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Cryotherapy for Removal of a Premaxillary Mass from a Chain Pickerel Using an Over-the-counter Wart Remover

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A 620-g chain pickerel (*Esox niger*) at a public aquarium developed a mass on the right premaxilla that reduced the exhibit quality of the fish. The fish was originally wild-caught 4 months previously. It had passed through the aquarium's usual quarantine procedures of 3 formalin treatments (25 ppm q48h with 50% water changes between treatments), continuous low salinity at 3 g/L for 90 days, and negative skin scrapes and gill biopsy results prior to being put on exhibit. The pickerel was held in a 30,000 L (8000 gal) mixed species exhibit along with several sunfish species (Centrarchidae), bowfin (*Amia calva*), longnose gar (*Lepisosteus osseus*), white catfish (*Ameiurus catus*), yellow bullhead (*Ameiurus natalis*), yellow perch (*Perca flavescens*) and a Florida softshell turtle (*Apalone ferox*). It was not exposed to pickerels or any other pike species (Esocidae) in captivity. Water quality parameter ranges were as follows: ammonia (0-0.04 mg/L), nitrite (0-0.007 mg/L), nitrate (12.7-16.8 mg/L), hardness (260-440 mg/L calcium carbonate equivalents), pH (6.6-6.9), salinity (2-3 g/L), and temperature (23.4-24.6ºC; 74.2-76.2ºF). The pickerel's diet consisted primarily of smelt with occasional crayfish tails or chopped fish.

Four months after acquisition, a firm, smooth, pink, fleshy, raised, 1-cm diameter mass on the right premaxilla was noted and was initially suspected to be an abrasion reaction. One month later, after no resolution and some increase in size (Fig 1), an excisional biopsy was performed. Anesthesia was induced with 150 mg/L buffered tricaine methanesulfonate (MS-222), and simple excision was performed with a #15 scalpel blade. Hemorrhage was minimal, but bony involvement prevented complete

removal. Ketoprofen (2 mg/kg IM) was administered for postoperative analgesia. Although the fish exhibited a marked hyperemic stress response from handling and anesthesia, it recovered well and fed the next day. Histologic examination revealed an expansile, unencapsulated spindle cell mass initially diagnosed as a fibrosarcoma, with margins extending to the deep sections.

The mass rapidly recurred and enlarged within 3 weeks. Treatment options considered included radical excision, laser surgery, intralesional cisplatin and cryotherapy. A radical excision was not considered feasible because of the likely disfigurement and impairment of feeding ability. Achieving adequate margins with laser surgery was considered to carry similar risks. Intralesional cisplatin in medical-grade sesame oil has been used to treat skin sarcomas and carcinomas in horses, but because of the small size of the patient (approximately 0.07 m^2), even a local treatment carries increased risk of lethal nephrotoxicity (canine minimum lethal dose 2.5 mg/kg or about 80 mg/m^2).[1]

Debulking followed by cryotherapy was elected as a means to devitalize the deep margins while retaining structural integrity of the premaxilla. The pickerel's poor response to handling made treatment on site preferable to transport to a veterinary hospital. Because of the distant facility location and logistics involved in transporting liquid nitrogen or a cryosurgery unit, an over-the-counter (OTC) wart removal system based on a dimethyl ether/propane/isobutane canister was selected for the cryotherapy (Compound W® Freeze Off® Wart Removal System, Medtech Products, Inc., Irvington, NY; Fig 2).

Two months following the initial biopsy, the pickerel was anesthetized with 125 mg/L buffered tricaine methanesulfonate (3 min induction, 9 min maintenance on a fish anesthesia delivery system[2]). A deeper excision, including a bone core extending into the protruding mass, was performed with a #15 scalpel blade and Mayo scissors. The surgery bed was subjected to 3 freeze-thaw cycles with a 2-mm blanch zone using the wart removal system according to operating directions (Fig 3). Ketoprofen (2 mg/kg IM) was administered for postoperative analgesia.

The pickerel recovered within 5 minutes of return to anesthesia-free water and again displayed marked erythema of all fins as a result of handling, which resolved gradually in its recovery tank. It fed the following day. Histologic diagnosis was initially as before, a fibrosarcoma with abnormal cells extending to deep sections, plus the presence of woven bone from the center to the base of the mass, which may have indicated bony infiltration or reactive bone formation against the mass growth (Fig 4). Subsequent re-examination of the series of histologic sections led to a re-interpretation of the mass as hyperostosis (= reactive bone), which is

Fig 1. Fleshy raised pink 1-cm diameter mass on the premaxilla of a chain pickerel at the time of initial examination.

Fig 2. a) Commercially-available over-the-counter cryotherapy wart removal product components; **b)** Over-the-counter cryotherapy wart removal product assembled and ready for charging the applicator by adiabatic cooling of expanding dimethyl ether, propane and isobutane.

Fig 3. Pickerel premaxilla following surgical removal of the mass and 3 freeze-thaw cycles.

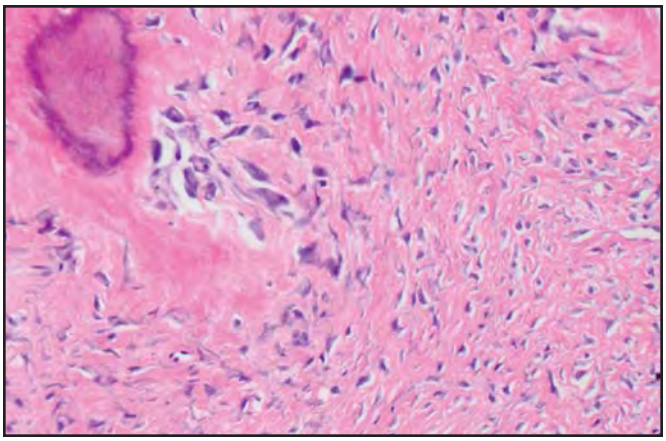

Fig 4. Histologic section of mass at second removal, showing a focal area of woven bone surrounded by a uniform sheet of spindle cells within abundant collagenous stroma (40x).

Fig 5. Pickerel 8 months after surgery, on exhibit.

consistent with the initial suspicion that the lesion started as a reaction to an abrasion.

The surgical wound healed rapidly, with return to a cosmetically-acceptable appearance within 2.5 weeks, and retention of normal function. Eight months following surgery, mild swelling remains, with a small (approximately 1 x 2 mm) area of depigmentation (Fig 5). The pickerel remains in good health and is good exhibit quality.

Several OTC wart cryotherapy systems have appeared on the market recently, amidst some controversy about how they compare with in-clinic cryotherapy based on liquid nitrogen.[3] The OTC wart remover systems work by adiabatic cooling and saturation of an applicator with dimethyl ether and propane, with or without isobutane, expanding from a pressurized canister. Label warnings and contraindications on the OTC system are lengthy, as would be expected when making such a product available to the general public. Many of the warnings would be applicable to the use of liquid nitrogen, with additional precautions regarding flammable contents under pressure.

The applicator of the OTC system reaches a temperature minimum of -59ºC (-74ºF) and upon application reduces skin temperature to -23ºC (-9ºF).[3] Liquid nitrogen, by contrast, boils at -196ºC (-320ºF) and, upon application using a cotton swab, reduces skin temperature to -100ºC (-148ºF).[3] The OTC systems, therefore, cannot achieve the same low temperatures and rapid freeze rates of liquid nitrogen cryotherapy, but they do effect rapid freezing none-the-less. Efficacy in this case was superior to debulking alone. Under some circumstances, OTC wart removal systems may be useful as a cryotherapy adjunct to surgical removal of external masses from fish.

References and Further Reading

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