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Extramedullary plasmacytoma in a dog: A case report

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Abstract
A postmortem examination was conducted on an 11-year-old female Labrador dog at the Department of Pathology, CoVSc & AH, DUVASU, Mathura. The dog had a history of weakness and labored breathing. During necropsy, the carcass appeared pale and anemic, with congested visceral organs including the liver, spleen, lungs and kidneys. The heart exhibited multiple raised firm nodules in both auricles. Histopathological analysis of heart samples revealed sheets of mononuclear cells with eccentric nuclei showing a distinct cartwheel or clock-faced chromatin pattern, along with anisocytosis, pleomorphism, and karyomegaly. Mitotic figures and binucleated cells were also present. Other organs showed signs of congestion upon examination. Immunohistochemistry revealed the positive immunostaining with the MUM1. Based on these findings, the diagnosis of extramedullary plasmacytoma was established highlighting its rare occurrence in canine pathology.

Keywords: Labrador, clock-faced chromatin, plasmacytoma, MUM1

Introduction
Plasmacytomas, originating from plasma cells, are relatively uncommon in dogs and cats, presenting in various forms such as extramedullary cutaneous, non-cutaneous, and multiple myeloma (Silva *et al*., 2017) [8]. Extramedullary plasmacytoma (EMP) denotes a neoplastic plasma cell tumor arising from soft tissues without primary bone marrow involvement, constituting approximately 2.5% of diagnosed canine neoplasms (Clarke *et al*., 1993) [2]. It has been observed in diverse anatomical sites, including visceral organs and skin (Morton *et al*., 1986) [6]. In dogs, EMP generally carries a more favorable prognosis compared to multiple myeloma (MM), although non-cutaneous, non-oral EMP can exhibit heightened aggressiveness (Vail *et al*., 2019) [12].
Cytologically, plasma cell tumors typically feature cells with round or oval eccentric or central nuclei, occasionally exhibiting stippled chromatin. Some cells may display an achromatic area between the nucleus and cytoplasm, while poorly differentiated cells often present varying degrees of anisocytosis, anisokaryosis, kidney-shaped or bizarre nuclei, and numerous multinucleated cells (Albanese, 2017) [1]. Histopathologically, plasmacytomas are characterized by solid sheets of plasma cells within a thin fibrovascular stroma, with eccentrically positioned round to oval-shaped nuclei containing coarse chromatin and abundant eosinophilic to lightly basophilic cytoplasm (Mathur *et al*., 2018) [5]. Immunohistochemically, these tumors typically exhibit positive immunostaining for MUM1 (Vail, 2007) [11].
This study aims to delineate the pathological features of a case involving extramedullary plasmacytoma, an uncommon presentation affecting visceral organs including the heart and kidney.

Material and Methods
Post mortem examination of dog was done and pathological samples includes heart, kidney, liver, lungs were collected for cytological and histopathological examination. Impression smears were made from the cut sections of the tumorous mass, followed by fixation in methanol and staining with Giemsa stain (Thangathurai *et al*., 2008) [10]. Additionally, 1×1 cm^3 sections of tissues from the affected organs were fixed in 10% neutral buffered formalin for subsequent Haematoxylin and Eosin (H&E) staining and immunohistochemistry (Luna, 1968) [13].

Results and Discussion

The case deals with the extramedullary plamacytoma affecting the 11years Labrador. That is consistent with the earlier findings (Dagar *et al*. 2023) [3]. Grossly, heart revealed multifocal round to ovoid well demarcated, white to tan coloured solid masses of about 2 to 5 cm diameter were seen protruding from the surface of both the auricles and liver showed focal areas of congestion and irregular contours. The cytology of impression smear revealed the presence of the round or oval eccentric or central nuclei with stippled chromatin, and some cells showed an achromatic area between the nucleus and the cytoplasm. The cytological findings were in accordance with the earlier studies (Nikousefat *et al*., 2015) [7]. The histologic features of the heart and kidney were consistent with a plasma cell tumor showed round cells with pleomorphic and hyperchromatic nuclei. These findings were in accordance with the earlier studies (Silva *et al*., 2023) [9].

Immunohistochemistry revealed neoplastic cells with intense immunostaining with MUM1. The finding was in accordance with the previous study (Gorenstein *et al*., 2016) [4]. MUM1 is a transcription cell factor in lymphoid cell differentiation and production of plasma cells (Johnson *et al*., 2021) [14].

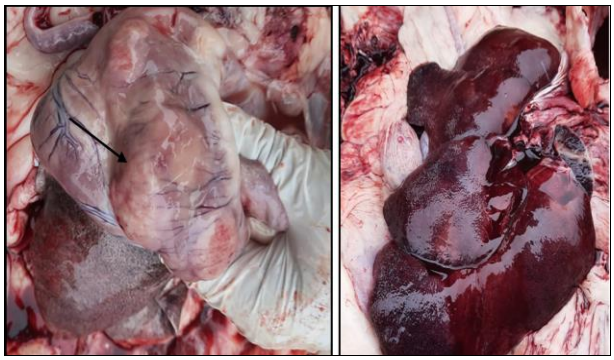

Fig 1: A. Multifocal round to ovoid well demarcated, white to tan colored solid masses (arrows) of about 2 to 5 cm diameter were seen protruding from the surface of both the auricles. B. Liver showed focal areas of congestion and irregular contours.

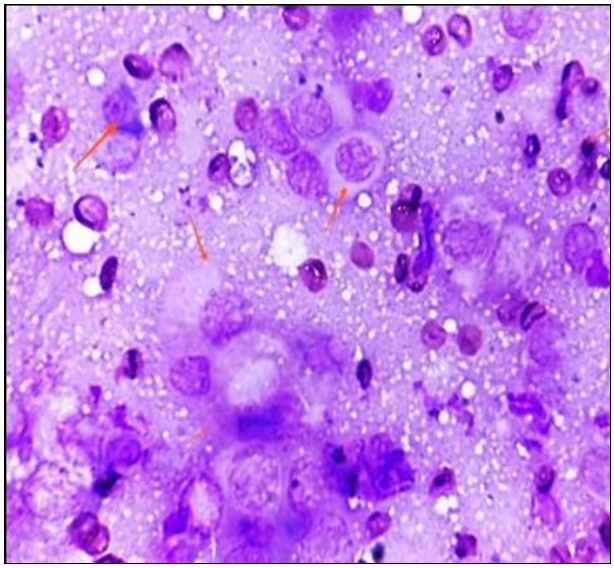

Fig 2: Cytological smear showing round or oval eccentric or central nuclei with stippled chromatin, and some cells showed an achromatic area between the nucleus and the cytoplasm (arrows). Giemsa stain, 1000X

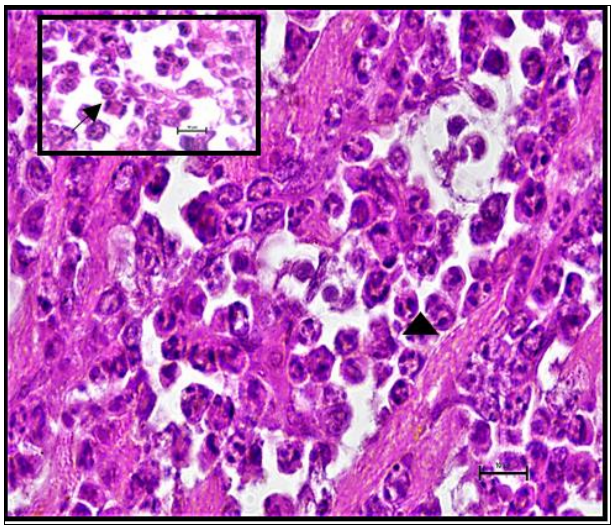

Fig 3: Histopathological section of heart showing large well differentiated round to ovoid cells with eccentric nuclei containing coarse chromatin arranged in a clock faced (cart wheel) pattern (arrowhead) H&E X 400. Inset: showing a mitotic figure (arrow) at the top right corner

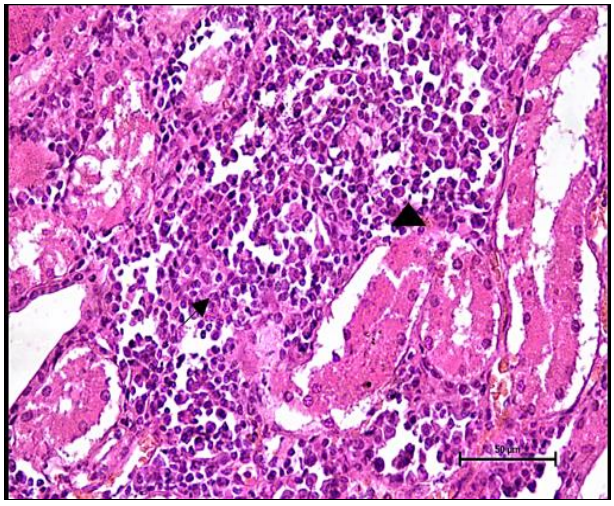

Fig 4: Renal parenchyma showing sheets of plasma cells (Arrow head) in the renal interstitium (arrow) H&E X 400

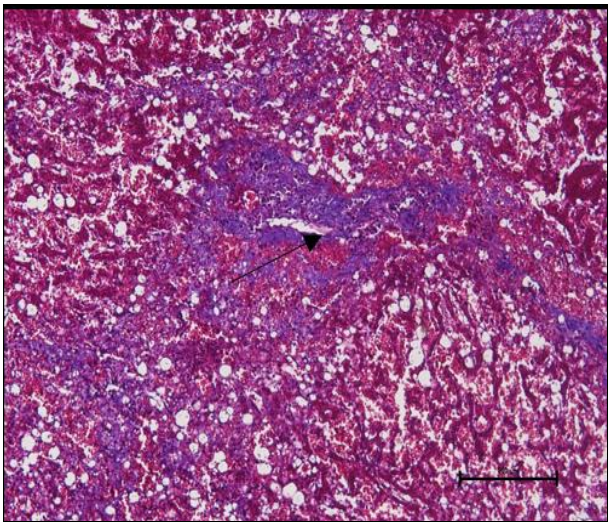

Fig 5: Section of liver showing delicate blue colored collagen fibers around the central vein (arrow) of the hepatic lobule disrupting the normal architecture of the liver. Masson's trichrome X40

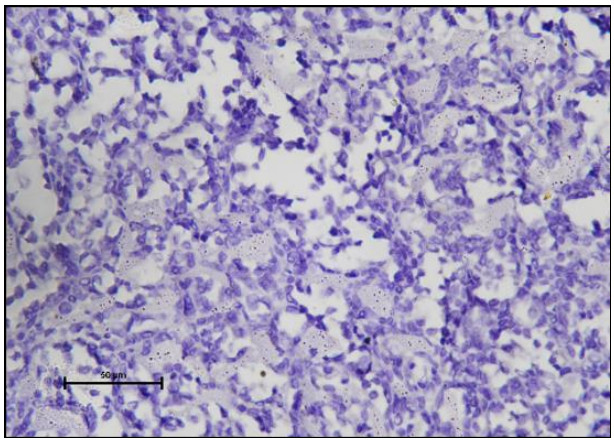

Fig 6: Shows control negative section where primary antibody was omitted showing no staining. IHC DAB chromogen & Mayer's haematoxylin counter stain X 400

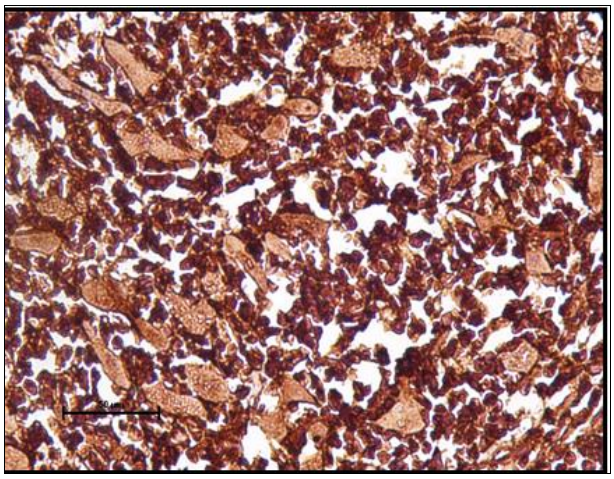

Fig 7: Heart tissue section showing intensely stained tumorous cells for MUM1. IHC DAB chromogen & Mayer's haematoxylin counter stain, 400X

Conclusion

In conclusion, non-cutaneous extramedullary plasmacytoma is an exceptionally rare tumor in dogs, with previous reports limited to extramedullary sites such as skin, oral cavity, and gastrointestinal tract. To date, very less cases of cardiac involvement have been documented in veterinary literature, though isolated occurrences are noted in humans. Utilization of MUM1 as an immunohistochemical marker aids in diagnosis, with overexpression linked to higher tumor grade and poorer prognosis. This case highlights the importance of recognizing unusual tumor locations and employing immunohistochemistry for accurate diagnosis and prognosis in canine cardiac tumors.

Acknowledgement

The assistance for the completion of the case is appreciable.

Conflict of interest

Authors have no conflict of interest in this study.

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