hematoxylin and eosin (H & E). No bacteria were isolated from the liver, spleen, kidney or brain of the diseased fish.

The most prominent pathological changes were observed in the gill tissues. Various stages of the cyst formation of epitheliocystis occurred in the gill lamellae. In the early stages, spindle-shaped epitheliocystis cysts formed in the respiratory epithelium and between the capillary and respiratory epithelium of the gill lamellae (Fig. 1-1). Small, round epitheliocystis cysts were also observed in the epithelium of the gill filaments. These cysts consisted of basophilic substance and the membranous wall. Enlarged cysts pressed against the capillaries and the covering respiratory epithelium were flattened in the lamellae, resulting in deformity and fusion of the affected lamellae.

In advanced cases, affected gill lamella showed extensive hyperplasia of epithelial cells resulting in clubbing of gill filaments (Fig. 1-2). These hyperplastic lesions contained many capsular structures of epithelial cells with a flat shape (Fig. 1-3). Cells inside capsules often displayed slight necrosis. Some cellular capsules contained an epitheliocystis cyst which was decreased in a size and degenerated (Fig. 1-3). The gill lamellae with epitheliocystis hyperplasia occasionally displayed hematoma in capillaries followed by hemorrhage within hyperplastic epithelial cells. Some cellular capsules were found to contain no cyst. No inflammatory response was observed in these lesions.

No epitheliocystis cysts or cellular capsules were observed in the heart, liver, spleen, kidney, digestive tract or brain. Hepatic cells displayed atrophy. The kidney had hyaline droplet degeneration in the renal epithelium. These changes were marked in fish that had severe lesions in the gills.

The present study revealed severe gill damage due to epitheliocystis infection caused mortality of amberjack. There is no previous report of epitheliocystis disease in amberjack in Japan. Moreover, the average body lengths of infected amberjack ranged from 33 to 37 cm. Epitheliocystis disease has often occurred in young fish including juveniles in Japan (Miyazaki et al. 1986; Ototake and Matsusato 1987; Egusa 1987). Mass mortality due to the epitheliocystis disease in Japan has not previously been reported in large fishes similar to fish in our study.

The epitheliocystis disease in amberjack has previously occurred in Spain (Crespo et al. 1990).
Histopathological changes of the diseased fish and the cyst formation of epitheliocystis in the affected gill were similar to those in our study. Further studies are needed to confirm the causative agent of the present disease by electron microscopy.

References


**Fig. 1. Seriola dumerili.** (1) Gill of diseased fish in early stages of the infection of epitheliocystis disease. The epitheliocystis cysts appear in the respiratory epithelium of gill lamellae (arrowheads). The cysts consist of basophilic substance. Scale bar = 20 µm. (2) Gill of diseased fish in an advance case. Affected gill lamella display extensive hyperplasia of epithelial cells resulting in clubbing of gill filaments. Scale bar = 200 µm. (3) Gill of diseased fish in an advance case. The extensive hyperplastic epithelial cells have the cysts (large arrowheads) and many cellular capsules (small arrowheads). An interior cyst of cellular capsule shows shrink (arrow). Scale bar = 40 µm.