An 18-year-old 377-kg Arabian mare was presented to the referring veterinarian because of swelling of the left tarsus of 1 day’s duration. Abnormalities identified on physical examination included moderate effusion of the left tarsus and signs of mild pain on palpation of the joint. There was no evidence of lameness, and all other findings were clinically normal.

Phenylbutazone was prescribed, and reevaluation of the mare was recommended if the effusion did not resolve. The effusion initially improved slightly but returned with increased severity the following month. The referring veterinarian noted severe swelling in the left tarsocrural joint and performed arthrocentesis. Synovial fluid analysis revealed a total nucleated cell count of 1,320 cells/μL (reference range, \(< 1,000\) cells/μL) and total protein concentration of 3.2 g/dL (reference range, \(< 2\) g/dL). Cytologic examination of the fluid revealed a predominance of eosinophils with lower numbers of neutrophils, macrophages, and small lymphocytes as well as rare mast cells (Figure 1), consistent with eosinophilic inflammation. No bacteria were recovered on microbial culture. Left tarsal radiography was performed by the referring veterinarian, and no important abnormalities were noted. The mare was referred for further evaluation and ultrasonographic examination of the left tarsus.

**Clinical and Gross Findings**

On referral examination, a firm swelling was evident over the dorsomedial and plantarolateral aspects of the left tarsus. Ultrasonography revealed thickened and proliferative synovium, with a multinodular hyperechoic mass on the plantarolateral and on the dorsomedial aspects of the tibiotarsal joint. Left tibiotarsal arthroscopy was performed, and a multinodular mass lesion was identified in association with the synovium and the joint capsule. This mass encompassed the entire joint capsule and consisted of coalescing yellow, hardened granules lining proliferative synovium.

**Histopathologic Findings**

Histologic examination of the pinch biopsy specimens revealed dense collagenous connective tissue that was expanded by multifocal to coalescing areas of necrosis surrounded by granulomatous inflammation and occasional sheets of mast cells suspended in fibrotic tissue (Figure 2). Areas of necrosis comprised a large central core of degenerated eosinophils mixed with brightly eosinophilic granular debris surrounded by a rim of macrophages and occasional multinucleated giant cells. Occasionally, expansive sheets of monomorphic, well-differentiated mast cells were

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Figure 1—Photomicrograph of cytocentrifuged preparation of synovial fluid (A) collected from the left tibiotarsal joint of an 18-year-old Arabian mare and an image obtained during arthroscopy (B) of that joint. The mare was evaluated because of swelling of the left tarsus of several months’ duration. A—There is a predominance of eosinophils, with fewer neutrophils and macrophages. Wright-Giemsa stain; bar = 10 μm. B—Rongeurs are being used to debulk the multinodular mass that has multifocal yellow, hardened granules lining proliferative synovium.
scattered adjacent to areas of necrosis and expanded the stroma of hyperplastic synovial fronds and papillary projections. The mast cells were uniform, and no mitotic figures were observed. Identification of mast cells was confirmed with Giemsa staining, which revealed numerous purple (metachromatic) cytoplasmic granules; immunohistochemical analysis revealed that the cells had strong granular membranous and occasional punctate perinuclear immunostaining (Catalog No. CME 296, BioCare Medical) for expression of the KIT protein (CD117; Figure 3). All sections were infiltrated by modest numbers of eosinophils and low numbers of lymphocytes and plasma cells.

**Morphologic Diagnosis and Case Summary**

Morphologic diagnosis: multinodular mast cell neoplasia and multifocal to coalescing eosinophilic, granulomatous, mastocytic joint capsulitis and synovitis with necrosis, fibrosis, and synovial hyperplasia.

Case summary: synovial mast cell tumor in the left tibiotarsal joint in a mare.

**Comments**

After the arthroscopic procedure, the mare received phenylbutazone (3 mg/kg, PO, q 12 h) and trimethoprim-sulfamethoxazole (30 mg/kg, PO, q 12 h) for 10 days. On recheck examination 1 month later, the swelling in the affected joint had improved, and the owners reported that the mare was well at home. The remaining affected tissue within the joint was infiltrated with 30 mg of triamcinolone under ultrasonographic guidance, and the tibiotarsal joint was injected with 10 mg of triamcinolone 4 weeks later. Approximately 4 months after the arthroscopic procedure, the mare was returned to work (light riding).

Cytologic evidence of eosinophilic inflammation in synovial fluid is an uncommon finding. In the human and veterinary medical literature, eosinophilic synovitis has rarely been reported. In humans, eosinophilic synovitis has been associated with intraarticular injection of dye or air and has developed secondary to infectious diseases, including Lyme disease.\(^2,3\) In 2 horses hyperimmunized with *Streptococcus equi* M protein vaccine, eosinophilic synovitis developed secondary to intraarticular injection of streptococcal antigen.\(^4\) Equine eosinophilic synovitis secondary to an intraarticular injection of methylprednisolone acetate, in association with a mast cell tumor of the common carpal sheath of the digital flexor tendons, and of an undetermined cause (eosinophilic tibiotarsal synovitis) has also been reported.\(^5-7\) The mare had no known history of previous joint injections; therefore, an inflammatory reaction secondary to an articular injection was unlikely. Although eosinophilic synovitis is not a typical feature of Lyme disease in horses,\(^8,9\) the mare of the present report was tested for Lyme disease and the result was negative. Given the cytologic findings of eosinophilic synovitis and the ultrasonographic findings of a mass lesion within the tibiotarsal joint, a mast cell tumor and an eosinophilic granuloma were the main differential diagnoses. Interestingly, similarities have been noted histologically between eosinophilic granulomas and long-standing mast cell tumors in horses.\(^10,11\) However, sheets of mast cells are generally not present in eosinophilic granulomas, which
aids in their differentiation from mast cell tumors.\textsuperscript{10} Although the histologic findings for the mare of the present report overlapped with features associated with equine eosinophilic granulomas, the presence of dense sheets of mast cells supported a diagnosis of a mast cell tumor.

Mast cell tumors in horses are often located in the dermis and subcutaneous tissues and typically have benign biologic behavior.\textsuperscript{10–12} However, occasionally, such masses are described as mastocytosis or mastocytomas because it is unclear whether the proliferation of mast cells is a result of a hypersensitivity reaction, inflammation secondary to parasitic disease, or a neoplastic process.\textsuperscript{10,11} Therefore, the terms mast cell tumor, mastocytoma, and mastocytosis appear to be used relatively interchangeably throughout the medical literature. For consistency, the term mast cell tumor has been used throughout this report.

Although equine mast cell tumors are typically cutaneous in origin, ocular, nasal, nasopharyngeal, and tracheal tumor locations in horses have also been reported.\textsuperscript{11} Mast cell tumors have been described in equine synovial structures, including the tibiotarsal joint (1 horse) and the common carpal sheath of the digital flexor tendon (1 horse).\textsuperscript{6,13} In the previous report\textsuperscript{15} of a tibiotarsal mast cell tumor, the neoplasm was characterized histologically by dense sheets of mast cells with eosinophils distributed throughout, whereas histologic findings for the mare of the present report included evidence of notable necrosis and granulomatous inflammation with occasional sheets of mast cells. Initially, equine cutaneous mast cell tumors contain dense sheets of mast cells but, with time, increased numbers of eosinophils and associated collagenolysis are often noted.\textsuperscript{10} Chronic lesions may also contain cellular necrosis and granulomatous inflammation.\textsuperscript{9} Therefore, the histologic findings for the mare of the present report were supportive of a long-standing mast cell tumor.

Given the rarity of synovial mast cell tumors in horses, detailed investigations of the prognostic factors for these tumors were not identified in a literature review. Information regarding cutaneous mast cell tumors is more abundant. Cutaneous mast cell tumors are common in many domestic animals; in horses, they are relatively rare\textsuperscript{12} and generally considered clinically benign.\textsuperscript{9} For dogs with cutaneous mast cell tumors, 2 histologic grading systems have been established, and the grades are suggested to be predictive of clinical outcome.\textsuperscript{14,15} Additionally, aberrant KIT expression and high proliferation indices in canine cutaneous mast cell tumors have also been associated with more aggressive tumor behavior.\textsuperscript{16} There may be associations of KIT expression and histologic features with the biologic behavior of these lesions in horses\textsuperscript{7,18}; however, large prospective studies are needed for further support of such relationships.

Treatment of horses with mast cell tumors can include surgical excision, intralesional injection of corticosteroids, radiotherapy, cryosurgery, and administration of chemotherapeutics including cisplatin.\textsuperscript{5,6,12,13} Systemic antihistamine treatment is also used in some cases to decrease mast cell degranulation and associated inflammation.\textsuperscript{13} Owing to the location and infiltrative nature of the mass in the mare of the present report, intralesional and intraarticular administration of glucocorticoids was performed as adjunct treatments.

An eosinophilic granuloma was a differential diagnosis for the mass in mare of the present report. Also called nodular necrobiosis and collagenolytic granuloma, eosinophilic granuloma is a common nodular skin disease in horses,\textsuperscript{19} typically considered idiopathic, but may be related to hypersensitivity reactions, trauma, or atopy.\textsuperscript{20} Nodules are most often observed in the region of the dorsal margins of the scapulae (ie, on the withers), back, and sides of the neck but can occur in many other body areas, including joint capsules.\textsuperscript{20,21} In a case series of 3 horses with eosinophilic granulomas, it was hypothesized that the lesions developed as a result of a hypersensitivity reaction to silicone-coated hypodermic needles.\textsuperscript{22}

The case described in the present report involved eosinophilic synovitis in conjunction with mast cell neoplasia of the left tibiotarsal joint capsule of a horse. Cytologic evaluation of synovial fluid samples and ultrasonographic imaging of joints in cases of synovial effusion of unknown causes should not be undervalued. For the mare of the present report, the results of such diagnostic tests supported the diagnostic need for arthroscopic examination and synovial biopsy with histologic examination of collected specimens.

References