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Sebaceous Adenoma in a Geriatric Poodle Dog: A Case Report

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Abstract

A 14-year-old black male Poodle was brought to the Animal Teaching Hospital, Udayana University by its owner with clinical signs of frequent licking of its left front paw. Upon examination, red bumps were observed on the left front leg, accompanied by small, round black spots scattered on the dorsal side of the body. Additionally, black nodules were present on the lower eyelids and hind limbs. Surgical intervention was undertaken to excise the tumor mass, with the animal under anesthesia induced by ketamine at 5 mg/kg BW intravenously. The reddish nodule was excised by performing an elliptical incision at the base of tumor. Postoperatively, the animal received an antibacterial injection comprising ceftriaxone and tazobactam at 25 mg/kg BW intramuscularly and antiseptic wound dressing for supportive care. Microscopic examination revealed neoplastic cells arranged into lobules of varying sizes and shapes within the tumor mass. These lobules consisted of differentiated sebocytes and basaloid cells. At the periphery of the neoplastic lobules, the basaloid cells displayed several layers and exhibited invasion with moderate anisocytosis. The mitotic index was no more than ten cells in one field of view. Based on these histopathological features, the tumor was confirmed to be a sebaceous adenoma. After a 10-month follow-up period, there were no signs of tumor recurrence observed.

Keywords: dog, histopathology examination, sebaceous adenoma

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INTRODUCTION

The skin, covering most of the body's surface, is a complex structure consisting of epithelium, mesenchymal tissue, and local defense cells crucial for maintaining homeostasis and protecting against external factors (Villamil *et al*., 2011; Graf *et al*., 2018). It is also directly exposed to chemicals, radiation, and physical influences from the external environment, which can lead to the development of both benign and malignant skin growths in dogs and cats (Todorova, 2006; Gross *et al*., 2008).

Skin tumors are more commonly observed in dogs than in cats. However, the incidence of malignant skin tumors is higher in cats compared to dogs (Gross *et al*., 2008; MacDonald *et al*., 2008). Among dogs, sebaceous gland tumors account for the most common glandular tumors, with a prevalence of 21.35% among all skin epithelial tumors (Scott and Anderson, 1990; Vail and Withrow, 2007). These tumors can occur anywhere on a dog's skin surface. Other types of skin tumors reported in dogs include basal cell tumors (epithelial origin), trichoblastoma and trichoepithelioma (adnexal differentiation), papilloma and basosquamous carcinoma (epidermal origin), apocrine adenoma and apocrine adenocarcinoma (apocrine gland origin), melanoma (melanocytic origin), sebaceous adenoma, sebaceous epithelioma, and sebaceous carcinoma (sebaceous glands tumor) (Pakhrin *et al*., 2007; Simkus *et al*., 2015).

Sebaceous glands play a role in secreting sebum to coat the fur and skin surfaces of animals (Vail and Withrow, 2007; Amaravathi *et al*., 2017). Tumors in the sebaceous glands can exhibit various shapes, including dome shapes, papules, or nodules (Yoon and Park, 2016). They may occur either as solitary growths or scattered

over the body surface. Previous reports have documented the occurrence of these tumors in dogs ranging from 4 months to 16 years of age. The most common locations for these tumors include the head, neck, extremities, tail, anus, and perianal area (Pakhrin *et al*., 2007; Kartikasari *et al*., 2020). Several retrospective studies have been conducted to determine the epidemiology of skin tumors in dogs. These studies vary in terms of sample size, study population, geographical area evaluated, and the quality of the analysis results (Graf *et al*., 2018; Kok *et al*., 2019; Moraes *et al*., 2009).

The diagnosis of sebaceous gland tumors is typically based on cytological examination, followed by the collection of tissue samples for microscopic analysis (Sananmuang *et al*., 2016; Triana *et al*., 2020; Sewoyo and Nainggolan, 2023). The characterization of sebaceous adenoma, sebaceous hyperplasia, sebaceous epithelioma, and sebaceous adenocarcinoma depends on factors such as structure, cell composition, and malignancy indicators like the mitotic index and the level of cell or nucleus atypia (Ozyigit *et al*., 2005; Lazar *et al*., 2007; Azevedo *et al*., 2009). Treatment usually involves surgical excision to remove the mass. Previous reports have indicated that this procedure is generally successful, with low recurrence rates (Sananmuang *et al*., 2016; Parmar *et al*., 2019; Dong *et al*., 2021; Rickyawan *et al*., 2021). Additionally, Angileri *et al*. (2019) have suggested that cryotherapy can also reduce the size of tumors in dogs with sebaceous adenomas.

Dogs are susceptible to tumors and carcinomas, as evidenced by numerous reports from studies worldwide. Demographic studies conducted over the last two decades reveal that more than 74,000 dogs in America suffer from neoplastic diseases, making them the most common cause of death in dogs over the age of 1 year (Biller *et al*., 2016). While adenocarcinomas are commonly reported in dogs, with prevalence ranging from 10% to 18% in organs such as the colon, kidney, rectum, mammary glands, and lymph nodes (Todorova, 2006). This case study reported sebaceous adenoma of the skin in a geriatric poodle dog and discusses the therapeutic outcome following surgical excision with post-operative care.

MATERIALS AND METHODS

Ethical Approval

This study did not require ethical approval because it aimed to reduce animal suffering.

Study Period and Location

A 14-year-old geriatric dog presented to the Animal Teaching Hospital, Udayana University, Indonesia. The study period, including the observation and monitoring, spanned ten months.

Signalments, Anamnesis, and History

The dog was a male poodle with a black coat, weighing approximately ± 20 kg, with a rectal temperature of 38.5°C and a heart rate of 105 beats per minute. The dog had already received several vaccinations against various infectious diseases prevalent in this area, and routine ectoparasite control had been administered. The owner reported that the dog maintained a normal appetite, and there were no signs of vomiting or diarrhea. Previously, the dog has been treated with the administration of antibiotics and anti-inflammatories, with no observed changes in the skin lesions. The dog exhibited clinical signs of frequently licking his left front paw.

Clinical Examinations

Based on clinical examination, the dog had normal mucous membranes, indicated by a pink color. Stool samples did not indicate diarrhea or intestinal parasite infection. Palpation of the lymph nodes revealed slight enlargement in a prescapular lymph node. There was no bladder distention, and the penis appeared normal. During the integumentary evaluation, a reddish nodular tumor mass, measuring 2.2 × 3.3 × 2.7 cm (width × length × height) with a moderate to hard consistency, was identified on the left forefoot. Small, round, black spots scattered on the dorsal side and similar spots were also observed on eyelids and hind limbs. Subsequently, the veterinarian decided to perform surgical excision to remove the tumor mass.

Surgical Tumor Mass Removal

The dog was given pre-anesthesia with atropine sulfate at 0.04 mg/kg BW subcutaneously. Then, fluid therapy with Ringer's lactate was administered to maintain hydration during the surgical process. General anesthesia was induced using ketamine HCl (Keta-A-100®, Agrovet SA, Lima, Peru) at 5 mg/kg BW given intravenously slowly. The surgical area was prepared aseptically. The nodular mass was then excised by making an elliptical incision at the base of tumor. The surgical wound on the skin was closed with interrupted sutures using non-absorbable suture nylon 2.0. The next day, post-operative care was administered by injecting antibacterial ceftriaxone and tazobactam (Intacef Tazo®, Intas Pharmaceuticals Ltd., Ahmedabad, India) at 25 mg/kg BW intramuscularly once a day for 5 days, along with antiseptic wound dressing at the tumor site, changed daily until the healing was evident. The wound stitches were removed on the 12th day post-surgery.

Histological Examination

The tumor mass was excised into 1 × 1 × 1 cm dimensions and placed in a container containing 10% neutral-buffered formalin. The sample was further processed for routine histological preparation and stained using Hematoxylin Eosin (HE), subsequently sent to a veterinary pathologist to confirm the diagnosis.

RESULTS AND DISCUSSION

Upon microscopic examination, neoplastic cells were found arranged into lobules of varying sizes. Within these lobules, the tumor mass consisted of differentiated sebocytes and basaloid cells. In the cytoplasm of neoplastic sebocytes, numerous vacuoles were observed, accompanied by clear cell boundaries. The nuclei were globular and contained 1–2 nucleoli. At the periphery of the neoplastic lobules, the basaloid cells appeared multilayered and exhibited invasiveness with moderate anisocytosis. The mitotic index revealed no more than ten cells per field of view. No necrosis or inflammatory cell infiltration was observed in the neoplastic area. The reddish nodular formations on the feet and their microscopic findings are depicted in Figure 1. No new tumor growth or secondary infection was observed during the ten-month observation period following tumor surgery.

This study reports the incidence of sebaceous adenoma in a 14-year-old black Poodle. Previous reports have also documented the occurrence of sebaceous adenoma in 14-year-old male Cocker Spaniel dogs (Ozygit *et al*., 2005). Cases of sebaceous adenomas have been reported in dogs ranging from 4 months to 16 years of age (Pakhrin *et al*., 2007). Sabattini *et al*. (2015) reported that the average age of dogs with sebaceous gland tumors was 12 years, falling within the range of 7–12 years. In our study, we also found that the most common dog breeds affected were Cocker Spaniels (n = 4), Labrador Retrievers (n = 3), and Siberian Huskies (n = 3). These breeds were associated with the tumor's location on the head (36.7%), eyelids (26.7%), lips (16.7%), body (13.3%), and extremities (6.6%).

Similar results were obtained by Patel *et al*. (2019), who reported that the highest incidence of dogs with sebaceous gland tumors occurred in the 9–12-year-old group (39.13%), followed by the 5–8-year-old and 1–4-year-old groups (30.43%). Regarding the incidence based on breed, Labrador Retrievers had the highest incidence (34.78%), followed by Pomeranians and dogs with non-specific breed descriptions (13.04%). Bull Mastiffs accounted for 8.69%, and other breeds represented 4.34% of the cases.

The incidence of benign skin tumors in dogs is ten times higher than in cats, whereas malignant tumors in cats are significantly higher, accounting for approximately 75%, compared to dogs, which range from 25% to 35% (Warland and Dobson, 2011). The most common skin tumor in dogs, as identified through histopathological examination, is sebaceous adenoma, with a prevalence of approximately 37.74% (20/53), followed by sebaceous hyperplasia at 32.08% (17/53), sebaceous carcinoma at 16.98% (9/53), and the least common being sebaceous epithelioma at 13.21% (7/53) of the samples studied (Costa *et al*., 2020). The results of the current study

conducted in northern Portugal revealed that benign skin tumors in dogs had a prevalence of 62.9%, with sebaceous tumors accounting for 8.1% of the cases, with 8.6% of them located on the forelegs (Martins *et al*., 2022).

Regarding the etiology, reports are linking the occurrence of sebaceous adenomas with decreased estrogen and progesterone receptors (Ginel *et al*., 2010). However, this relationship may not apply to dogs that have never been castrated. This observation underscores the connection between sex hormones and neoplasms, as fluctuating hormone levels can influence tumor growth (Queiroga *et al*., 2009). When these hormones bind to specific receptors in the hepatoid gland, they can stimulate the process of carcinogenesis. This phenomenon is supported by several studies demonstrating an increased percentage of estrogen and progesterone receptor expression in proliferative cells compared to healthy glandular tissue (Pisani *et al*., 2006; Tozan *et al*., 2005). Furthermore, studies indicate that the administration of estrogen-based formulas can partially or completely suppress the growth of perianal adenomas in castrated dogs (Tozon *et al*., 2010).

In contrast, in humans, the incidence of sebaceous adenoma is associated with Muir-Torre syndrome (MTS) (Flux, 2017). MTS is an autosomal dominant genodermatosis characterized by DNA mismatch repair (MMR) mutations (Cohen *et al*., 1991; Singh *et al*., 2008). Genes encoding DNA MMR enzymes, such as MLH1, MSH2, MSH3, MLH3, MSH6, PMS1, and PMS2 (Singh *et al*., 2008), are involved. The accumulation of errors in the DNA microsatellite regions triggers DNA instability, characterized by the development of sebaceous tumors and internal malignancies (Singh *et al*., 2008).

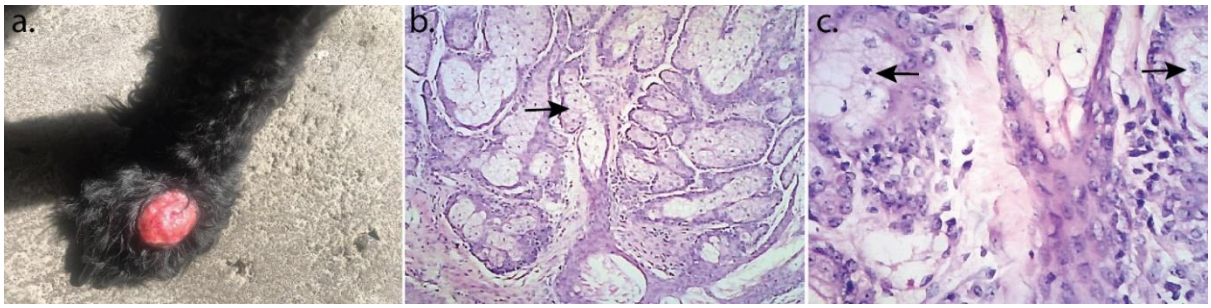

Figure 1. (a) Reddish nodular mass on the left forefoot, (b) Photomicrograph revealed neoplastic lobules with various shapes and sizes (→), (c) Sebocytes and basaloid cells with moderate anisocytosis (→), along with a mitotic index of no more than ten cells in one field of view.

There are microscopic differences between the sebaceous adenoma in this case and sebaceous hyperplasia, sebaceous epithelioma, and sebaceous adenocarcinoma as reported by several previous studies. In this case, we observed the formation of sebaceous glands with various shapes and sizes. The tumor cells consist of sebocytes and basaloid cells. The cytoplasm of the sebocytes appears vacuolated with non-uniform nuclei, while the basaloid cells exhibit moderate anisocytosis. In sebaceous hyperplasia, gland enlargement is noted, accompanied by mature sebocytes with uniform cytoplasm and nuclei. In sebaceous epithelioma, the tumor cells are basaloid cells with hyperchromatic nuclei and visible mitoses. The lobules are separated from each other by the proliferation of connective tissue. Some of the neoplastic cells exhibit foamy cytoplasm with large nuclei. Sebaceous adenocarcinoma is characterized by neoplastic cells displaying anisocytosis and anisokaryosis, accompanied by mitotic activity (Yoon and Park, 2016; Amaravathi *et al*., 2017; Patel *et al*., 2019). Surgical excision in dogs with sebaceous adenoma is considered the best option, as evidenced by the absence of complications and the absence of new tumor growth on the skin surface following post-operative care. This finding aligns closely with the study by Sananmuang *et al*. (2016), with the main difference being the duration of observation time after surgery.

CONCLUSION

This study reported the occurrence of sebaceous adenoma in Poodle dogs, which is exceptionally rare. The diagnosis was established through histopathological examination, revealing several neoplastic lobules containing sebocytes and basaloid cells. The surgical excision, combined with appropriate postoperative care involving antibacterial ceftriaxone and tazobactam administration and antiseptic wound dressing, proved effective in removing the tumor mass without any signs of complications. Following a 10-month follow-up period, no tumor recurrence was evident, and no complications were observed.

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AUTHORS' CONTRIBUTIONS

IBOW: Conceptualization, Writing - Original Draft, Investigation. AAAMA: Conceptualization, Supervision, Validation. LMS: Formal Analysis; Methodology. IMM: Resources; Project administration; Formal Analysis. PHS: Data Curation; Methodology. IGAGPP: Investigation; Data Curation. PSS: Writing - Review and Editing, Visualization. All authors have read, reviewed, and approved the final manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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