Case Report

A conjunctival mast cell tumor in Golden Retriever: a case report

Kornnapar Wittawaswong[1] Onrampa Supsombon[1]

Nalinee Tuntivanich[2] Orapun Jaturakan[2*]

Abstract

A high-grade mast cell tumor of the conjunctiva in the Golden Retriever is a rare condition. Wide excisional conjunctival mass biopsy is suggested, combined with chemotherapy. A 9-year-old neutered female Golden Retriever with a painless conjunctival mass at the right temporal bulbar conjunctiva was presented at the Ophthalmology Clinic of the Small Animal Teaching Hospital, Faculty of Veterinary Sciences, Chulalongkorn University. Complete physical and ophthalmic examinations were performed. The metastasis of the primary conjunctival mass was investigated by radiography of the skull, orbit, thorax, and abdomen, as well as by ultrasonography in the orbit and abdomen. No metastasis was confirmed by imaging diagnosis. A wide excisional conjunctival mass biopsy was performed under general anesthesia. The histopathological study was conducted by a veterinary pathologist, who reported a high-grade mast cell tumor. Chemotherapy was prescribed for the dog. However, the dog died three weeks after surgical treatment due to an unknown cause, with no recurrence of the conjunctival mass. This case presents the atypical nature of conjunctival mast cell tumors in Golden Retrievers, emphasizing the need for individualized and concerned clinical management to improve results in predisposed breeds.

Keywords: canine, conjunctival mass, ehrlichiosis, Golden Retriever, mast cell tumor

[1]*Ophthalmology Unit, Small Animal Teaching Hospital, Faculty of Veterinary Science, Chulalongkorn University, 10330, Thailand*

[2]*Department of Veterinary Surgery, Faculty of Veterinary Science, Chulalongkorn University, 10330, Thailand*

***Correspondence**: Orapun.j@chula.ac.th* (O. Jaturakan)

Received: June 12, 2024

Accepted: June 21, 2024

Introduction

Canine conjunctival mass is rarely reported in dogs. Previous studies of primary conjunctival mast cell tumors (MCTs) have shown them to be benign tumors without recurrence after surgical excision (Barsotti *et al*., 2007; Fife *et al*., 2011).

Canine MCTs are the most common malignant skin tumors in dogs. They originate from mast cells, which are a type of white blood cell involved in the body's immune response. Mast cells are normally found in various tissues, particularly in the skin, respiratory system, and digestive tract. MCTs can be categorized as cutaneous, mucosal, extra mucosal without skin involvement, and leukemia according to the location and tissue involvement (Willmann *et al*., 2021).

MCTs can occur in any canine breed, although certain breeds, such as Boxers, Boston Terriers, and Labrador Retrievers, may have a higher incidence (Garrett, 2014). Moreover, MCTs can affect dogs of any age but typically affect middle-aged to older dogs (Garrett, 2014). No sexual predisposition has been noticed for canine MCTs (Patnaik *et al*., 1984). These tumors can vary in appearance, ranging from small, raised skin masses to larger, ulcerated growths. MCTs may be single or multiple masses and can develop anywhere on the body. The exact cause of MCTs in dogs is unknown, but various factors have been suggested to contribute to their development. These include genetic predisposition, environmental factors, chronic inflammation, and exposure to certain chemicals or substances.

Treatment options for MCTs depend on several factors, including the grade of the tumor, its location, and the dog's overall health. Surgery is often the primary treatment and involves removing the tumor with a margin of healthy tissue (Selmic and Ruple., 2020). Based on the severity, metastasis, and grading of the MCTs, additional therapies may be required, such as radiation therapy to target any remaining cancer cells, chemotherapy to treat metastatic disease, tyrosine kinase inhibitors to treat abnormal tyrosine kinase expressions, or a combination of treatments (Macedo *et al*., 2022).

Canine conjunctival MCTs are relatively rare but can occur in dogs of any age or breed. The exact cause of these tumors is still not fully understood, but genetics and environmental factors may play a role (Ayl *et al*., 1992; Kiupel *et al*., 2005; Arendt *et al*., 2015). The common locations of ocular MCTs are the conjunctiva and the third eyelid. Clinical signs of conjunctival MCTs can vary depending on the size and location of the tumor. Some common signs include swelling or thickening of the conjunctiva, redness or irritation of the eye, discharge from the affected eye, and mass-liked lesions that may be visible on the conjunctiva. In this case report, we present the clinical and histopathological findings of a primary conjunctival mast cell tumor in a 9-year-old, neutered female Golden Retriever.

Case description

A 9-year-old, neutered female Golden Retriever presented with a swelling of the right lateral canthus. This smooth, round, pink mass-like lesion had been observed by the owner for one month with no pain in the eye. In addition, the dog had been raised in a closed system.

The dog had a pink mucous membrane, normal hydration status, and normal heartbeat and lung sound. Rectal temperature was 102°F. Her body weight was 30 kg, and her body condition score was 3/5. Ophthalmic examinations, including the Schirmer tear test, intraocular pressure (IOP), and neuro-ophthalmic examination, were evaluated by a board-certified ophthalmologist. The size of the mass at the right lateral conjunctival canthus was 3 × 4 mm without corneal invasion.

Ocular ultrasonography was performed prior to surgery to locate the involvement and invasion of masses behind the globe. A normal retrobulbar region was confirmed for both eyes. Blood collection was performed for a complete blood count, serum chemistry, total protein, and albumin. Importantly, the dog had normal blood profiles but a positive result with *Ehrlichia canis* using SNAP 4Dx

The dog was premedicated with acepromazine (0.03 mg/kg) and morphine (0.3 mg/kg) intramuscularly, inducted with propofol (4 mg/kg) intravenously (IV), and maintained with isoflurane 2% via intubation. Subsequently, cefazolin (20 mg/kg IV) and caprofen (4.4 mg/kg, subcutaneously) were prescribed for antibiotic prophylaxis and to control inflammation, respectively.

Surgical removal of the masses was performed using sterile techniques. (Figures 1A–1D). The conjunctival mass was dissected gently to avoid surrounding tissue trauma and prevent tumor contamination (Figure 1B). The conjunctiva was then sutured with Vicryl 7/0 using a simple interrupted pattern for conjunctival wound closure (Figure 1D). A right subconjunctival mass with a diameter of 3 × 4 mm was preserved in 10% formalin and transferred to the pathology unit for histopathological examination (Figure 1C).

Postoperative management included topical antibiotics (ofloxacin eyedrops, every 3 hours), systemic antibiotics (doxycycline, 10 mg/kg per oral, once daily), and systemic NSAIDs (caprofen, 2.2 mg/kg, per oral, once daily) were prescribed. One day after surgery, the conjunctiva showed mild swelling, but the dog had a normal response to ophthalmic examination and no clinical signs of pain. Nine days later, chemotherapy with a vinblastine, prednisolone, and cyclophosphamide (VPC) protocol was prescribed for the dog following the biopsy result showing high-grade MCTs. Thereafter, the dog died due to an unknown cause three weeks later.

Histopathological lesions from the right conjunctival mass, size 3 × 4 mm, were examined under a light microscope by a veterinary pathologist using high-power fields (HPFs) (×40 magnification). The MCTs prognostic panel, the Kiupel system, was used to describe the grading information for the tumor as low-grade and high-grade mast cell tumor (MCT) (Kiupel and Camus, 2019). The grading criteria for MCTs include the number of cell morphology, nuclear morphology, karyomegaly, and mitotic figures per HPFs. Therefore, the histopathologic results in this study showed poorly circumscribed, highly cellular

proliferation of neoplastic mast cells (Figure 2). The neoplastic cells were arranged in sheets supported by small amounts of collagenous stroma. These cells were round to polygonal, had distinct cell borders, and contained abundant amphophilic cytoplasm with numerous fine basophilic intracytoplasmic granules. The nuclei were round to oval, finely to coarsely stippled, and contained one to three small nucleoli. Anisocytosis and anisokaryosis were moderate. The histopathological final diagnosis was high-grade MCT.

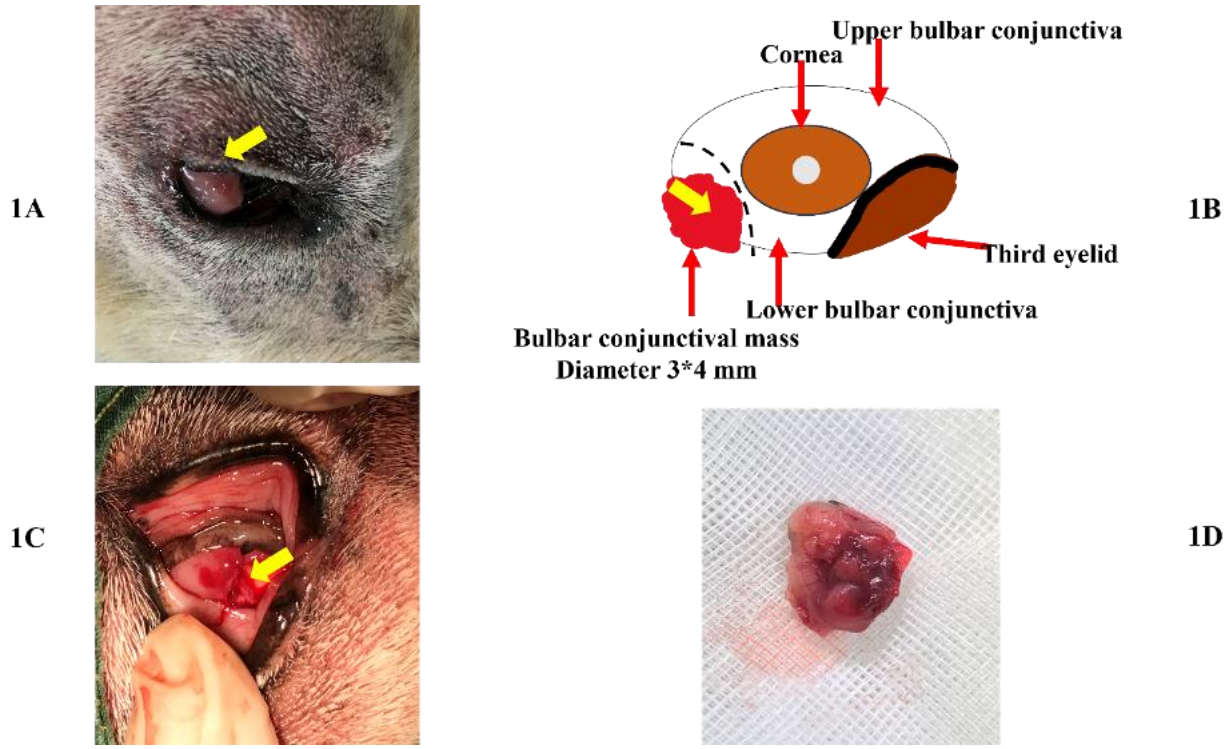

Figure 1 Lower bulbar conjunctival MCT mass in the right eye (1A). Schematic of the excision mass biopsy area (dashed line) (1B). Bulbar conjunctiva after removing the MCT mass (1C). Conjunctival mass surrounded by conjunctival tissue after excisional biopsy (1D). The yellow arrows show the location of the conjunctival MCT mass.

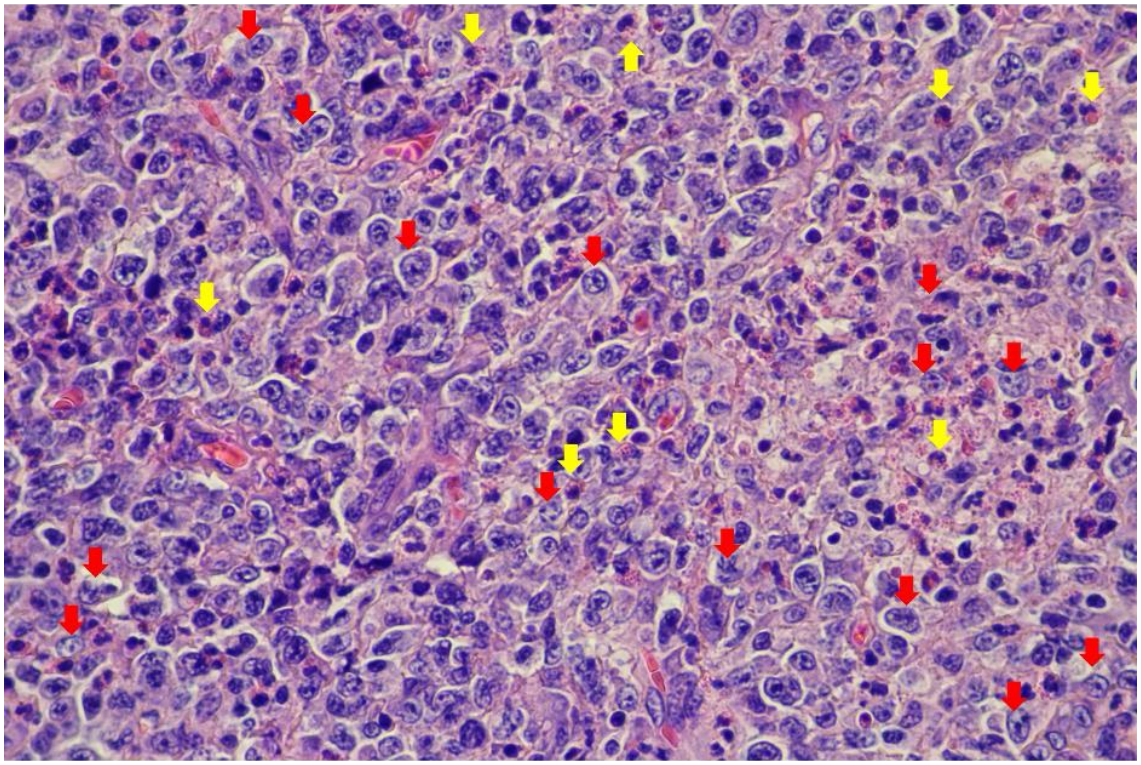

Figure 2 The histopathological examination of the high-grade MCT revealed round cells with granules. There are more than 7 mitotic figures in 1 HPFs of the right conjunctival tissue (×40, magnification). The yellow arrows indicate the numerous mast cells per HPFs, and the red arrows identify a lot of neoplastic cells with mitotic figures, karyomegaly, or bizarre nuclei.

Discussion

To our knowledge, there are limited case reports of canine primary conjunctival MCT in a Golden Retriever dog. Commonly, conjunctival MCTs have been reported to be histopathologically and clinically benign (Fife *et al*., 2011). However, in this case report, we found that the mass was clinically aggressive and showed rapid progression with a high-grade tumor score using the Kiupel criteria (Kiupel and Camus, 2019). High-grade MCTs can be identified by meeting any one of the following criteria: (1) at least 7 mitotic figures in 10 HPFs; (2) at least 3 multinucleated cells (with 3 or more nuclei) in 10 HPFs; (3) at least 3 cells with abnormal nuclei in 10 HPFs; or (4) karyomegaly, where the nuclear diameters of at least 10% of the neoplastic cells differ by at least 2 times (Kiupel and Camus, 2019). Additionally, one retrospective study found that a female neutered Golden Retriever had a low-grade conjunctival MCT by using the Kiupel criteria (Fischer *et al*., 2023). Surgical resection with a wide margin was the appropriate treatment and diagnosis for the present case. The high grade was interpreted from the biopsy report. The treatment plan for the dog in the present study was prescribed by an oncology clinic due to the results of the biopsy showing high-grade MCTs. However, the dog died three weeks after receiving a combination chemotherapy VPC protocol. Previous reports have demonstrated that a VPC protocol could be prescribed for high-grade or high-risk metastasis MCTs in dogs (Camps-Palau *et al*., 2007). It has been found that a VPC protocol had a lower recurrence, better response, and lower self-limitation toxicity when compared with other chemotherapy protocols for progressive MCTs (Davies *et al*., 2004). However, the dog in this case report died three weeks after receiving the first VPC protocol with unknown cause. Old age, *Ehrlichia canis*, and chemotherapy may have been involved in the death of this dog.

It is noteworthy that the dog did not show any metastasis after surgery; this was confirmed by radiography and ultrasonography of the thorax and abdomen, respectively. The metastasis of MCTs is generally monitored by radiography of both lungs and abdominal organs. The organs that are frequently reported to be infiltrated with mast cells include the spleen, skin, liver, kidneys, bone marrow, and heart (Macy, 1985). No computed tomography scan of the head and skull region was performed to evaluate potential regional lymph node involvement. We suggest that conjunctival MCTs should be evaluated for the presence of regional lymph node involvement to ensure a complete prognosis in patients.

The prognosis for canine MCTs can vary widely depending on various factors, including tumor grade, location, the presence of metastasis, and success of treatment. Some low-grade MCTs can be effectively cured by removal, including a clean surgical margin alone, whereas high-grade tumors can be more challenging to manage and have a poorer prognosis.

Secondary complications or paraneoplastic syndromes of MCTs can occur resulting from histamine, heparin, eosinophil chemotactic factor, and proteolytic enzymes (Patnaik *et al*., 1984). Furthermore, ocular MCTs, inflammation, and secondary glaucoma should be monitored after surgery.

We concluded that precise clinical management, including identification of the presence of primary or secondary MCTs, staging MCTs as described in previous reports (Kiupel and Camus, 2019; Selmic and Ruple, 2020), metastasis check-up, treatment plan, and follow-up plan should be evaluated to improve the outcome for affected dogs. Moreover, dog breeds that are predisposed to MCTs should be considered for early diagnostic procedures to reduce the severity of this tumor.

Acknowledgments

The authors would like to thank all staff from the Ophthalmology Unit, Small Animal Teaching Hospital, Faculty of Veterinary Science, Chulalongkorn University for their support throughout the study period. We are sincerely grateful for the histopathological information from the Department of Pathology, Faculty of Veterinary Science, Chulalongkorn University.

References

Arendt ML, Melin M, Tonomura N, Koltookian M, Courtay-Cahen C, Flindall N, Bass J, Boerkamp K, Megquir K, Youell L, Murphy S, McCarthy C, London C, Rutteman GR, Starkey M and Lindblad-Toh K 2015. Genome-Wide Association Study of Golden Retrievers Identifies Germ-Line Risk Factors Predisposing to Mast Cell Tumours. PLoS Genet. 20(11): 1-21.

Ayl RD, Couto CG, Hammer AS, Weisbrode S, Ericson JG and Mathes L 1992. Correlation of DNA ploidy to tumor histologic grade, clinical variables, and survival in dogs with mast cell tumors. Vet Pathol. 29(5): 386-390.

Barsotti G, Marchetti V and Abramo F 2007. Primary conjunctival mast cell tumor in a Labrador Retriever. Vet Ophthalmol. 10(1): 60-64.

Camps-Palau MA, Leibman NF, Elmslie R, Lana SE, Plaza S, McKnight MJ, Risbon R and Bergman PJ 2007. Treatment of canine mast cell tumours with vinblastine, cyclophosphamide and prednisone: 35 cases (1997 – 2004). Vet Comp Oncol. 5(3): 156-167.

Davies DR, Wyatt KM, Jardine JE, Robertson ID and Irwin PJ 2004. Vinblastine and prednisolone as adjunctive therapy for canine cutaneous mast cell tumors. J Am Anim Hosp Assoc. 40(2): 124-130.

Fife M, Blocker T, Fife T, Dubielzig RR and Dunn K 2011. Canine conjunctival mast cell tumors: a retrospective study. Vet Ophthalmol. 14(3): 153-160.

Fischer BM, Kessler M and Braus BK 2024. Eyelid and conjunctival mast cell tumors: A retrospective study of 26 dogs and 8 cats. Vet Ophthalmol. 27(3): 256-265.

Garrett LD 2014. Canine mast cell tumors: diagnosis, treatment, and prognosis. Vet Med. 5: 49-58.

Kiupel M and Camus M 2019. Diagnosis and Prognosis of Canine Cutaneous Mast Cell Tumors. Vet Clin North Am Small Anim Pract. 49(5): 819-836.

Kiupel M, Webster JD, Miller RA and Kaneene JB 2005. Impact of tumour depth, tumour location and

multiple synchronous masses on the prognosis of canine cutaneous mast cell tumours. J Vet Med A Physiol Pathol Clin Med. 52(6): 280-286.

Macedo TR, de Queiroz GF, Casagrande TAC, Alexandre PA, Brandão PE, Fukumasu H, Melo SR, Dagli MLZ, Pinto ACBCF and Matera JM 2022. Imatinib Mesylate for the Treatment of Canine Mast Cell Tumors: Assessment of the Response and Adverse Events in Comparison with the Conventional Therapy with Vinblastine and Prednisone. Cells. 11(3): 1-12.

Macy DW 1985. Canine mast cell tumors. Vet Clin North Am Small Anim Pract. 15(4): 783-803.

Patnaik AK, Ehler WJ and MacEwen EG 1984. Canine cutaneous mast cell tumor: morphologic grading and survival time in 83 dogs. Vet Pathol. 21(5): 469-474.

Selmic LE and Ruple A. 2020. A systematic review of surgical margins utilized for removal of cutaneous mast cell tumors in dogs. BMC Vet Res. 16(1): 1-6.

Willmann M, Yuzbasiyan-Gurkan V, Marconato L, Dacasto M, Hadzijusufovic E, Hermine O, Sadovnik I, Gamperl S, Schneeweiss-Gleixner M, Gleixner KV, Böhm T, Peter B, Eisenwort G, Moriggl R, Li Z, Jawhar M, Sotlar K, Jensen-Jarolim E, Sexl V, Horny HP, Galli SJ, Arock M, Vail DM, Kiupel M and Valent P 2021. Proposed Diagnostic Criteria and Classification of Canine Mast Cell Neoplasms: A Consensus Proposal. Front Vet Sci. 10(8): 1-10.