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Canine melanoma

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Abstract
Canine melanoma is a malignant cancer that originates from melanocytes, the pigment-producing cells in dogs. This neoplasm manifests in various anatomical locations, such as the oral cavity, skin, digits, and mucocutaneous junctions. In this specific study, the identification of tumours involved the utilization of both cytological and histopathological techniques. Cytological assessments encompassed the use of Fine Needle Aspiration Cytology (FNAC) and impression smears, applied to both palpable and non-palpable tumour masses. Cytological smears revealed anisocytosis, anisokaryosis, and brownish-black intracytoplasmic pigments. Histopathology revealed densely packed spindle-shaped melanocytes and epithelial cells forming pigmented islands, accompanied by the presence of giant cells and mitotic figures. Canine melanoma poses a significant health threat, with diverse clinical presentations so timely diagnosis and treatment of melanoma is necessary.

Keywords: Melanoma, cytology, histopathology, neoplasm, FNAC

1. Introduction
Cancer encompasses a spectrum of diseases characterized by distinctive traits, including self-sufficiency in growth signals, insensitivity to antigrowth signals, evasion of apoptosis, limitless replicative potential, sustained angiogenesis, and the ability to metastasize. The disease progression is marked by pathological alterations, transitioning from normal epithelium to hyperplasia, carcinoma, and eventually invasive carcinoma.
Melanocytic neoplasms have been documented in various species, both human and domesticated, such as dogs, cats, horses, as well as in diverse wild terrestrial and marine mammals (Sweet *et al*., 2012) [14]. In dogs, these neoplasms constitute approximately 0.8-2% of all cutaneous tumours and are particularly prevalent in individuals with heavily pigmented skin (Williams *et al*., 2003) [17]. In canines, oral malignant melanomas typically originate from the gingiva, but they can also have their origins in the palatine, labial, or buccal mucosa (Harvey *et al*. 1981) [7]. These malignant melanomas exhibit distinctive characteristics, such as rapid growth, local invasiveness, and early metastasis during the progression of the disease (Esplin 2008) [6].
Diagnostic cytology entails the microscopic examination of cellular specimens with the aim of discerning the lesion's nature and promptly diagnosing a disease. Renowned for its high specificity and sensitivity, this approach has gained widespread acceptance in diagnosing various human and animal diseases (Cohen *et al*., 2003) [3]. In the context of cutaneous and subcutaneous cytology, it proves particularly valuable for identifying bacterial, fungal, parasitic, and superficial neoplastic skin conditions. The ease of obtaining samples from cutaneous and subcutaneous masses, without the need for tranquilization or anaesthesia, facilitates cytologic evaluation, allowing for the differentiation between neoplastic and non-neoplastic processes (Wellman, 1990) [16].

2. Material and Method
2.1 Source and Collection of Samples: This research initiative transpired at the Department of Veterinary Pathology, Post Graduate Institute of Veterinary Education and Research, Jaipur, spanning the temporal spectrum from August 2020 to February 2021. The study population comprised 58 instances of spontaneously arising tumour masses, meticulously sourced from

canines of diverse breeds and age demographics, encompassing both genders. Tissue specimens for this comprehensive investigation were garnered from heterogeneous anatomical sites, including the Government Veterinary Polyclinic (Department of Animal Husbandry), the Department of Veterinary Surgery and Radiology, the Department of Veterinary Pathology at PGIVER, Jaipur, and the Veterinary Hospital (Help in Suffering/HIS, Jaipur).

2.2 Gross Examination: Preceding any surgical interventions, a systematic and thorough macroscopic scrutiny was conducted on all tumour masses. This involved a meticulous evaluation for signs of ulceration and precise anatomical localization. Post-surgical excision, a meticulous analysis ensued, considering parameters such as dimensions (quantified in centimeters), morphology (circular, oval, irregular, multilobulated, etc.), mass (in grams), consistency (soft, hard, firm, cystic, etc.), and the chromatic attributes of the excised tumour surface.

2.3 Cytological Examination: Cytological evaluations were meticulously orchestrated through the employment of fine needle aspiration cytology (FNAC) and impression smear/touch imprint cytology methodologies, adhering to the delineations provided by Cowell and Valenciano (2014) [4].

2.4 Histopathological Examination: Histopathological Examination: Excised tissue specimens underwent immersion in a 10 percent buffered formalin solution and were subjected to rigorous histopathological scrutiny utilizing the hematoxylin and eosin staining methodology, adhering to well-established protocols as outlined by Luna (1960) [9] and Culling (1974) [5].

3. Results and Discussion

3.1 Incidence of Melanoma

A singular instance of melanoma was documented, reflecting an incidence of 1.72%. These findings align with the observations made by Williams *et al*. (2003) [17], who reported melanoma accounting for 0.8-2% of all cutaneous tumours in canines.

3.2 Gross morphology, Cytology and Histopathology of Melanoma

Macroscopically, the tumour mass exhibited irregularity, a black hue, and a soft consistency, as illustrated in (Fig. 1), situated in the anterior submandibular region. The cut surface displayed a coffee to black color, measuring 4 x 3 x 2 cm and weighing 25g. These gross morphological observations align with the works of Withrow and Ewen (2001) [18], Chauhan (2010) [2], and Subapriya *et al*. (2018a) [12].

Cytologically, impression smears depicted a moderately cellular composition with notable anisocytosis. The cells, displaying round, caudate to ovoid shapes, were arranged individually or in clusters (Fig. 2). Brownish-black intracytoplasmic pigments were evident within neoplastic cells (Fig. 3). Aspirate smears from the tumour mass revealed centrally or marginally positioned nuclei. While most cells had a single nucleus, occasional binucleation was observed. Nuclei were at times obscured by granular, blackish cytoplasmic pigments in specific cells (Figure 4). These findings parallel the results reported by Krithiga *et al.* (2005) [8], Raskin and Meyer (2010) [11], and Subapriya *et al.* (2018) [13].

Histopathological examinations unveiled clusters of closely packed spindle-shaped melanocytes and epithelial cells exhibiting brown to black pigmentation in the cytoplasm (Figure 5). Melanocytes were interspersed within fibrovascular stromal tissue, forming cell nests (Figure 6). Anisocytosis was conspicuous, with round nuclei, multinucleated giant cells, and atypical mitotic figures. Some nuclei were obscured by pigmentation (Figure 7). These histopathological findings align with the studies conducted by Nishiya *et al*. (2016) [10] and Chandravathi *et al*. (2013) [1].

Fig 1: Macroscopic Image Displaying melanoma: Irregular Shape and Dark Pigmentation.

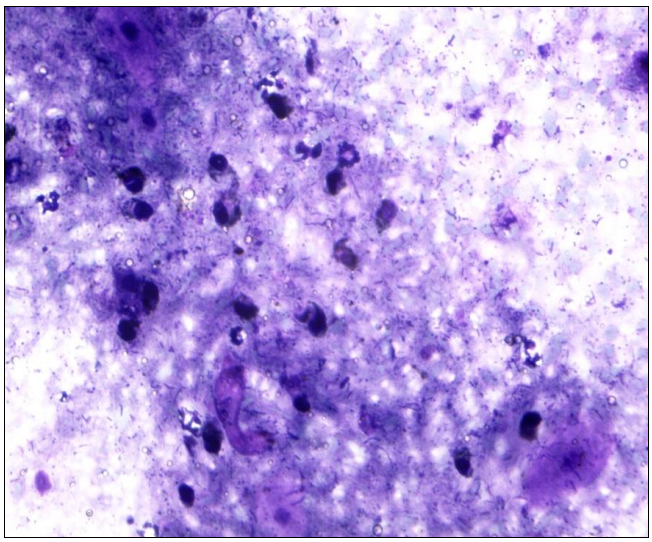

Fig 2: Microscopic Image of Impression Smear Illustrating Variations in Cell Size, Round, Caudate to Ovoid Shaped Cells. Giemsa stain, 400X

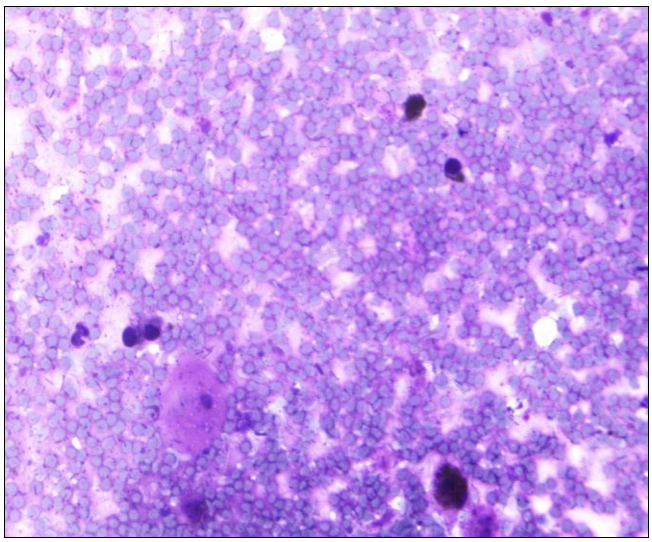

Fig 3: Microscopic Image of Impression Smear Depicting Brownish-Black Intracytoplasmic Pigments. Giemsa stain, 400X

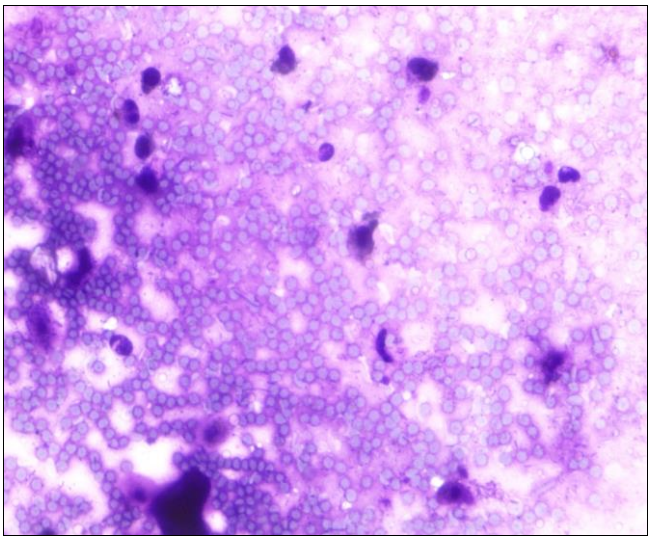

Fig 4: Microscopic Image from FNAC Illustrating Nuclei Positioned centrally or Marginally, Concealed by Granular-Blackish Cytoplasmic Pigment. Giemsa stain, 400X

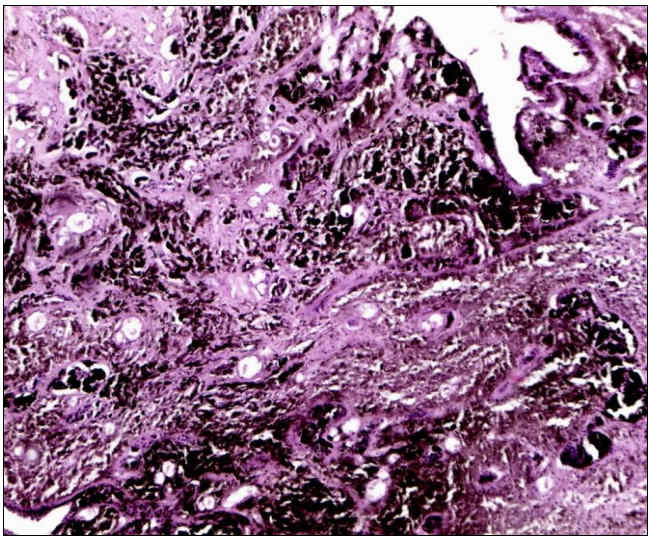

Fig 5: Microscopic Image Depicting Clusters of Spindle-Shaped Melanocytes and Epithelial Cells Exhibiting Brown to Black Pigmentation in Cytoplasm. H & E stain, 100X

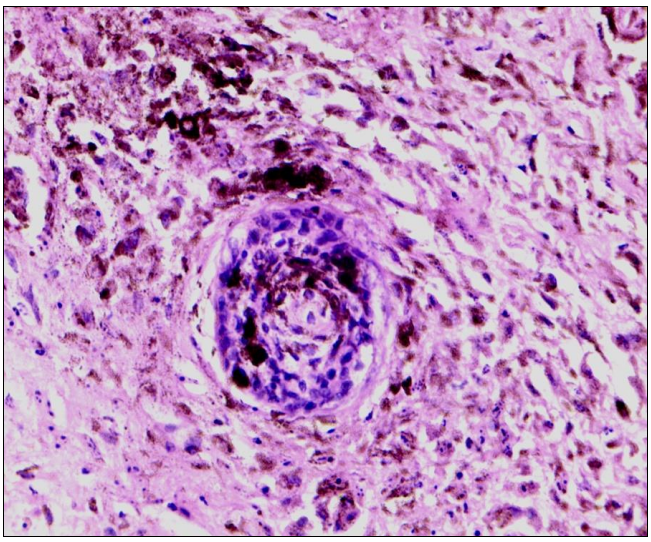

Fig 6: Microscopic Image Illustrating Melanocytes Separated by Fibrovascular Stromal Tissue and the Formation of Cell Nests. H & E stain, 400X

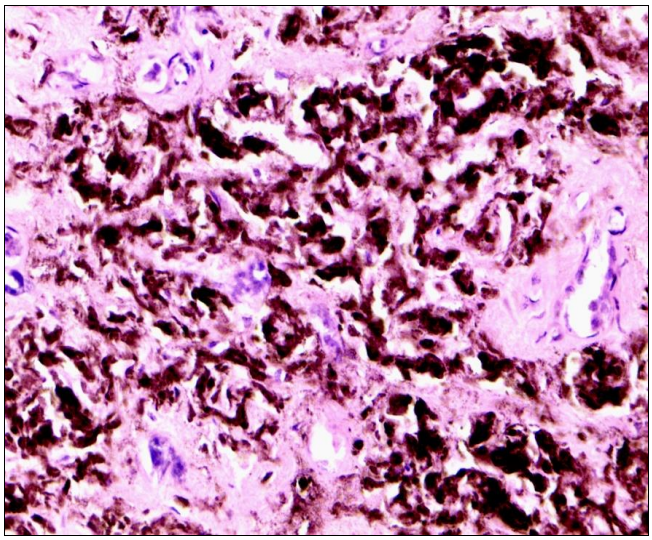

Fig 7: Microscopic Image Revealing Variations in Cell Size, Round Nuclei with Multinucleated Giant Cells, and Presence of Mitotic Figures. H & E stain, 400X

4. Conclusions

In summary, this investigation delineates a singular occurrence of melanoma, representing an incidence rate of 1.72% within the cohort of 58 cases under examination. Macroscopic observations manifested irregularity, a melanin-enriched black hue, and a pliant consistency in the anterior submandibular region. Cytologically, impression smears exhibited a moderate degree of cellularity characterized by anisocytosis, round to ovoid cells, and the presence of brownish-black pigments. Histopathological scrutiny disclosed densely arranged spindle-shaped melanocytes featuring brown to black pigmentation, organized into nests within the fibrovascular stromal tissue. In the context of our ongoing inquiry, cytology emerges as a pivotal diagnostic modality, serving as a primary tool in discerning the existence of pathological processes and neoplastic proliferation across diverse anatomical tissues. This technique is distinguished by its straightforward and expeditious nature, rendering it a cost-effective and reliable method conducive to outpatient applications, obviating the necessity for anesthesia or intricate apparatus.

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