A 3-year-old 679-g sexually intact male chinchilla (Chinchilla chinchilla) was presented to its primary care veterinarian because of a swollen left cheek. The owner had reportedly first noticed the swelling the preceding day. The chinchilla was acting appropriately and exhibiting normal mentation and appetite at the time of presentation. During the previous year’s wellness exam, all physical examination findings had been normal.

**Clinical and Clinicopathologic Findings**

On physical examination, a 4-cm-diameter firm, subcutaneous soft tissue mass was present ventral to the left ear. The remaining physical examination findings were unremarkable. A fine-needle aspirate of the mass was collected, and slides of the sample were stained with Wright-Giemsa stain (Figure 1). The sample was highly cellular and minimally hemodiluted with a predominant population of individualized, discrete round cells. These cells had a moderate amount of basophilic cytoplasm containing variable numbers of fine, magenta to dark-purple granules. The nuclei were round to cleaved and variably located, and contained finely stippled to lacy chromatin. Prominent nucleoli were commonly observed and varied substantially in size, shape (round to oblong), and number (1 to 3). Moderate anisocytosis and anisokaryosis were noted, as well as few binucleated cells displaying nuclear molding. Rarely, these cells appeared more plump to spindloid in appearance, and maintained discrete cellular margins. Low numbers of heavily granulated mast cells were also seen.

Three days later, the chinchilla was sedated with buprenorphine IM, and an excisional biopsy was attempted. During surgical exploration, the mass was discovered to be quite friable with deep margins that extended to the skull, preventing complete excision. An incisional biopsy specimen was submitted for histopathologic evaluation. The patient was treated with meloxicam (0.07 mL of a 0.5-mg/mL solution, IM) and diphenhydramine (0.03 mL of

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**History**

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a 50-mg/mL solution, SC), and meloxicam was dispensed for at-home administration.

Formulate differential diagnoses, then continue reading.

**Histopathologic Findings**

The incisional biopsy was trimmed and processed routinely, and sections were stained with H&E stain for histopathologic examination. Assessment of the mass revealed a poorly demarcated, highly cellular, infiltrative, and unencapsulated neoplasm composed of spindloid cells effacing most of the examined tissue (Figure 2). The neoplastic cells were arranged in long streams and bundles, creating mixed interwoven and herringbone patterns supported by a moderately dense fibrovascular stroma. Cell margins were indistinct, and cells had moderate to abundant eosinophilic fibrillar cytoplasm. Neoplastic cell nuclei were oval to elongate and contained finely stippled chromatin and a central magenta nucleolus. There were 18 mitoses/2.37 mm². Moderate anisocytosis and anisokaryosis were observed. Multiple small to moderate-size regions of lytic necrosis were present throughout the neoplasm, and occasional single-cell necrosis was also seen. Rare lymphocytes and plasma cells were observed scattered throughout the neoplasm.

Results of immunohistochemical staining for smooth muscle actin, desmin, and glial fibrillary acidic protein were negative. Approximately 50% of the neoplastic cells had faint to moderate cytoplasmic reactivity to immunohistochemical staining for S100.

**Diagnosis and Case Summary**

Diagnosis and case summary: subcutaneous fibrosarcoma ventral to the left ear in a captive, pet chinchilla.

**Comments**

Neoplastic processes have been documented infrequently in chinchillas, despite their substantially protracted life span, compared with life spans of other rodent species.1 Sporadic reports of neoplasms in chinchillas include cases of neuroblastoma, carcinoma, lipoma, lymphosarcoma, leiomyosarcoma, osteosarcoma, and hemangiosarcoma,1–3 but to our knowledge this case represents the first reported case of a fibrosarcoma in a chinchilla. Conditions associated more frequently with geriatric chinchillas may be underrepresented in the literature because most chinchillas have traditionally been used as laboratory animals or in the fur industry.1 As the popularity of chinchillas as a companion species increases, these conditions may be observed and described more frequently.1

In guinea pigs—which, like chinchillas, are hystricognathic rodents—and gerbils, the skin and subcutis are the second most commonly reported location for neoplasms, likely because neoplasms in these locations are easily noticed by owners and can be sampled in a minimally invasive manner.3 Fibrosarcomas, fibromas, fibrolipomas, undifferentiated sarcomas, and adenocarcinomas have all been described in guinea pigs.3 Histopathologic examination is particularly critical for the differentiation of mesenchymal neoplasms, especially in zoologic companion mammals, and when differentiating neoplasia from infectious diseases, such as cervical lymphadenitis caused by Streptococcus spp.2

Because of the scarcity of data on neoplasia in chinchillas, nothing is known about the biologic behavior of fibrosarcomas in this species. Fibrosarcomas arise from malignant transformation of fibroblasts and are a histologic subtype of soft tissue sarcoma in dogs.4 In dogs, fibrosarcomas arise predominantly in the skin, subcutis, and oral cavity.5 They are locally invasive and prone to recurrence in

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**Figure 2**—Photomicrographs of an incisional biopsy specimen from the mass. A—Neoplastic mesenchymal cells form long, interwoven streams and bundles. H&E stain; bar = 50 μm. B—Neoplastic cells have indistinct cell borders, moderate eosinophilic fibrillar cytoplasm, and an oval to elongate nucleus containing finely stippled chromatin and a central magenta nucleolus. A mitotic figure is present (arrow). H&E stain; bar = 20 μm.
dogs, and are known to metastasize in up to 20% of cases; however, this information cannot necessarily be extrapolated to apply to chinchillas.\(^6\),\(^7\)

Several studies in other mammalian species have been unable to prove, although some do suggest, that fibrosarcomas carry a worse prognosis than other subtypes of soft tissue sarcoma.\(^3\) In this case, the chinchilla was reported to be comfortable and acting normally, but not eating on its own, during a follow-up call 4 days after presentation. The following day, however, the chinchilla was presented in lateral recumbency with a low body temperature and large amounts of firm stool palpable in its abdomen. The chinchilla was placed on a heating pad, and staff administered fluids SC and 0.3 mL (20 mg) of simethicone because of suspected secondary gastrointestinal ileus. Unfortunately, 10 minutes after presentation, the chinchilla experienced cardiac arrest and died. A necropsy was not performed.

Discriminating characteristics of fibrosarcomas include distinctive, streaming bundles of spindle cells displayed in an interwoven or herringbone pattern and surrounded by a dense, collagenous stromal matrix.\(^3\) Frequently, however, soft tissue sarcomas, including fibrosarcomas, in dogs are poorly differentiated or even undifferentiated, lacking 1 or more of the aforementioned characteristics, and cannot be subtyped precisely. The usefulness of immunohistochemical staining is limited when subtyping soft tissue sarcomas in dogs because there is a lack of distinguishing markers. A 2013 study by Klopfleisch et al\(^8\) determined that 8 genes have higher expression in fibrosarcomas than in peripheral nerve sheath tumors, and that 7 nonoverlapping neuroectodermal differentiation-associated genes are more highly expressed in peripheral nerve sheath tumors than in fibrosarcomas.\(^3\) These markers may eventually be useful in differentiating fibrosarcomas from peripheral nerve sheath tumors; however, commercially available genotypic or phenotypic tests to characterize expression patterns of these genes are not currently available. A reliably sensitive and specific immunohistochemical marker for the diagnosis of fibrosarcomas has not yet been developed.

In our case, the fibrosarcoma was well differentiated histologically, with neoplastic spindleoid mesenchymal cells forming long streams and bundles in an interwoven or herringbone pattern. However, a striking feature of this case was the discordance between the cytologic and histologic findings. The presence of an individualized population of round cells with discrete cell borders prompted the initial cytologic interpretation of a round cell neoplasm, with primary concern for a poorly granulated mast cell neoplasm. Plasma cell neoplasia was also considered, given the frequency of binucleation. Only rare cells displayed a tapered appearance more compatible with fibrosarcoma, although these cells maintained discrete cytoplasmic margins. The magenta granules within the neoplastic cells were of unclear origin, although similar eosinophilic proteinaceous material has been identified within fibrosarcomas, osteosarcomas, and chondrosarcomas in dogs.\(^8\)

Because of the dissimilitude in cytologic and histologic findings, and for didactic purposes, immunohistochemical staining was performed. The negative staining results for smooth muscle actin, desmin, and glial fibrillary acidic protein ruled out smooth muscle neoplasia (smooth muscle actin and desmin) and a subset of glial fibrillary acidic protein–positive peripheral nerve sheath tumors. Approximately 50% of cells were positive for S100; however, both peripheral nerve sheath tumors and fibrosarcomas can display S100 positivity. Peripheral nerve sheath tumors typically display well-circumscribed, palisading whirls of wavy spindle cell bundles.\(^3\) Classic morphologic features, such as the herringbone and interwoven structures, facilitated the diagnosis of fibrosarcoma. Although the reason for the discordance between cytologic and histopathologic findings was not readily apparent in this case, it is possible that the fine-needle aspirate sampled a different tumor region that was more poorly differentiated and excluded from the incisional biopsy specimen.

References


