TECHNIQUE OF MANDIBULAR SALIVARY GLAND BIOPSY IN RIVER OTTERS (LUTRA CANADENSIS)


Abstract: A Franklin-Silverman biopsy needle was used to obtain 2-5- x 1-2-mm mandibular salivary gland tissue samples percutaneously from nine North American river otters (Lutra canadensis). The samples were suitable for fluorescent antibody or polymerase chain reaction rabies testing. Ninety-two percent (11/12) of the biopsy procedures yielded histologically confirmed salivary gland tissue, and the remaining biopsy yielded adipose tissue. No complications were noted after 5-21 days.

Key words: biopsy, Lutra canadensis, rabies, river otter, salivary gland.

INTRODUCTION

The North Carolina State Wildlife Resources Commission is translocating river otters (Lutra canadensis) to suitable habitats, with more than 275 river otters translocated over a recent 7-yr period. The number of animals with confirmed cases of rabies has also recently increased in North Carolina. The Centers for Disease Control and Prevention (CDC, Atlanta, Georgia 30333, USA) presently utilizes serology, virus isolation, antigen recognition, or nucleic acid detection techniques in the ante-mortem diagnosis of suspect human rabies cases. In the future, such methods could be extrapolated to other species once sensitivity and specificity resolution has taken place.

The anatomy of the river otter neck differs significantly from that of dogs and cats, and percutaneous salivary gland biopsy techniques developed in these species for obtaining salivary gland tissue for possible use in rabies testing might not work in river otters. A pilot study was therefore undertaken between 13 January 1996 and 28 February 1996 to determine if antemortem mandibular salivary gland biopsy could be reliably accomplished in wild river otters.

MATERIALS AND METHODS

The 12 otters used in the study (8 males, 4 females) were from a group of 110 otters that were being translocated from eastern North Carolina to another state. All testing was done in compliance with the North Carolina State Wildlife Resources Commission Animal Care and Use Committee. The otters were weighed and then anesthetized with an injection of ketamine hydrochloride (Ketaset, Aveco Co., Fort Dodge, Iowa 50501, USA, 10 mg/kg i.m.) combined with midazolam hydrochloride (Versed, Hoffman-LaRoche, Nutley, New Jersey 07110, USA, 0.25 mg/kg i.m.). The anesthetized animals were placed in dorsal recumbency and monitored.

The right or left mandibular salivary gland was identified under the skin by palpation and by the location of anatomic landmarks (Fig. 1). The gland was superficial to the ventral neck musculature just under the skin, midway between and slightly caudal to a line drawn between the angle of the jaw and the thyroid cartilage of the larynx (Fig. 2). The gland was grasped between the gloved thumb and index finger throughout the procedure. The area around the caudal aspect of the gland was alternately scrubbed (without clipping the hair) with a betadine solution and with alcohol for three cycles. A 1-1.5-cm skin incision was made at the caudal pole of the gland with a no. 15 scalpel blade, and the gland capsule was punctured with the scalpel tip. A sterile Franklin-Silverman soft tissue biopsy needle (Baxter Scientific, V. Mueller, Deerfield Park, Illinois 60015, USA) was inserted through the incision into the gland in a caudal-to-cranial direction and slightly medial to lateral. If insufficient tissue was obtained on the first try, a second attempt was made through the same incision. Bleeding, if present, was controlled with direct digital pressure. After biopsy, the edges of the skin incision were apposed using tissue adhesive (Nexaban®, Veterinary Product Laboratories, Phoenix, Arizona 85013, USA) applied to the epidermis.

The biopsied tissue was placed in a 2-ml cryogenic vial (Nalge Co., Rochester, New York 14601, USA) containing tissue culture medium, frozen in

252
Figure 1. Lateral view of the face and neck region of a river otter, showing in situ position of the jugular vein (arrowhead), mandibular salivary gland (closed arrow), mandibular lymph nodes (open arrows), and parotid salivary gland (P). Jugular vein, salivary glands, and lymph node lay superficial to the neck musculature and deep to the skin layers.

Figure 2. Ventral view of the neck of a river otter showing anatomical landmarks (numbers) used to locate the mandibular salivary gland for biopsy and other pertinent structures located in the biopsy region (arrows): angle of the jaw (1), thyroid cartilage of the larynx (2), mandibular salivary gland (3), parotid salivary gland (open arrow), mandibular lymph nodes (arrowheads [3]).

Liquid nitrogen, and stored at −70°C. The biopsy samples were prepared for histologic examination in a cryostatic medium, sectioned at 6 μm, and stained with hematoxylin and eosin. The stained tissue sections were examined microscopically at ×400 magnification for the presence of salivary gland tissue.

Three otters deemed unsuitable for translocation were euthanized with an i.v. overdose of ketamine and potassium chloride after biopsy.1 Anesthetic recovery in the remaining otters was uneventful. Animals were held for 5–21 days postbiopsy and observed for swelling under the jaw, difficulty in mastication, and/or behavioral changes.

RESULTS

The 12 tissue samples were 2–5 × 1–2 mm. Eleven of the samples (92%) were salivary gland tissue. One contained only adipose tissue. Very little bleeding occurred during the procedure, and all bleeding appeared to originate from the dermis. No laceration of the jugular vein was noted. Additionally, no problems that could be associated with absence of hair clipping prior to tissue sampling were recognized, and no swelling at the biopsy site or changes in mastication or behavior were noted.
DISCUSSION

The mandibular salivary gland in river otters is approximately 2.0–2.5 × 1.5–2.0 × 0.5–1.0 cm and is easily palpable. The jugular vein is dorsolateral to the mandibular gland (Figs. 1, 2) and divides into the linguofacial and maxillary veins rostral to the cranial pole of the gland, as it does in sea otters.1,2,3

In the dog, the jugular vein divides at the caudal pole of the mandibular salivary gland, and the linguofacial and maxillary veins surround the gland.1,2 Careful palpation is needed to distinguish the river otter’s mandibular salivary gland (Figs. 1, 2) from a small mandibular lymph node cranial to it.

The biopsy technique described here was effective in obtaining enough mandibular salivary gland tissue to conduct fluorescent antibody5 or polymerase chain reaction6 rabies testing, and a complete pelt was maintained in otters destined for release to the wild.

Postmortem histologic study of brain tissue remains the definitive method of rabies diagnosis.2 Otters can contract rabies,2 and rabies-infected animals must not be transported into a geographic areas where disease prevalence is low or absent. Because of the technical ease of the procedure, lack of negative effects, and consistent accuracy in yielding salivary gland tissue, mandibular salivary gland biopsy can be an effective component of a multiprocedural antemortem rabies screening protocol for river otters destined for translocation.

Acknowledgments: We thank Mary Clarke and North Carolina State University veterinary students for assistance in specimen collection. This study was funded in part by the North Carolina Zoological Park and the College of Veterinary Medicine, North Carolina State University.

LITERATURE CITED


Received for publication 21 August 1997