NOTE

Hypodermal lipoma in a striped (grey) mullet *Mugil cephalus*Mohey El-S. Easa¹, John C. Harshbarger², F. M. Hetrick³¹Department of Pathology, Faculty of Veterinary Medicine, Cairo University, Giza, Egypt²Registry of Tumors in Lower Animals, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, USA³Department of Microbiology, University of Maryland, College Park, Maryland 20742, USA

ABSTRACT: Lipomas are noted less frequently in fish than in some other animal groups and the one described here, occurring in a striped mullet *Mugil cephalus* in Egypt, is the first report of a fat tumor in this species. The tumor was a well-circumscribed, non-invasive, hypodermal mass of mature disorganized fat tissue containing a minimum of supporting stroma. The etiology of the tumor is unknown.

About 50 cases of subcutaneous lipoma have been accessioned by the Registry of Tumors in Lower Animals (RTLA) and/or reported in the literature in 37 species of fish (Mawdesley-Thomas 1972, Harshbarger et al. 1981). These include bream *Abramis brama* (Mawdesley-Thomas & Bucke 1968), largemouth bass *Micropterus salmoides* (Mawdesley-Thomas 1972), black crappie *Pomoxis nigromaculatus* (Harshbarger 1972), and channel catfish *Ictalurus punctatus* (McCoy et al. 1985). In some cases, the neoplastic adipose tissue is mixed with other connective tissues. Examples include a fibrolipoma on the caudal peduncle of a Pacific halibut *Hippoglossus stenolepis* (Wellings 1969), a subcutaneous fibrolipoma on the mid-dorsal trunk of a splitnose rockfish *Sebastes diploproa* (Harshbarger & Bane 1969), and a lipo-osteoma on the operculum of another Pacific halibut (Wellings 1969).

The hypodermal lipoma (RTLA 3981) described here is the first fat tumor registered in a striped (grey) mullet *Mugil cephalus*.

Materials and methods. A single striped mullet with a massive protrusion on the posterior trunk was caught in a gill net during summer 1986 from Karoon Lake (brackish water), about 70 km south of Cairo, Egypt. The fish was a 2-yr-old male weighing 2.25 kg and measuring 45 cm in length.

The tumor tissue was preserved in phosphate-buffered formalin. Microslides were prepared from paraffin-embedded tissue blocks by conventional histologic processing and stained with hematoxylin and eosin (H & E). Other tissue blocks were washed free of formalin,

frozen, and sectioned on a cryostat. These sections were stained with Oil red O, Nile blue, and osmium tetroxide.

Results and discussion. A lobulated mass protruded from the left dorsolateral aspect of the trunk near the caudal peduncle and involved the posterior part of the dorsal fin (Fig. 1). The overlying skin was pale, with flattened scale pockets, scattered petechiae and a small apical ulceration as a result of being stretched by the enlarging mass.

The tumor had a spongy consistency and felt oily. Tissue blocks were buoyant in water and oily droplets floated on the surface. Cut sections were pale and the tumor appeared lobulated and circumscribed without encapsulation. On dissection, the tumor with a flange of normal tissue weighed ca 100 g and measured 10 × 8 cm. Postmortem examination showed no evidence of infiltration or metastasis into visceral organs.

Histopathologically, the hypodermal tumor mass consisted of mature lipocytes bordered by skin on one side and by muscle on the other. An inflammatory process characterized by granulation tissue was associated with the ulcer. The mass was well circumscribed but not encapsulated. It caused pressure atrophy to adjacent muscle bundles but, in contrast to the channel catfish cases (McCoy et al. 1985), it did not infiltrate any of the neighboring normal tissue (Fig. 2). Fat cells were pleomorphic and occurred randomly rather than in a specific pattern except for an occasional fibrovascular septum. Cells consisted of a variably large cytoplasmic vacuole with a flattened marginated nucleus that was often out of the plane of section (Fig. 3). The vacuoles were empty in the conventionally processed tissue because the solvents used extracted the fat; however, the presence of fat was confirmed by staining frozen sections with Oil red O, Nile blue, and osmium tetroxide. The fat was so abundant that it oozed out of vacuoles during sectioning and appeared as globules

Fig. 1. *Mugil cephalus*. Striped mullet showing tumor. The gross lesion protruded conspicuously from the left dorsolateral trunk between the second dorsal and the pelvic fins just anterior to the caudal peduncle. The outer surface of the lesion was ulcerated

Fig. 2. *Mugil cephalus*. Section showing adipose tumor tissue abutted against but not invading the compact skeletal muscle (32×)

on the microslides. Mitotic figures were not apparent. Capillaries occurred between the cells and nerves were seen in the mass, which is different from the fibrolipoma reported in a rockfish (*Sebastes diploproa*) where innervation and vascularization were not prominent (Harshbarger & Bane 1969).

A few strands and islands of fibrous tissue associated with extracellular collagen were widely scattered within the mass, but the fibrous tissue was insufficient to define it as a fibrolipoma. The granulation tissue in the ulcerated area contained a mixed population of leucocytes (mainly macrophages and lymphocytes) together with a few lipocytes (Fig. 4). It was probably an inflammatory response to the presence of microbes

on the exposed surface. The adjacent stretched skin had a flattened scale pocket in the dermis that was grossly inapparent. Extravasated erythrocytes were occasionally observed. Healing was probably an ongoing process in the ulcerated area because the protruding tumor was vulnerable to repeated traumatization.

Based on the lesion being a slow-growing, well-circumscribed, noninvasive hypodermal mass of mature disorganized fat tissue containing a minimum of supporting stroma, the tumor was diagnosed as a lipoma.

Lipomas can grow to enormous size in fish. The record is shared by lipomas in 2 tuna. One was a 20 kg lipoma from a 180 kg bluefin tuna *Thunnus thynnus*

Fig. 3. *Mugil cephalus*. Histological sections of tumor. Fig. 3. Monotonous fields of unpolarized pleomorphic cells, each containing a large single cytoplasmic fat vacuole which flattened the nucleus against the cell wall. The monotony was occasionally broken by a thin fibrovascular septum. Fig. 4. Ulcerated surface bordered by a band of granulation tissue and containing a mixed population of inflammatory white blood cells. A few tumor cells are trapped with the inflammatory tissue

caught off Massachusetts, USA (RTLA 1518 contributed by Paul R. Yevich). The other was an oval 21×16 cm mass plus adjacent lobules in a Southern bluefin tuna *Thunnus maccoyii* caught off Southern Australia (Lester & Kelly 1983).

The exact nature and cause of subcutaneous lipomas is unknown. In humans (Lattes 1982), lipomas are histologically and chemically similar to normal fat, but the fat itself is unavailable to the host. Some human lipomas have been linked with errors in fat metabolism, including those associated with other endocrine or neurological disorders such as multiple endocrine adenomatosis and neurofibromatosis. This raises the question of whether subcutaneous lipomas might actually represent an excessive differentiation of mesenchyme into adipose tissue rather than true neoplasia (Robbins et al. 1984).

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