

## Metastatic mast cell tumour in African hedgehog: A case report

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**Abstract:** Neoplastic lesions are common in African hedgehogs (*Atelerix albiventris*). To our knowledge, so far mast cell tumour metastases have only been described in local lymph nodes. An African hedgehog was referred to the veterinary clinic. A nodule was located on the right part of the mandible. Based on the clinical trial, an abscess was suspected. Surgery was performed, but a histopathological examination was not undertaken. After few months, tumour recurrence was detected and, additionally, a second tumour was found on the metatarsal skin. Due to the deteriorating clinical condition of the patient, euthanasia was decided, and a post-mortem examination was performed. During the post-mortem examination, a spleen tumour was detected, and, furthermore, mesenteric lymph nodes, liver and lung sections were also collected. The histopathological examination confirmed mast cell tumour metastasis to the spleen and lymph nodes, additionally single mast cells were found in the liver. Interestingly, the histological picture of the tumour does not show high malignancy. To our knowledge, this is the first description of a mast cell tumour with metastases to the spleen and lymph in the African hedgehog.

**Keywords:** neoplasm; MCT; metastases; mastocytosis

Reports of mast cell tumours (MCTs) in hedgehogs are rare in veterinary literature (Raymond et al. 1997; Heathley et al. 2005; Juan-Salles and Garner 2007). In those cases, neoplastic lesions usually occurred on the head, neck or axilla. There are reports of MCT metastases to local lymph nodes (Raymond et al. 1997; Heathley et al. 2005; Juan-Salles and Garner 2007). There is also a case in which single mast cells have been reported in the spleen. In in-

sectivorous animals, their presence is quite common in this organ (Raymond et al. 1997).

Abnormal proliferation and accumulation of mast cells lead to the formation of mast cell neoplasia. We can distinguish different kinds of mast cell disease. The cutaneous form is divided into a solitary, localised tumour of the skin and diffuse cutaneous mastocytosis. On the other hand, systemic mastocytosis is characterised by the proliferation of mast

cells in the internal organs (Valent et al. 2017). In hedgehogs, MCTs usually take the form of a solid tumour of the skin or the subcutaneous tissue, usually white on the cross-section, and its surface can be ulcerated, hairless, congested or necrotic (Raymond et al. 1997; Heathley et al. 2005). Mast cell tumours are very common in the dermis and subcutis of dogs, where there are detailed reports of their appearance and grading schemes and prognosis (Patnaik et al. 1984; Heathley et al. 2005; Kiupel et al. 2011). Mast cell tumours are infrequently seen in the skin of cats and ferrets; much less is known about their prognosis (Tamlin et al. 2020).

In hedgehogs, the main method of treatment is the surgical excision, which should be preceded by the use of antihistamines, e.g., diphenhydramine. In the case of poorly differentiated tumours, it is recommended to take a larger margin of excision of normal tissue, just as in the case of dogs and cats (Raymond and Garner 2001).

The following report describes a case of a mast cell tumour in an African hedgehog. To our knowledge, this is the first case report of metastases of a mast cell tumour in the spleen and mesenteric lymph nodes.

## Case description

A male African hedgehog (*Atelerix albiventris*), about 4 years old, was referred to the veterinary clinic. The animal was in good condition, weighing 376 g. The owner noted a lesion, 0.5 cm in diameter, situated on the right part of the mandible. The clinical examination revealed a soft mass of the skin; the skin surface was hairless and congested. The mandibular lymph nodes were unchanged. Based on the clinical trial, an abscess was confirmed. Teeth tartar and gingivitis were also found. Without any additional examinations, surgery was decided upon. The dental scaling and mass excision were performed. An abscess was confirmed based on the cross section; the histopathological examination was not undertaken. Enrofloxacin (10 mg kg/BW, s.c., Baytril 5%; Bayer, Warsaw, Poland) and meloxicam (0.5 mg kg/BW, s.c., Metacam; Boehringer Ingelheim Vetmedica GmbH, Ingelheim, Germany) was administered and the continuation of the antibiotic for 7 days at home was recommended. It was recommended to monitor the appetite. After 9 days, another visit

took place. The hedgehog had a decreased appetite and started to lose weight. The use of a preparation supporting the liver function was recommended (Hepatiale Forte Small Breed & Cat; VetExpert, Lomianki, Poland). After a few days, the condition of the animal returned to normal.

Two months later, the patient's condition deteriorated again. The animal became lethargic and its body weight dropped to 336 g. During the clinical examination, gingivitis and dehydration were diagnosed. The blood test revealed leucocytosis, erythrocytosis, granulocytosis, decreased mean corpuscular volume (MCV), mean cellular haemoglobin concentration (MCHC) and mean cellular haemoglobin (MCH) values, increased mean platelet volume (MPV) and red blood cell distribution width (RDW) values as well as an increased alkaline phosphatase activity and creatinine concentration and a decreased alanine aminotransferase (ALT) (Table 1). Based on the blood test results and the clinical examination, the administration of meloxicam was recommended again, as well as an additional vitamin-mineral preparation (Vetaminex; VetExpert, Lomianki, Poland) and the Convalescent Instant Diet (Royal Canin). The condition of the hedgehog improved.

After about 4 months, the lesion reappeared in the same area on the mandible (Figure 1). A tumour of a solid structure, a diameter of 0.3 cm, with haemorrhagic foci on the surface was disclosed. The mandibular lymph nodes were unchanged. A fine needle aspiration only revealed degenerated neutrophils. Pradofloxacin was administered orally at a dose of 3.65 mg kg/BW (Veraflox; Bayer, Warsaw, Poland) and the Convalescent Instant Diet (Royal Canin) was recommended.

Another 2 months later, the owner once again came to the veterinary clinic. Despite the previous treatment, the tumour in the mandible continued to grow and another lesion appeared on the right pelvic limb (Figure 2). It was a circular, solid tumour on the metatarsus of approx. 0.8 cm in size; the skin of this area was not changed. A fine needle aspiration showed that both lesions were mast cell tumours. The round cells were dominating; low to moderate anisocytosis and anisokaryosis were revealed. The cells were abundant in the cytoplasm containing metachromatic granules. There was a single vesicular nucleus with an unclear nucleolus. No mitotic figures were found. Weak eosinophilic infiltration was observed (Figure 3).

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Table 1. The blood test results

	Reference value	Result	
WBC ( $10^9/l$ )	6.30–10	10.88	↑
RBC ( $10^6/l$ )	5.2–6.8	6.94	↑
Haemoglobin (g/l)	115–151	118.5	=
HCT (%)	36–47	44.45	=
MCV ( $\mu m^3$ )	65–76	64	↓
MCHC (g/l)	295–339	266.6	↓
MCH (pg)	21.1–24.5	17.07	↓
PLT ( $10^9/l$ )	250–610	394	=
MPV ( $\mu m^3$ )	5–7	9.38	↑
RDW (%)	12–14.5	15.26	↑
Lymphocytes ( $mm^3$ )	3 300–7 000	4 800	=
Monocytes ( $mm^3$ )	0–400	300	=
Granulocytes ( $mm^3$ )	1.600–3.700	5.800	↑
Glucose (mg/l)	890–1 200	950	=
BUN (mg/l)	270–360	290	=
Protein, total (g/l)	58–65	58	=
ALT (IU/l)	53–76	27	↓
Alkaline phosphatase (IU/l)	51–72	83	↑
Creatinine (mg/l)	4–6	10	↑

ALT = alanine aminotransferase; BUN = blood urea nitrogen; HCT = haematocrit; MCH = mean cellular haemoglobin; MCHC = mean cellular haemoglobin concentration; MCV = mean corpuscular volume; MPV = mean platelet volume; PLT = platelet; RBC = red blood cell; RDW = red blood cell distribution width; WBC = white blood cell

Unfortunately, the condition of the animal steadily deteriorated. Methylprednisolone acetate at a dose of 1.0 mg/kg/BW was given once (Depo-Medrone; Pfizer, Puurs, Belgium). The vitamin-mineral preparation (Vetaminex; VetExpert, Lomianki, Poland) and Convalescent Instant Diet (Royal Canin) were recommended. A few days later, the owner informed the clinic that the patient had lost its appetite, was laying on his side all the time and could not control its defecation. Due to the poor clinical condition, the animal was euthanised; medetomidine sedation (Domitor; Orion Pharma Animal Health, Warsaw, Poland) with pentobarbital sodium (Euthasol; Orion Pharma Animal Health, Warsaw, Poland) were used and a post-mortem examination was performed.

In the post-mortem examination, a small firm tumour, whitish in colour with red patches, was found on the spleen. All the other organs remained unchanged. The splenic tumour, mesenteric lymph



Figure 1. The primary mast cell tumour localised in the mandible area – the recurrence



Figure 2. The secondary mast cell tumour localised on the right pelvic limb

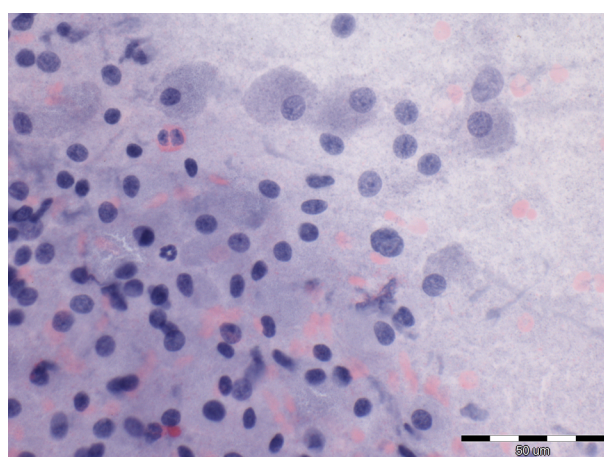


Figure 3. The cytological examination of the primary tumour of the mandible; round cells of low to moderate anisocytosis and anisokaryosis are dominating. The cytoplasmic granules are visible. Single eosinophils are observed



nodes, liver and lung sections were collected for a histopathological analysis; stained with haematoxylin and eosin (H&E) and with toluidine blue to stain the mast cell granules.

In the histopathological examination, it was confirmed that the mandibular and metatarsal area neoplasms, as well as the spleen tumour were mast cell tumours. All the tumours demonstrated a similar histopathological appearance. The cells had abundant amount of cytoplasm and weakly visible metachromatic granules. The nuclei were vesicular with usually clearly visible nucleoli. Mast cells with up to three nuclei were disclosed. No mitotic figures were observed. The cells showed a low nuclear-cytoplasmic ratio, there was a mild variation of the cell size and of the nuclear size (anisocytosis and anisokaryosis). Additionally, newly formed blood vessels and a weak inflammatory

infiltrate that contained eosinophils and lymphocytes were detected (Figure 4A–C). Aggregates of the mast cells were detected in the mesenteric lymph nodes (Figure 4D). There were no lesions reported in the lungs.

## DISCUSSION AND CONCLUSIONS

Skin tumours were previously described in African hedgehogs and include nerve sheath tumours, plasmacytomas, hemangiosarcomas, fibrosarcomas, osteosarcomas or poorly differentiated sarcomas; mast cell tumours were previously reported in three hedgehogs (Raymond et al. 1997; Heathley et al. 2005; Juan-Salles and Garner 2007).

In hedgehogs, MCTs in the subcutaneous tissue of the head, neck or axillary region were previ-

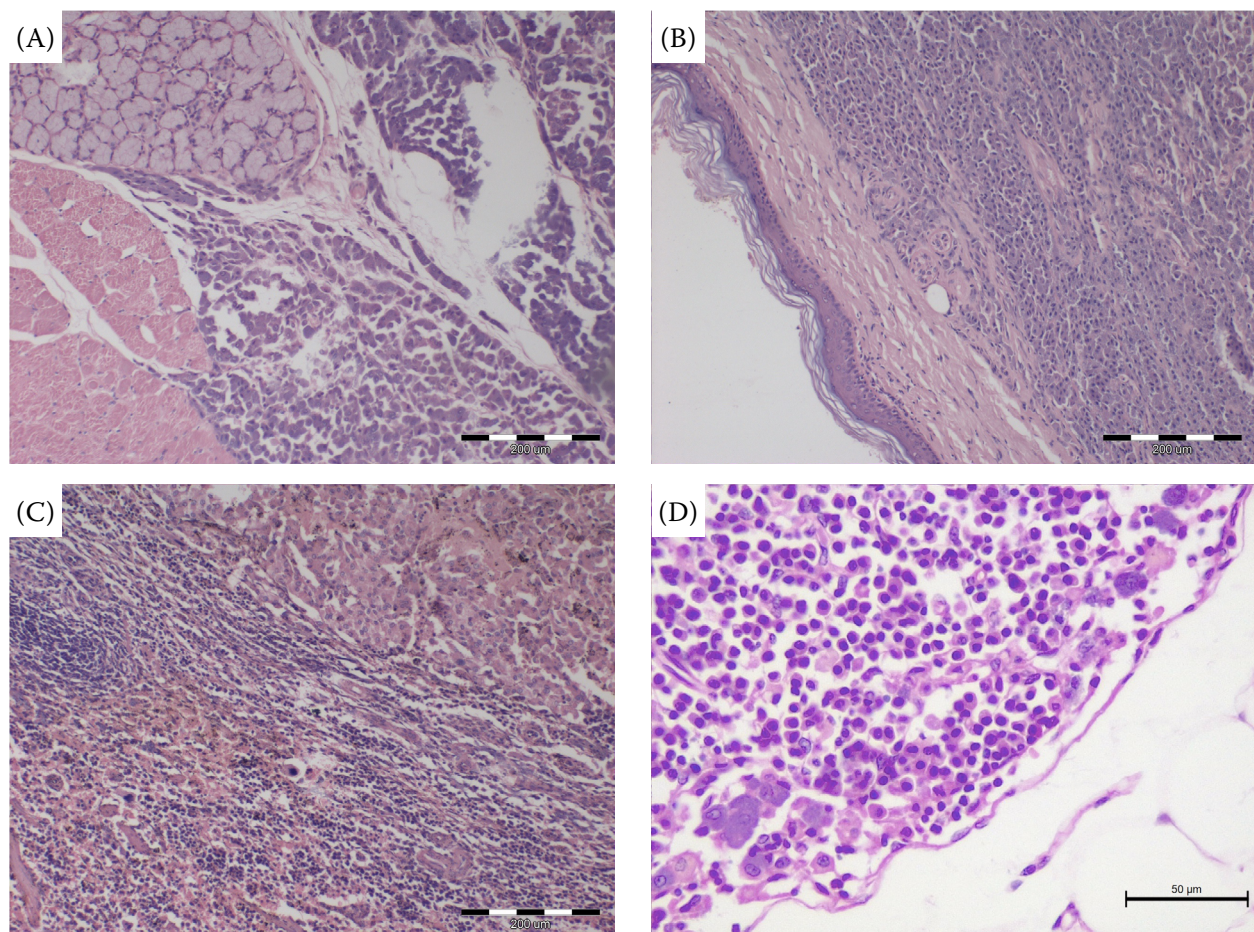


Figure 4. The histopathological examination of the tissue samples – H&E staining. (A) The neoplastic tissue infiltrates the muscles and salivary gland. The tumour contains well-differentiated cells with metachromatic granules. Single blood vessels are visible. (B) The mast cell tumour of the metatarsal area. The cells are similar to the primary tumour cells. (C) The spleen metastasis, the lesion is well demarcated from the splenic tissue. (D) Single mast cell inside the mesenteric lymph node sample

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ously observed. In one case, metastases in the local lymph nodes were present and also single mast cells were found within the spleen, but it is a normal finding in insectivorous animals (Raymond et al. 1997; Juan-Salles and Garner 2007). In dogs, cats and ferrets, the metastases usually occur in regional lymph nodes, as well as in the spleen and liver (Stefanello et al. 2009; Tamlin et al. 2020). Because the original lesion was on the mandible and no other lesions were identified, the mandibular mass is assumed to be the primary mass and the subsequently identified cutaneous and internal masses are considered to be metastases. The simultaneous development in each location as part of the systemic disease was considered unlikely because of the clinical progression. Unfortunately, the primary tumour was initially incorrectly diagnosed as an abscess; only after observing another lesion on the metatarsus was the second cytological examination performed.

It is also a possibility that, in our case, a systemic mastocytosis with multiple epitheliotropic cutaneous mast cell tumours occurred. Systemic mastocytosis is associated with visceral MCTs, spleen MCT can be observed quite often (Lamm et al. 2009; Woldemeskel et al. 2017). Due to lack of blood smear or collection of the bone marrow, it cannot be proven.

In the case of African hedgehogs, no strict standards for determining the malignancy grade of the tumour have been developed so far. In dogs, as the degree of the histological malignancy increases, cells begin to infiltrate deeper tissues, exhibit significant atypia traits, as well as increase the tumour's proliferative potential (Patnaik et al. 1984; Kiupel et al. 2011). In cats and ferrets, MCTs can be divided into well-differentiated or poorly differentiated tumours. The mitotic count is probably the strongest prognostic indicator (Tamlin et al. 2020). The shape of the cells, the presence of cytoplasmic granules, the number of cell nuclei, the number of mitotic figures per high power field and the infiltration of deeper tissues are taken into account in the evaluation of the MTC malignancy grade. In the described case, the characteristic features of the histological malignancy were not strongly marked, and the proliferative potential of the lesion was also low. In the primary tumour, it strongly infiltrated the dermis, subcutis and muscles. The cells were usually circular in shape. Single, multinucleated cells were observed (up

to 3 nuclei, usually 2). Cytoplasmic granules were hardly visible. There were no mitotic figures.

In canine MCTs, lymph nodes are classified according to the Weishaar et al. (2014) classification system based on the number of, distribution of, and architectural disruption by, the nodal mast cells. Unfortunately, we did not obtain regional, cutaneous lymph nodes. In the mesenteric lymph nodes, we found aggregates of mast cells within the subcapsular sinus, consistent with an HN2 classification (early metastasis).

To the best of our knowledge, this is the first described case of MCT with metastases of the internal organs of an African hedgehog. An interesting fact in this case is that the primary tumour histological appearance rather suggested benign biological behaviour. The early detection of a neoplastic disease allows the undertaking of a proper treatment quickly, which increases the chances of recovery.

## Conflict of interest

The authors declare no conflict of interest.

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