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Case Study

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Cutaneous Melanoma in a 13-Year-Old Persian Cat: A Case Study

Afif Muhammad Akrom[1], Sitarina Widyarini[1*], Jeffi Candra Ajiguna[2], Retno Merlangen[2]

[1]Department of Pathology, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Yogyakarta, Indonesia
[2]Vet Call Animal Clinic, Yogyakarta, Indonesia

*Corresponding author: sitarina@ugm.ac.id

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ABSTRACT

Background: Melanoma in cats is a rare neoplastic condition, most commonly affecting the ears and skin of the head. Due to its low incidence, detailed clinicopathological reports are important to support accurate diagnosis and understanding of this disease in feline patients.

Aims: This case report aimed to describe the clinical presentation, histopathological features, and immunohistochemical findings of melanoma in a domestic cat.

Methods: A 13-year-old male tabby Persian cat was presented to a veterinary clinic in Yogyakarta with a solitary cutaneous nodule measuring approximately 2 cm. Surgical excision of the mass was performed, and the tissue was fixed in 10% neutral buffered formalin. Histopathological examination was conducted using routine microscopic evaluation. Immunohistochemical staining was performed using anti-melan-A antibodies to confirm the melanocytic origin of the tumor.

Results: Microscopic examination revealed neoplastic melanocytes containing abundant melanin within the cytoplasm and surrounding tissue. The tumor cells were pleomorphic, exhibited large nuclei, and formed multiple nests separated by fibrovascular stroma within the epidermis. Areas of intratumoral necrosis were also observed. Immunohistochemical staining demonstrated a positive immunoreactive response to anti-melan-A, supporting the diagnosis.

Conclusion: Based on histopathological and immunohistochemical findings, the cutaneous mass was diagnosed as melanoma. This case highlights the importance of histopathology and immunohistochemistry in confirming feline melanoma.

INTRODUCTION

The body's primary barrier against external factors is the skin, which is therefore continuously exposed to radiation, chemicals, and physical influences from the environment that can cause tumors to grow (Todorova, 2006; Gross et al., 2008; Dumitras et al., 2019). Skin tumors are the most common and easiest to diagnose in domestic animals, as abnormalities in the skin are easily visible to owners, who then promptly take their pets to the veterinarian (Meuten, 2017; Dumitras et al., 2019).

Melanocytic tumors are common tumors in dogs and humans. These tumors originate from melanocytes, cells that synthesize melanin or its precursor, melanoblasts (Chamel et al., 2017; Contel et al., 2024). The incidence of melanocytic tumors in cats is very infrequently compared to dogs and humans (Luna et al., 2000; Munday et al., 2011; Polton et al., 2024). The incidence is only 0.8 to 7.0% of all skin tumors and less than 1% of all cancers diagnosed in cats (Miller et al., 1993; Chamel et al., 2017; Van der Wayden et al., 2020).

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Melanocytic tumors generally appear on hairy skin, such as on the head, extremities, and digits, and in dogs, they have a predilection for the head and scrotum (Meuten, 2017; Dumitras et al., 2019). In cats, the most common sites for melanocytic tumors are the skin, specifically the back, neck, lips, eyelids, and pinna, and they can also occur in the oral cavity (Meuten, 2017; Dumitras et al., 2019; Polton et al., 2024). Macroscopically, melanocytic tumor lesions cannot distinguish between benign and malignant lesions because the lesions are very similar (Meuten, 2017; Dumitras, 2019). Small black or brown masses are the most common, although lesions can be large, flat, wavy, or multiple (Proteau & Andre, 2019; Bergman et al., 2020; Polton et al., 2024).

Histopathologically, neoplastic cells in melanoma may appear as single cells or small clusters in the basal layer of the epidermis, with larger and more prominent nuclei than neoplastic cells in melanocytoma. In addition, mitosis is more frequently observed (Meuten, 2017). In the dermis, pleomorphic and anaplastic melanocytes are often found, which can be epithelioid, polygonal, or fusiform in shape (Mueten, 2017).

This case study describes a 13-year-old Persian male cat with skin melanoma. Diagnosis of skin melanoma is established by histopathological examination using Hematoxylin and Eosin (HE) staining and immunohistochemical staining with anti-Melan A antibodies. The findings of this case study may serve as a valuable reference for veterinarians and researchers in diagnosing, understanding, and providing additional information related to cutaneous melanoma in cats.

CASE STUDY

Signalement and Anamnese

A 13-year-old Persian male cat with tabby coloring was brought to the Vet Call Yogyakarta animal clinic on November 14th, 2024, complaining of a lump on the skin of the face. According to the owner, a small lump had been present on the skin of the caudo-lateral palpebra dexter since July 2024 (Figure 1). By November 2024, the lump had grown larger. The cat's appetite and water intake were normal, with no vomiting or diarrhea. The cat has been routinely vaccinated, dewormed, and treated with an antiparasitic agent if ectoparasites are found.

Tumor Mass Removal Procedure

Tumor mass removal surgery was performed under general anesthesia with preanesthetic medication using atropine sulfate at a dose of 0,03 mg/Kg BW. Fifteen minutes after preanesthetic medication, general anesthesia was administered intramuscularly. The anesthetic used is a combination of ketamine and acepromazine at doses of 5 mg/kg BW and 0,1 mg/Kg BW, respectively. Excision was performed by making an incision in the area of the skin of the caudo-lateral palpebra dexter, where the suspected tumor mass was located, down to the subcutaneous depth. The subcutaneous area was prepared to expose the entire mass, and the tumor mass was excised. After the tumor mass was removed, the area was flushed with a 0.9% sodium chloride infusion solution. The incision wound was sutured using a simple interrupted technique with plain catgut suture. The patient was given gentamicin antibiotic ointment for the wound after the operation. Prior to the mass removal operation, the owner had signed a consent letter for the procedure.

Figure 1. Nodule on the caudo-lateral palpebrae dexter.

Histopathological Examinations

Tumor mass samples were placed in plastic containers containing 10% formalin buffer. The samples were then processed at the Pathology Laboratory of the Faculty of Veterinary Medicine, Universitas Gadjah Mada, for Hematoxylin Eosin (HE) staining. Immunohistochemistry (IHC) using anti-Melan-A antibodies was performed at the Pathology Laboratory of the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada.

RESULTS AND DISCUSSION

Microscopic examination revealed the presence of melanocytes with abundant melanin pigment within the cytoplasm and around the cells (Figure 2). Intratumoral

necrosis was found in a homogeneous eosinophilic mass consisting of aggregates of neoplastic cell necrosis and melanin (Figure 2). Neoplastic cells formed numerous nests of varying sizes and were separated by fibrovascular stroma in the epidermal layer. The size of the neoplastic cells was variable or pleomorphic with large nuclei (Figure 3). Immunohistochemistry with anti-Melan-A antibodies on skin samples showed a positive immunoreactive response (Figure 4). Our findings are consistent with the microscopic appearance of a malignant melanocytic tumor/melanoma, as previously reported (Mueten, 2017; Polton et al., 2024).

Melanoma is a very rare neoplasm in cats (Luna et al., 2000; Karakurum et al., 2009; Munday et al., 2011; Meuten, 2017; Sabattini et al., 2018; Polton et al., 2024). Out of 4,808 cases of feline tumors in Italy, only 60 (1%) were melanocytic tumors, comprising 6 cases of melanocytoma and 53 cases of melanoma (Lo Giudice et al., 2024). To the best of the author's knowledge, there have been no reports of melanoma in cats in Indonesia to date. However, there have been reports of melanocytic tumors in dogs and a honey bear (Mango et al., 2016; Zaenab et al., 2017; Widyarini et al., 2022).

Melanocytic tumors can be benign (melanocytoma) or malignant (melanoma) (Meuten, 2017). Melanoma with melanocytic neoplasms cannot be distinguished solely by macroscopic changes. Macroscopic lesions of melanoma may have abundant or sparse pigmentation (Meuten, 2017). The morphology of melanocytes in melanoma can be polygonal/epithelioid, spindle-

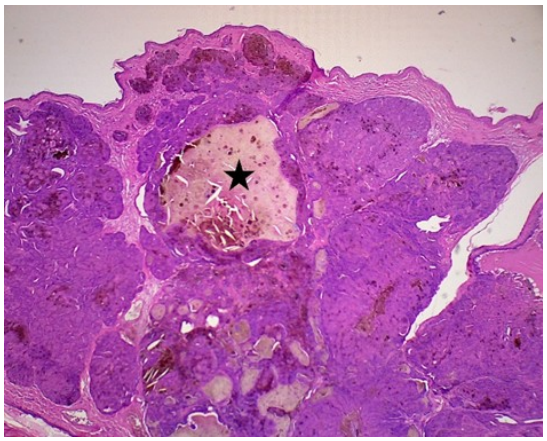

Figure 2. Intratumoral necrosis (star). This is an aggregate form of neoplastic cell necrosis and melanin (Hematoxylin & Eosin, 100X magnification).

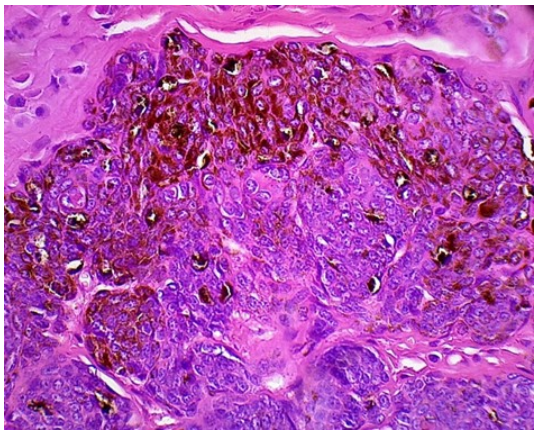

Figure 3. Pleomorphic neoplastic melanocyte with large nuclei. Some neoplastic cells contain melanin in the cytoplasm and the surrounding area (Hematoxylin & Eosin, 400X magnification).

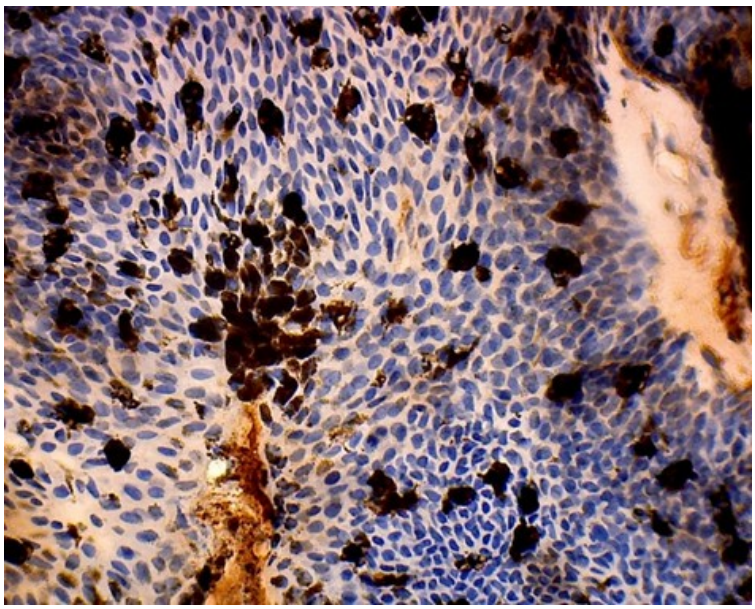

Figure 4. An immunoreactive response is observed, marked by a brownish color on the cells (IHC staining with anti-Melan-A antibody, 400x magnification).

shaped, and balloon cell variant (Meuten, 2017; Pittaway et al., 2019). The shape of melanocytes in this case is polygonal/epithelioid, where cells with various shapes are found. This shape is the most commonly found (Pittiway et al., 2019; Eroksuz et al., 2025). In melanoma, the shape of the tumor cells does not affect their biological behavior and prognosis (Meuten, 2017; Pittiway et al., 2019). However, according to Sabbatini *et al*. (2018), epithelioid morphology may be associated with less aggressive biological behavior.

Intratumoral necrosis was also observed in this case, suggesting the tumor had the potential to grow rapidly. A study by Pittiway *et al*. (2019) showed that a high mitotic rate and intratumoral necrosis may indicate faster tumor growth. Melanoma does not always contain melanin pigment around the tumor cells, but can also be amelanotic. Previous studies have shown that amelanotic melanoma has a poor prognosis (Chamel *et al*. 2017; Pittiway et al., 2019; Korkmaz, 2025), which is true not only in cats but also in dogs (Chamel *et al*. 2017).

The cat in this case was 13 years old, which is considered old. Melanocytic tumors in cats are more commonly found in older cats. A study by Chamel *et al*. (2017) that retrospectively analyzed 30 cases of non-ocular melanoma in cats found that the average age of cats with melanoma was 13.3 years (range 9-19 years). Pittaway *et al*. (2019) reported that cases of non-ocular melanocytic neoplasia primarily occur in middle-aged to elderly cats. Previous case reports also indicate melanocytic neoplasia in older cats, including a 14-year-old and a 16-year-old, and in a 15-year-old Siberian tiger (Karakurum et al., 2009; Morges and Zaks, 2010; Eckstein et al., 2020).

Although it often occurs in older cats, it doesn't rule out the possibility of happening in younger cats, as Munday *et al*. (2011) reported in a case of melanoma in an 11-month-old cat. Besides that, cats with auricular melanoma are significantly younger (Chamel *et al*. 2017). More than fifty percent of cats with auricular melanoma were younger than 10 years (Miller et al., 1993; Luna et al., 2000).

In this case, the cat's coat color is tabby, which falls into the dark color category. Dark colors are one of the predisposing factors for melanoma. Melanocytic tumors most commonly occur in cats with dark-colored hair (black or gray) (Gross et al., 2006; Dumitras et al., 2019). A study of melanocytic tumors on the nasal planum found that 8 of 10 cats had a darkly pigmented nasal planum (Reck and Kessler, 2020). Another report stated that 58 out of 78 cats with melanocytic tumors had darker coat colors (black, black and white, tabby, tabby and white, and

gray) (Pittaway et al., 2019). In cats, breed does not influence the occurrence of melanocytic tumors (Chamel et al., 2017; Dumitras et al., 2019). However, breed is a predisposing factor for melanocytic tumors in dogs (Miller et al., 2013; Withrow and Vail, 2013; Chamel et al., 2017; Polton et al., 2024).

In general, melanoma appears in the eyes, oral cavity, and skin. In dogs, melanoma most often appears in the oral cavity, followed by the skin and then the eyes (Polton et al., 2024). Unlike dogs, the proportion of melanoma in cats more often appears on the skin and is not associated with prognosis, but melanoma that appears on the mucosa is associated with a poor prognosis (Sabattini et al., 2018). The most common location for melanocytic tumors in cats is the head (Luna et al., 2000; Chamel et al., 2017; Dumitras et al., 2019; Pittiway et al., 2019), and in this case, the melanoma appeared on the caudo-lateral palpebra dexter. The tumor's location suggests that ultraviolet (UV) radiation may play a role in its development; however, the relationship between melanoma development and UV exposure in cats has not yet been clearly established (Chamel et al., 2017).

However, other studies suggest that the effect of UV on tumor growth is unlikely, as 50% of cats with melanoma do not have outdoor access (Sabattini et al., 2017). According to Reck and Kessler (2020), UV radiation is not a causative factor in the development of nasal planum melanoma in cats. In humans, chronic and intermittent UV exposure is the main cause of melanoma on sun-exposed skin due to high BRAF gene mutations (van der Weyden et al., 2020; Polton et al., 2024). Unlike humans, the frequency of BRAF mutations due to UV exposure in dogs is low, resulting in a low incidence of melanoma in dogs caused by UV exposure (Mochizuki et al., 2015; Polton et al., 2024).

Antibodies commonly used in IHC evaluation of melanocytic tumors in dogs and cats include Melan-A, PNL-2, and S100 (Krokmaz, 2025). Melan-A, also known as MART-1, is a transmembrane protein expressed in melanocytes in the skin and retina (Pitcovski et al., 2017). This marker is specific to melanocyte differentiation but has low sensitivity in less differentiated tumors (Korkmaz, 2025). The diagnostic sensitivity of Melan-A for melanocytic tumors in dogs and cats is 81.6% (Polton et al., 2024). However, Melan-A has poor sensitivity on amelanotic melanoma; only 5 of 17 amelanotic melanomas were positive for this marker (Chamel et al., 2017). Additionally, Melan-A also does not react with melanoma in horses (Ramos-Vara et al., 2014).

Although Melan-A is sensitive for the diagnosis of melanocytic tumors in cats, the intensity of expression and percentage of immunoreactive cells with the Melan-A marker are reported to be not significantly associated with host mortality due to melanocytic tumors (Chamel et al., 2017; Pittiway et al., 2019). Other biomarkers, such as SOX-10, can be used in conjunction with other biomarkers to improve sensitivity in the diagnosis of melanoma (Orlandio et al., 2024). Prognosis in melanoma cases can be determined by evaluating the nuclear protein Ki-67 (Ki-67 index) along with other variables such as cell morphology and mitotic count (Sabbatini et al., 2018).

Currently, the recommended treatment for melanoma on the skin is surgical removal of the entire tumor with a wide margin (2-3 cm lateral margin) (Polton et al., 2024). A study conducted by Chamel *et al*. (2017) showed that cats with melanoma that underwent surgery had a significantly longer survival compared to those that only received medication. The study also showed that free margin was not associated with longer survival. However, according to Sabbatini *et al*. (2018), margin clearance correlates with good outcomes. Resection surgery may be difficult to perform in certain locations, such as melanoma that appears on the nasal planum, which, according to Reck and Kessler (2020), may lead to poor survival. As of the writing of this article, the cat in this case is reported to be alive and active as normal.

CONCLUSION

Based on the diagnostic method in this case, with the discovery of various histological and immunohistochemical features such as pleomorphism, intratumoral necrosis, epidermal involvement, and Melan-A immunoreactivity, it was determined that the tumor was melanoma and may have metastatic potential. However, this case study has limitations due to the absence of diagnostic staging, including lymph node examination or other examinations for metastasis, such as abnormal mitotic ratio and metastatic biomarkers. In addition, there was also no proper follow-up period for this case.

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AUTHORS CONTRIBUTION

A.M.A. contributed to the conceptualisation of the study, histological examinations, collecting data, data analysis, and manuscript drafting. S.W. served as supervisor, histological examinations and manuscript drafting. J.C.A. participated in the physical examination and collected data. R.M. contributed to the data collection and the physical examination.

"The author declares that there is no conflict of interest with the parties involved in this research."

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