

## Primary Salivary Gland Adenocarcinoma in a Dog

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**Abstract :** A 17-year-old neutered male Miniature Pinscher dog presented with a mass on the left side of the submandibular region. Fine needle aspiration revealed malignant epithelial cells from the salivary gland but no evidence of metastasis was found on radiography, ultrasonography, or computed tomography. The cervical mass was surgically resected, and the histopathological examination confirmed adenocarcinoma of the mandibular salivary gland. Seven months after the initial diagnosis, the dog is alive without any clinical signs. This report describes the clinical findings, cytology, diagnostic imaging, and histopathological characteristics of a mandibular salivary gland adenocarcinoma in a Miniature Pinscher dog.

**Key words :** Adenocarcinoma, Salivary gland, Tumor, Dog.

### Introduction

In dogs, the main causes of palpable masses in the submandibular regions are sialocele, sialadenitis, or tumors such as lymphoma or salivary gland tumors. However, primary salivary gland tumors are relatively rare in dogs with a reported rate of less than 0.2% of the overall incidence among all canine tumors (1-3). Primary salivary gland tumors are more likely to be found in older dogs, and malignant tumors are more common than benign tumors. Although tumors can arise from any salivary gland, the mandibular and parotid salivary glands are the most common locations, and account for 75% to 80% of all salivary gland neoplasia (1-4). Malignant salivary tumors can metastasize to local lymph nodes; however, progression of disease is known to be relatively slow (2).

The most successful treatment is surgical removal (4). If surgery is not an option or there is concern about metastasis, chemotherapy might be considered. However, clinical application of systemic antineoplastic drug therapy is rarely reported, and its effectiveness is still unknown (2,4).

Here, we report a case of adenocarcinoma arising from the mandibular salivary gland in a Miniature Pinscher dog.

### Case

A 17-year-old castrated male Miniature Pinscher dog presented to a veterinary medical teaching hospital with a palpable mass at the base of the left submandibular region. The owner first noticed the mass 9 years ago, and the mass had been slowly growing over the past 4 years. Clinical signs such as anorexia, dysphagia, or a painful reaction when opening

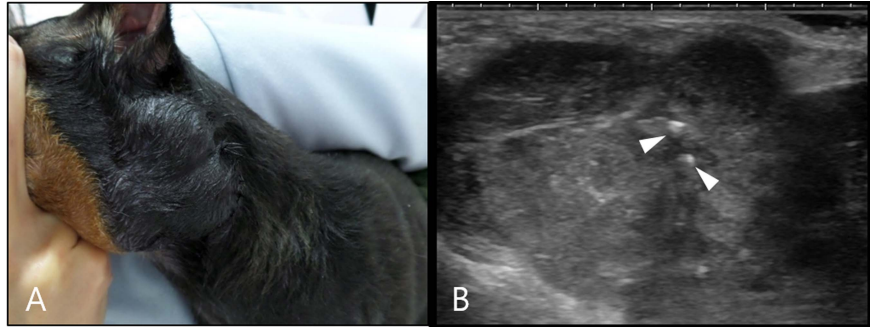
the mouth were not present.

On physical examination, three closely grouped, well-demarcated, ovoid, painless masses (each approximately 2 cm in diameter) were palpable around the left submandibular region. They were located at the base of the left ear, and rmly attached to deeper tissues (Fig 1A). However, superficial lymph nodes were not palpable.

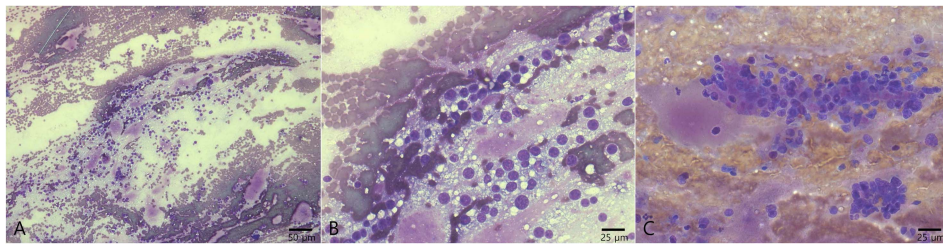
A fine needle aspiration of the mass was performed for biopsy prior to surgical excision. The fine needle aspiration was accomplished using a 22-gauge needle and a 10 ml syringe; the needle was redirected to several areas of the masses to increase the chance of obtaining a diagnostic sample. Cytological microscopic examination revealed a predominance of cohesive neoplastic epithelial cells with mucus. Marked anisocytosis and anisokaryosis, and a high nucleus-to-cytoplasm ratio were observed. The nuclei were round, deeply basophilic, with coarse chromatin and one or multiple prominent nucleoli. The background consisted of erythrocytes in rows and eosinophilic to amphophilic abundant mucus. There were also a few scattered individual round cells, neutrophils, macrophages, and plasma cells representing local inflammation. Based on the cytological findings and the location of the mass, a presumptive cytological diagnosis of salivary gland adenocarcinoma was made (Fig 2).

Abnormalities associated with paraneoplastic syndrome were not detected in the clinicopathologic examination. Further diagnostic tests including radiographs, abdominal ultrasound, and computed tomography (CT) were performed to exclude the presence of tumor metastasis. Radiographs showed an oval, opaque soft tissue mass lateral to the larynx. Ultrasonography revealed enlargement of the left submandibular gland with well-circumscribed, heterogeneous parenchymal echogenicity and hyperechoic mineral foci (Fig 1B). Dual-phase CT showed that the enlarged submandibular gland

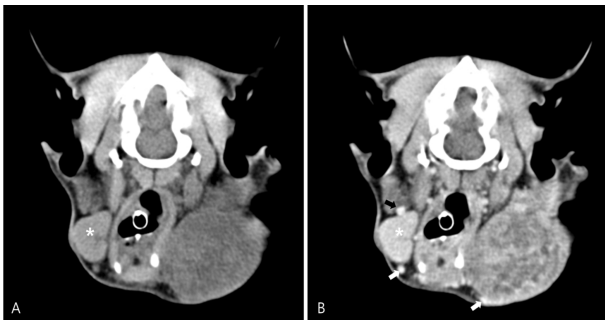
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**Fig 1.** A: Photograph of the left submandibular mass. Each mass was an approximately 2 cm in diameter, well-circumscribed ovoid, at the base of the left ear, rmly attached to deeper tissues. B: Ultrasonographic images of the submandibular gland showing an enlarged salivary gland with a well-circumscribed, heterogeneous parenchymal echogenicity and hyperechoic mineral foci (arrowhead).



**Fig 2.** Cytology of fine needle aspiration of the left submandibular mass. A: Microscopic examination revealed pleomorphic epithelial cells with eosinophilic to amphophilic mucus and windrowing erythrocytes. The cells were pleomorphic, prominent anisocytosis, and anisokaryosis. B: Dark basophilic large nuclei appeared round with coarse chromatin and one or multiple prominent nucleoli. C: Cluster cells with acinar pattern. A presumptive cytological diagnosis of salivary gland adenocarcinoma was made.



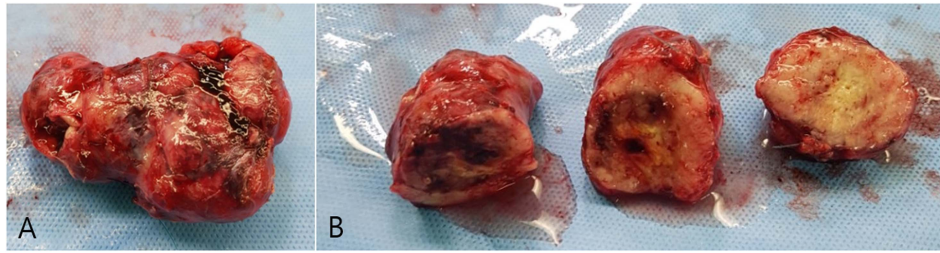
**Fig 3.** Pre-contrast (A) and post-contrast (B) transverse computed tomography images of the mandibular gland. A: The enlarged submandibular gland appeared isoattenuated to the soft tissue. B: The mass heterogeneously enhanced following contrast administration. Left linguofacial vein was compressed and the larynx was displaced by the mass on the right side. Linguofacial vein (black arrow), maxillary vein (white arrow), right submandibular gland (asterisk).

appeared isoattenuated to the soft tissue (mean attenuation value: 50 HU) within a focal hypoattenuated region and hyperattenuated foci in the pre-contrast CT images. The mass heterogeneously enhanced following contrast administration. The left maxillary vein was not visible and the left linguofacial vein was compressed immediately cranial to the bifurcation of the external jugular vein where they came in close connection to the mass. The larynx was displaced by the mass on the right side. Enlarged lymph nodes and muscular

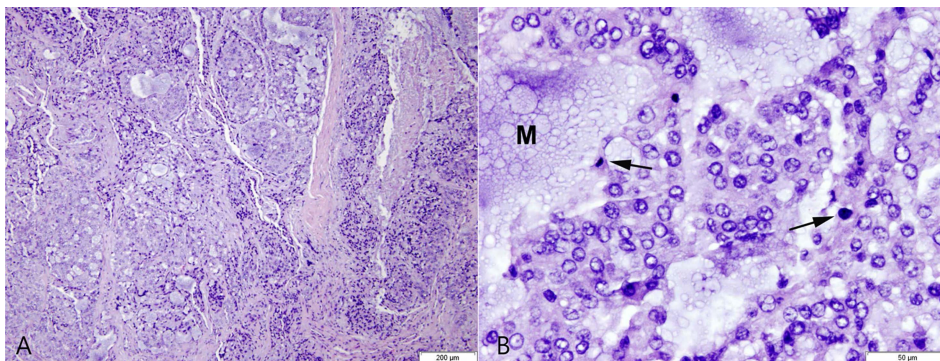
infiltrations were not noted (Fig 3) in accordance with the physical examination. These findings were suggestive of a primary submandibular gland tumor but sialadenitis could not be definitely ruled out; thus, surgical removal for histopathological examination was performed. Grossly, the mass was 7 cm in diameter, firm, and mottled in yellow and brown on cut sections (Fig 4). Histologically, the submandibular specimen contained a poorly demarcated neoplasm composed of large epithelial cells. The tumor cells were arranged in irregularly shaped and sized glands or cellular sheets in multiple lobules that were occasionally separated by fibrous stroma. The tumor cells had large round nuclei with mild to moderate pleomorphism, margination of the chromatin, a single prominent nucleolus, and eosinophilic cytoplasm with indistinct borders. Mitoses were uncommon; five mitoses were counted in 10 400 × fields. The neoplastic glands commonly contained mucinous material (Fig 5). Based upon the characteristics of the histopathologic findings, this case was diagnosed as salivary gland adenocarcinoma. Obvious clinical signs were not found, and the owner decided against additional treatment. Clinical signs completely resolved after the surgery and did not recur. The dog has remained healthy for more than 7 months.

## Discussion

Salivary gland adenocarcinoma is a rarely reported primary tumor in dogs and the carcinogenesis of salivary gland tumors is not clearly understood. Studies of environmental



**Fig 4.** Macroscopic findings of the salivary gland after surgical resection. A: The long axis of the tumor was 7 cm in diameter. B: Cross-sections of the tumor. The tumor was firm and mottled in yellow and brown on cut sections.



**Fig 5.** Histopathologic examination of salivary gland adenocarcinoma. A: The adenocarcinoma consisted of irregularly shaped and sized glands, containing mucinous material. B: The tumor cells have round nuclei with mild to moderate pleomorphism and uncommon mitoses (arrows). The glands contained mucinous material (M). H&E stain.

carcinogens in humans also have conflicting results (2).

After complete evaluation, the patient was staged as T3N0M0 by using the standard tumor-node-metastasis (TNM) staging classification (T3, the greatest dimension of mass is more than 4 cm; N0, no nodal involvement; M0, no distant metastases). According to previous reports, tumors bigger than 4 cm have poor prognosis compared with those smaller than 4 cm regardless of histological type or grade (2,5). Metastasis to nodes was identified in approximately 20% of affected dogs at presentation (2,4). The size of the tumor and nodal involvement at presentation are strong predictors of prognosis and are a useful clinical guide (5). In the present dog, the salivary gland mass was first noticed 9 years ago, and had slowly increased in size over the past 4 years. According to previous reports, the median survival time is 2 years (4); however, less than 40% of dogs with salivary tumors greater than 4 cm in size have lived beyond 5 years (5).

Successful treatment of a malignant salivary gland tumor requires surgical resection. In human medicine, careful surgical management and follow-up (5) is recommended even for the most common benign neoplasms. For invasive tumors that involve adjacent structures, complete resection can sometimes be impractical (1). The key determining factor for successful surgical outcome of a malignant salivary gland tumor is a non-invasive margin (5). In the present case, surgical resection successfully removed the tumor and the patient was able to live an improved life with extended survival time. A standard protocol for chemotherapy against a malignant salivary gland tumor has not been described in dogs, and no chemotherapy regimen has yet improved their

survival or quality of life (1-3).

In summary, adenocarcinoma is a rare form of malignant salivary gland tumor in dogs. This report describes the clinical findings, cytology, diagnostic imaging, and histopathological characteristics of a mandibular salivary gland adenocarcinoma in a Miniature Pinscher dog. In this case, complete surgical removal of the salivary gland contributed to a good quality of life.

### Acknowledgment

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