

POECILIID RESEARCH

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Research Article

Congenital teratoma in guppy (*Poecilia reticulata*) in Iran

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Abstract. In this study, one ovoid mass was observed on ventral body wall of male guppy, *Poecilia reticulata*. The fish was euthanized and then the mass was fixed in 10% buffered formalin and submitted for histopathological examination. The mass was 6 mm long, 5 mm high, and 3.5 mm wide, weighed 1 g. The mass was composed of connective tissue, skeletal muscle, adipose tissue, melanocytes, cartilage, bone, blood vessels (arteries and veins), lymphatic vessels, nervous tissue (nervous trunk), tendon, ctenoid scale and lepidotrichium. Teratomas are true tumors or neoplasms containing multiple tissues originating from more than one germ cell layer. All 3 germ layers are represented. This is the first report of teratomata in fish in Iran.

Key Words: ovoid mass, male guppy, histopathology, tumor.

Introduction. Teratomas are true tumors or neoplasms containing multiple tissues originating from more than one germ cell layer (Newman et al 2003). Teratomas have been recorded and studied in human (Dehner et al 1970), horses (Frazer et al 1988), pigs (Kennedy & Miller 1993), cattle (Dehner et al 1970), dogs (Greenlee & Patnaik 1985), cats (Gelberg & McEntee 1985), rodents (Dehner et al 1970; Frisk et al 1978), monkeys (Baskin et al 1982), domestic fowl (Helmboldt et al 1974), woodchucks (Anderson & Johnson 1988), squirrels (Dehner et al 1970), lizards (Anderson et al 1996; Stolk 1958), reptiles (Machotka et al 1992), and fish (Schlumberger & Lucke 1948). Reports of teratomas in fish have been limited to the guppy (*Poecilia reticulata*) (Stolk 1953; Stolk 1955; Hisaoka 1961; Petrescu-Mag et al 2011)), swordtail (*Xiphophorus helleri*) (Hisaoka 1963), platyfish (*Xiphophorus maculatus*) (Stolk 1959), ornamental hybrid carp (Nishikigoi) (Ishikawa & Takayama 1978), sea lamprey (*Petromyzon marinus*) (Piavis et al 1979), medaka (*Oryzias latipes*) (Bunton & Wolfe 1996), chinook salmon (*Oncorhynchus tshawytscha*) (Lumsden & Marshall 2003). To the best our knowledge, this is the first report of teratoma in fish in Iran.

Material and Method. In September 2013, while clinical examining of 1000 adult guppy in an ornamental fish farm, one ovoid mass on ventral body wall of male guppy was observed (Figure 1). Based on owner statements, the guppy was born as a Siamese twin (conjoined twins) and one of them was reabsorbed up to this phase. The fish was referred to the ornamental fish clinic of Faculty of Veterinary Medicine, University of Tehran. The year-old fish possessing the mass was 39 mm in length. The oval mass was 6 mm long, 5 mm high, and 3.5 mm wide, weighed 1 gr. The fish was living in excellent condition and its activity was observed over a period of 5 days. In spite of the fact that the fish had a large mass, its movements and swimming behaviors in the water were normal. Color pattern of the mass and fish was partly similar and the mass was covered by scales. A relatively large finfold (Figure 1) was present on the median ventral and caudal surface of the mass. Also, two pairs of short fins were located on the posterior

part of the tumor near its attachment to the fish. Then the fish was euthanized and necropsy was performed under sterile conditions. Bacterial and fungal cultures from multiple internal organs incubated at 25°C resulted in no growth. No parasite was observed in skin, gills and internal organs. For histological purposes, samples of the mass and internal organs of the guppy were dissected and preserved in 10% buffer formalin, dehydrated and embedded in paraffin, and serial sections (4-5 µm) were cut and subsequently stained with haematoxylin-eosin (H&E).

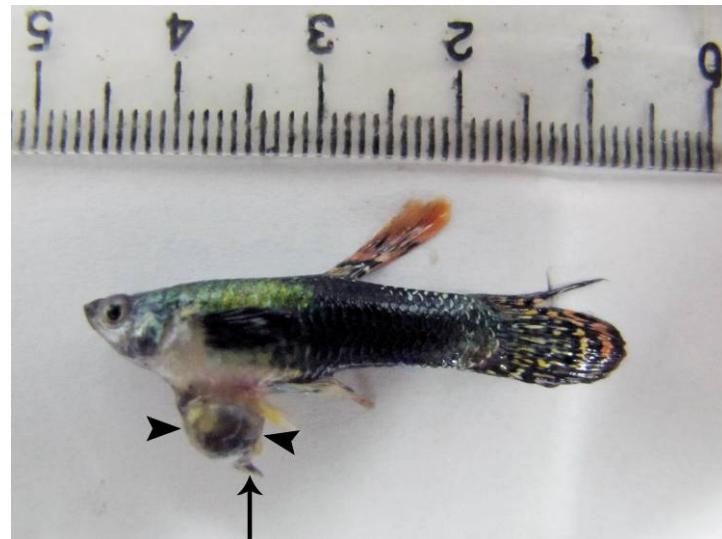


Figure 1. The male guppy with one ovoid mass on ventral body wall (arrowheads). Finfold (arrow).

Results. Histological sections showed that the guppy and the mass were connected to each other by a fusion of the lateral body walls which was composed of epidermis, ctenoid scales, connective tissue and lipocytes (Figure 2). The mass possessed multiple tissues which were well differentiated and was composed of connective tissue, skeletal muscle (stratified muscle), adipose tissue, melanocytes, cartilage, bone, blood vessels (arteries and veins), lymphatic vessels, nervous tissue, tendon, epidermis, ctenoid scale and lepidotrichia (Figures 2 and 3). Striated muscle was the most predominant and formed the bulk of tissues teratoma. Histologically, 3 germ cell layers were represented.

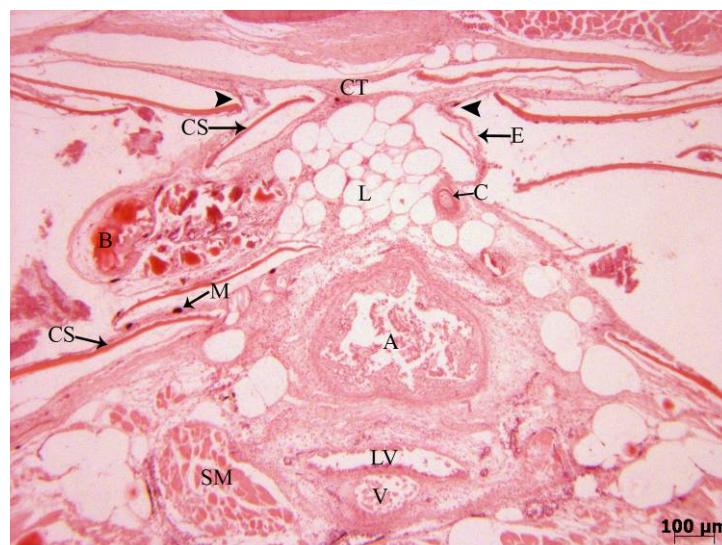


Figure 2. The guppy and the mass are connected to each other (arrowheads). Connective tissue (CT), ctenoid scale (CS), lipocytes (L), epidermis (E), cartilage (C), bone (B), melanocytes (M), artery (A) and vein (V), lymphatic vessel (LV), stratified muscle (SM) (H&E).

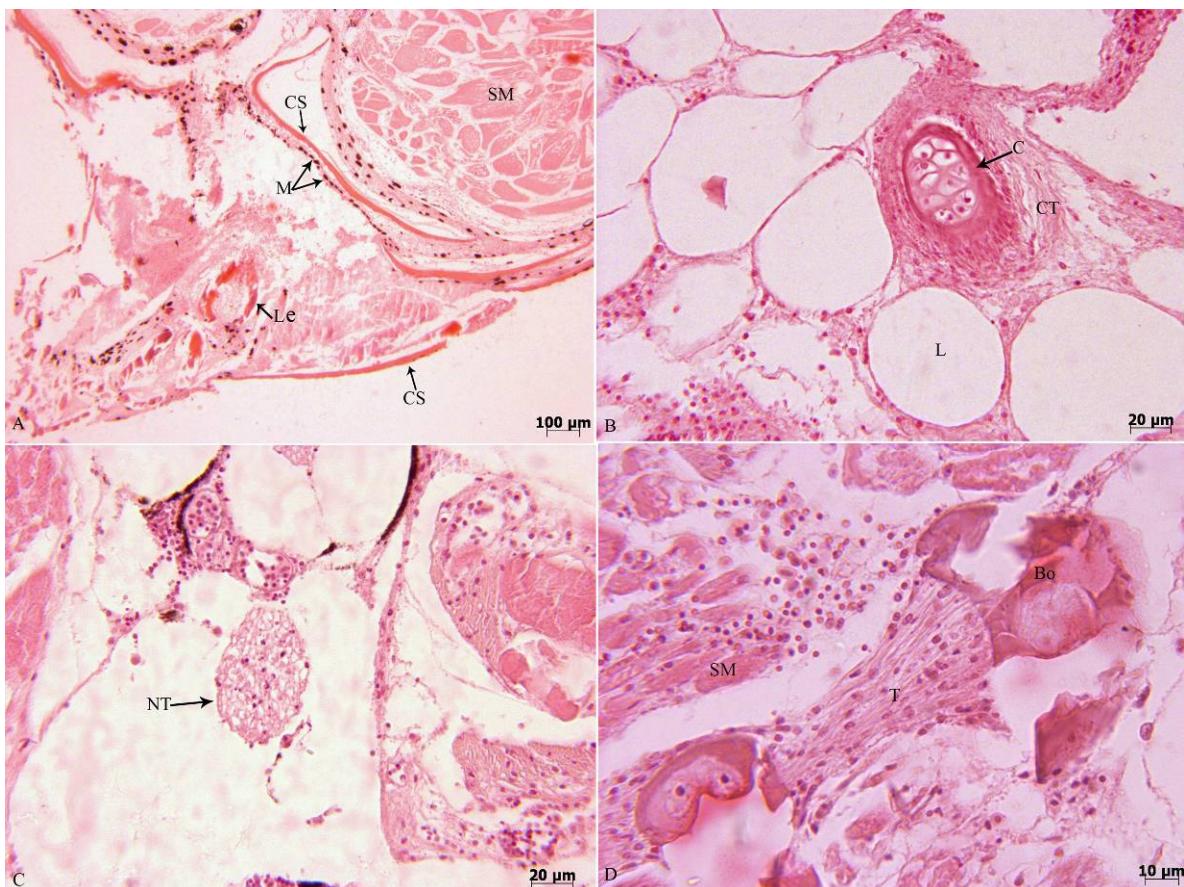


Figure 3. Teratoma in the guppy. A: stratified muscle (SM), ctenoid scale (CS), melanocytes (M) and lepidotrichia (Le); B: cartilage (C), connective tissue (CT) and lipocytes (L); C: nervous tissue (NT); D: stratified muscle (SM), tendon (T) and bone (Bo) (H&E).

Discussion. Teratomas may be classified as benign (mature) or malignant (immature) depending on varying degrees of morphological differentiation (Hisaoka 1961). The location of this type of tumor is varied, although the teratomas most commonly arise from gonadal tissue and may occur in extragonadal sites including intracranial, peritoneal and retroperitoneal sites (Newman et al 2003). Teratomas include a mixture of cells from all three germ layers (Harshbarger 2001). Teratomas are most common in viviparous fishes (Stolk 1953, 1955, 1959; Hisaoka 1961, 1963). Hisaoka (1961) reported that the teratoma occurs in both male and female with equal frequency. Although, this rare tumor is not limited in occurrence to viviparous, teratomas have been reported in egg-laying species of fish (Ishikawa & Takayama 1978; Lumsden & Marshall 2003). Many reports suggested ovarian origin for teratoma but some suggested the tumor originates in the embryo (Ishikawa & Takayama 1978; Hisaoka 1963). The etiology of these tumors is unknown, but previous research suggested some reason including cytotoxic teratogen (various chemical carcinogenic agent) like N-methyl-N'-nitro-N-nitrosoguanidine, pathological infection agent like *Ichthyophonus spp.* (Bunton 1996; Stolk 1959). The teratogenic effect observed in guppy was not due to the dose of cloramphenicol administered (Petrescu-Mag et al 2008, 2011). Studies about teratoma in the guppy suggest a relationship of this tumor to twinning (Hisaoka 1961). Previous research indicates that teratoma in the guppy may be composed of a single or double mass which possesses fins corresponding in position to the pectoral and pelvic fins (Hisaoka 1963). This study showed that derivatives of all three germ layers are represented and the bulk of the teratoma develops from mesodermal and ectodermal origin. There have been no previous reports of teratoma in Iran.

Conclusions. On the basis of the macroscopic and microscopic characteristics, cause of this condition remained unknown. However, genetic predisposition appears to be the best explanation for teratoma in this case.

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