Synovial Hemangioma Accompanied by Cruciate Ligament Injury in a Dog

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ABSTRACT. We report here the clinical presentation and successful surgical management of synovial hemangioma accompanied by cruciate ligament injury in a dog. Surgical correction of cruciate ligament injury was performed after removing torn cruciate ligaments, synovial mass and masses attached to the ligaments and distal femoral articular cartilage. At 10 months, the dog has showed no evidence of recurrence in the stifle joint. Synovial hemangioma, although a seemingly rare cause of stifle joint pathology, should be considered in the differential diagnosis for cruciate ligament injury when a circumscribed intra-articular soft tissue mass is evident radiographically with cranial or caudal drawer motion. This is the first case report in a dog to describe synovial hemangioma accompanied by cruciate ligament injury.

KEY WORDS: canine, cruciate ligament injury, synovial hemangioma.


In canine joints, synovial histiocytic sarcoma and synovial sarcoma are considered the most common tumors, followed by synovial cell sarcoma, myxomas, malignant fibrous histiocytoma, undifferentiated sarcoma, fibrosarcoma and chondrosarcoma [2]. Vascular tumors are common in the skin and subcutis; however, rarely recognized in the canine synovium [4]. In humans, synovial hemangioma is a rare benign vascular tumor and most commonly involving the knee [6]. To the authors’ knowledge, canine synovial hemangioma has been described in only two case reports [1, 4]. The purpose of this case report is to describe the clinical presentation and successful surgical management of synovial hemangioma accompanied by cruciate ligament injury in a dog. This is the first case report in a dog to describe synovial hemangioma accompanied by cruciate ligament injury.

A 27-kg, 5-year-old, intact female Jindo dog was presented for evaluation of progressive left pelvic limb lameness of a few weeks’ duration. The owner reported that the dog showed initial lameness on a walk. On physical examination, the dog was reluctant to walk and showed non-weight bearing lameness. Soft tissue swelling around the stifle joint and marked muscle atrophy of the left pelvic limb were obvious. There were both cranial and caudal drawer signs with pain that was elicited on the left stifle joint manipulation. Mediolateral radiographic projection of the left pelvic limb revealed a well-defined mass with soft tissue opacity in the proximal aspect of the infrapatellar fat pad, caudal tibial displacement in a plain view and cranial subluxation of the tibial tuberosity in a stress view (Fig. 1). There was no evidence of hemorrhrosis on synovial fluid aspiration. Synovial fluid cytology revealed predominant lymphocytes and no tumor cells.

Surgical exploration of the stifle joint was performed through an arthrotomy lateral to the patellar ligament. Pedunculated masses located in the proximal aspect of the infrapatellar fat pad were attached to the synovial membrane, cruciate ligaments and distal femoral articular cartilage (Fig. 2). Cranial and caudal cruciate ligament injury and degenerative changes including cartilage defects were identified (Fig. 2). Masses attached to the synovial membrane were removed with samples of adjacent synovial membrane. The torn cruciate ligaments and masses attached to the ligaments were removed. The masses attached to distal femoral articular cartilage were debrided using a curette. The removed masses were submitted for microscopic evaluation.

The stifle joint was then lavaged with warmed sterile saline. Extra-articular reconstruction techniques were performed for cranial and caudal cruciate ligaments injury, respectively. To prevent cranial drawer motion, two tunnels were drilled; one tunnel was created from the caudal portion of the lateral femoral condyle to the distal diaphysis of the medial femur, and the other tunnel was formed from the cranio proximal edge of the extensor groove of the lateral tibia to the cranioproximal portion of the medial tibia. The stifle was then stabilized using a nylon suture placed through the tunnels and two surgical buttons to secure the nylon. Then, two nylon sutures were placed to eliminate caudal drawer motion from the patellar tendon, just distal to the patella, to two bone anchors placed in the bilateral caudoproximal portions of the tibia, respectively.

Formalin-fixed, paraffin-embedded tissue sections were...
stained with hematoxyline and eosin. Variable sized vascular spaces were filled with erythrocytes, lined by a single layer of well-differentiated endothelial cells, and separated by fibrous connective tissue (Fig. 3). Histopathology results described the synovial mass as a synovial hemangioma. Necrosis of synoviocytes and fibrosis of the synovial membrane were observed. The new vascular channels were infiltrated by numerous lymphoplasmacytes and some neutrophils in the mass attached to the ruptured cruciate ligament (Fig. 3). Loose, necrotic connective tissues and perivascular lymphoplasmacytes were identified in the ruptured cruciate ligament (Fig. 3).

The dog began walking on four legs 3 days postoperatively and had a near normal gait at 14-day recheck. Recheck examinations were scheduled monthly. At 10 months, no evidence of soft tissue swelling around the stifle joint was
noted. There was an improvement in muscle mass, especially in the quadriceps femoris and biceps femoris muscles.

Synovial hemangioma is defined as a benign proliferation of blood vessels within the synovium of a joint or bursa [2]. Hemangioma arises from vascular endothelial cells of the dermis or subcutaneous tissues [7]. Synovial hemangioma can be classified as the deep hemangioma including usually skeletal muscle, or rarely bone, nerve, lymph node or synovium [4]. In young horses, synovial hemangioma has been recognized in carpal and digital tendon sheaths [5]. In human medicine, hemangioma of bone constitutes 1% of all primary bone tumors [9]. The soft tissue types are even less common, and especially synovial linings are less frequent sites of origin [9]. Since the first case was described by Bouchut in 1856, fewer than 200 cases have been reported [10]. Canine synovial hemangioma is not a commonly recognized one and has been reported in only two dogs [1, 4]. Furthermore, even if hemangioma is a common skin or subcutis tumor, dogs are unlikely to develop juvenile hemangioma in skin, subcutis or deeper tissue [4]. The dog of this case report was 5-year-old at presentation.

Clinical signs associated with synovial hemangioma involve soft-tissue swelling around the stifle, lameness, muscle atrophy and pain on stifle manipulation [1, 4, 8]. In this case report, there was instability of stifle joint, which was elicited on stifle manipulation. Instability of the stifle joint usually occurs as a result of injury of a cruciate ligament [3]. In human medicine, there was a case report of intra-articular knee hemangioma originating from the anterior cruciate ligament [8]. In this case report, histopathology results described that the synovial mass was attached to the ruptured cruciate ligament, and loose, necrotic connective tissues and perivascular lymphoplasmacytes were identified in the ruptured cruciate ligament. If possible causes for the cruciate ligament injury are a direct detrimental effect of intra-articular stifle hemangioma on cruciate ligament or degenerative changes secondary to intra-articular stifle hemangioma, instability of stifle joint can be a clinical sign associated with synovial hemangioma.

Diagnosis of synovial hemangioma is frequently difficult and delayed [10]. Nonspecific presentations are also common and may lead to a diagnostic delay of many years [9]. Usually, the dog associated with synovial hemangioma presents with a history of recurrent atraumatic bloody effusions [1, 4]. The diagnosis is often based on evidence of a soft tissue mass on radiographs concurrent with hemarthrosis; however, a soft tissue mass evident on radiographs and hemarthrosis can be identified in the more common canine articular tumors such as histiocytic sarcoma, myxomas, fibrosarcoma, hemangiosarcoma and osteosarcoma [1, 2, 4]. In this case report, there was evidence of a soft tissue mass on radiographs; however, no hemarthrosis was identified on synovial fluid aspiration.

Fig. 3. Synovial hemangioma of stifle. Variable sized vascular spaces are filled with erythrocytes, lined by a single layer of well-differentiated endothelial cells, and separated by fibrous connective tissue (a). New vascular channels are infiltrated by numerous lymphoplasmacytes and some neutrophils in mass (left) attached to the ruptured cruciate ligament (right) (b). Loose, necrotic connective tissues and perivascular lymphoplasmacytes are identified in the ruptured cruciate ligament (c). Hematoxylin and eosin stain. Bars=70 µm.
In human medicine, a magnetic resonance imaging, surgical exploration and histopathology have been described for the diagnosis and management of a 12-year-old boy with synovial hemangioma associated with no bloody effusion [9]. Hemarthrosis should be imperatively necessary for the diagnosis of hemangioma; however, hemarthrosis might not be concurrent with hemangioma. Diagnosis of synovial hemangioma should be based on overall diagnostic tools such as clinical findings, diagnostic imaging, synovial fluid characteristics including hemarthrosis and histologic findings.

In this case report, excision, debridement and joint lavage eliminated the hemangioma, lameness, soft tissue swelling, muscle atrophy and pain for at least 10 months; however, some tumor tissues or tumor cells would remain around the synovial membrane, torn cruciate ligaments and distal femoral articular cartilage that the tumor tissues were attached to. Continuous observation for recurrent lameness and pain should be considered on the long-term follow-up.

Based on human cases and findings in this case report, surgical excision is effective treatment for the dogs with synovial hemangioma and recommended as soon as possible to avoid the risk of degenerative changes in cartilage. Synovial hemangioma, although a seemingly rare cause of stifle joint pathology, should be considered in the differential diagnosis for cruciate ligament injury when a circumscribed intra-articular soft tissue mass is evident radiographically with cranial or caudal drawer motion.

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REFERENCES