Case Report

Craniopharyngeal Duct Cysts of Paris Distalis in Beagles

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Abstract: Craniopharyngeal duct cysts were examined in two beagles. Histologically, multiple cysts of various sizes were observed in the pars distalis. They were lined with flattened, cuboidal, or columnar shaped epithelial cells, with or without cilium, whereas the cysts in rats consisted of various shaped epithelial structures, such as tubular, mucous glandular, or fusiform. Immunohistochemically, the epithelial cells of the cysts were found to express epithelial markers. The morphological findings indicated that they originated from the stomatodeum, but not that the cystic epithelia obviously differentiated into the salivary gland. (J Toxicol Pathol 2003; 16: 183–186)

Key words: craniopharyngeal duct cyst, dog, immunohistochemistry

Craniopharyngeal duct cyst may have been developed from the remnants of the distal end of the craniopharyngeal duct and occurs predominantly in the periphery of the pars distalis and the pars tuberalis¹,². Occasionally, they become large enough to exert pressure on the infundibular stalk and the hypophyseal-hypothalamic portal system, median eminence, or the pars distalis. Although the craniopharyngeal stalk seen in embryonic condition disappears normally, they are present even in adults in some species such as dogs, wild canidae, elephants, and mier-cats³. Cystic remnants of craniopharyngeal ducts were found in 53 percent of dogs of several breeds in one survey². In beagle, the incidence of pituitary cyst is 26.5% (10.5–35.1%) and might not be age-related⁴–⁸. However, the reports on immunohistochemical studies of the craniopharyngeal duct cysts in dogs have not been published. Our study investigates the histological, immunohistochemical and ultrastructural aspects of the craniopharyngeal duct cysts, in order to clarify the morphologic features of craniopharyngeal duct cysts in dogs.

Two beagles, which had cystic lesions in the pituitary glands, were used. Dog 1 (female, 7.5 kg) and Dog 2 (male, 9.6 kg) were euthanized by exsanguinations under phenobarbital at 9 and 12 months of age, respectively. They showed no clinical signs. The pituitary glands were removed, fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned at 4-µm thickness, and stained routinely with hematoxylin and eosin (HE), periodic acid-Schiff’s reaction (PAS)–alcian blue (pH 2.5), and Masson’s trichrome stains for histopathological evaluation. Immunohistochemical staining involving proliferating cell nuclear antigen (PCNA) (DAKO, Japan), S-100 protein (DAKO, Japan), cytokeratin (DAKO, Japan), glial fibrillary acidic protein (GFAP) (DAKO, Japan), and α-smooth

Fig. 1. Cysts (C: ↑) at periphery of pars distalis (D) and pars tuberalis (T) in Dog 1. Pars nervosa (N), Hypothalamus (H).
Muscle actin (DAKO, Japan) were performed according to the avidin-biotin complex (ABC) method (VECTSTAIN ABC Kit: Vector Laboratories Inc., Canada). For ultrastructural examination, the formalin-fixed tissue (Dog 1) was postfixed in 1% solution of osmium tetroxide, then dehydrated in ethanol and embedded in Epon 812. Ultrathin sections were stained with uranyl acetate and lead citrate.

Macroscopically, Dog 1 had two cysts, about 2 and 3 mm in diameter each, in the pituitary gland (Fig. 1). Dog 2 had a red nodule, about 5-mm in diameter, which incorporated in the pituitary gland.

Histologically, multiple cysts of various sizes and acinar structures were observed in the pars distalis (Dog 1) or in the pars distalis continued into the pars intermedia (Dog 2) (Fig. 2). Some of them contained eosinophilic mucous substance, which stained positively with PAS and alcian blue. The cysts were lined with single or pseudostratified, cuboidal, or columnar shaped epithelial cells with or without cilia and goblet cells in Dog 2 (Fig. 3). Epithelial cells were positive for cytokeratin in Dog 2 (Fig. 4).
slightly eosinophilic, epithelia including goblet cells, resembling the bronchial mucous membrane. The epithelial cells were flattened, cuboidal, or columnar in shape with round nuclei located at the basal side, with or without cilia (Fig. 3). The epithelial cells were transitional from one to another type. The large cysts were predominantly lined with single flattened epithelial cells, and contained PAS positive granules. Some of the cysts and acinar structures, which were surrounded by fibrous tissue, stained positively with Masson’s trichrome. Neither mitotic figures nor PCNA positive nuclei were generally seen in the cystic lesions. There were no other abnormalities in the pituitary glands. Immunohistochemically, the cuboidal or cylindrical-shaped epithelial cells were stained negatively with GFAP and $\alpha$-smooth muscle actin, and positively with S-100 protein and cytokeratin (Fig. 4). Ultrastructurally, the epithelial cells had few small microvilli at the luminal surface and rested on the basal lamina (Fig. 5). Tight junctions or desmosomes were seen at the cytoplasmic boundaries of adjoining cells (Dog 1).

In the present cases, the cystic masses generally did not compress the adjacent tissue and absence of intense proliferative activities, which suggested that they are not neoplastic growth. Nonneoplastic cystic lesions in pituitary glands are divided into craniopharyngeal duct cysts and cysts associated with pituitary dwarfism divide$^{1,2}$. The morphological findings of the cystic lesions in the present cases resembled ones of pituitary dwarfism in German shepherd dogs$^{9,10}$. However, since our cases showed neither abnormality of pars distalis nor pituitary dwarfism, they are considered to be craniopharyngeal duct cysts.

Craniopharyngeal derivatives$^{11,12}$, aberrant craniopharyngeal structures$^{13}$, or Rathke’s cleft abnormality$^{14}$, which resemble craniopharyngeal duct cysts, are known in rats. However, these cystic masses are located in the neurohypophysis or between the neurohypophysis and the pars intermedia. The primary cysts are surrounded by a cluster of small secondary cysts or aberrant epithelial structures, which consist of tubular, mucous glandular, or fusiform structure with stratified squamous epithelial cells. As compared to our cases, the morphology of these structures shows various aspects. Iwata et al. reported that the aberrant epithelial structures in rats were accompanied by myoepithelial like cells, which showed positive reactivity for $\alpha$-smooth muscle actin. Thus, craniopharyngeal derivatives might be a developmental aberration derived from the stomatodeum, which is the origin of both nasal and epithelial tissues, including parotid, palatine, labial or buccal glands, other than the Rathke's pouch$^{11}$. In the present cases, the cystic epithelia were similar to the fetal stomodeum. Immunohistochemically, they expressed epithelial marker, same as human$^{15}$ and rats$^{13}$, except S-100 protein which is considered to be a nonspecific immunohistochemical marker$^{15}$. However, fusiform-structured epithelial cells, squamous epithelial cells, or myoepithelial like cell were not observed. These morphological findings indicated that they originated from the stomatodeum, but not that the cystic epithelia obviously differentiated into salivary glands. Therefore, these epithelial structures are considered to be more undifferentiated than those in rats.

Acknowledgements: The authors thank Ms. Kaori Maejima, Mr. Atsushi Funakoshi, Mr. Yoshinori Tanaka, and Mr. Kiyoshi Kobayashi for their excellent technical assistance.
References