Synovial sarcoma is a well-characterized malignant soft-tissue sarcoma that often occurs in close proximity to large joints of the extremities and is most prevalent in adolescents and young adults aged 15 to 40 years. Males are more often affected than females at a rate of 1.2:1. Synovial sarcoma accounts for approximately 8% to 10% of all sarcomas, and approximately 6% of all foot and ankle soft-tissue tumors, without race predilection. Synovial sarcomas traditionally have been considered to have a poor prognosis; however, in recent years, not all synovial sarcomas share the same dismal outcome. Although, it is often found to be in close association with tendon sheaths, bursa, and joint capsules, it is unusual for it to invade joints. Joint cavity involvement has been reported to occur in less than 5% of patients. Synovial sarcomas of the extremities have a poorer prognosis than do those involving the head and neck. In the extremities, the most common site is the knee, followed by the ankle and foot, elbow, and upper arm and shoulder.

Typically, patients present with a long history of a slow-growing soft-tissue mass, often giving a false impression as to the degree of malignancy, delaying diagnosis and therapy. Because the mass may have a benign appearance on imaging studies, varying in size, and with pain symptoms similar to a trauma, these cases are often incorrectly diagnosed initially as benign processes such as myositis, hematoma, synovitis, tendonitis, or bursitis.

In most cases, the disease duration before surgery ranges from 2 to 4 years, with some cases reported with symptoms at the tumor site as long as 20 years before surgery. Synovial sarcomas frequently have a fine sandlike or flourlike calcification, which may be visible on radiographs or computed tomographic (CT) scans. They are also quite vascular and generally demonstrate considerable enhancement with intravenous contrast on CT and magnetic resonance imaging (MRI). The examination of choice is MRI owing to its soft-tissue contrast, its ability to depict multiple planes of lesion invasion, and its ability to evaluate the extent of the tumor and involvement with other related structures. On T1-weighted images, these tumors typically show low-signal intensity, unless recent hemorrhage has occurred; on T2-weighted images, synovial sarcoma shows increased signal intensity. Owing to the vascular and hemorrhagic nature of these lesions, fluid levels are not in-

We report a case of a 40-year-old woman with synovial sarcoma who presented with neural symptoms in the medial aspect of the right foot and ankle. The radiographic appearance of the foot and ankle was unremarkable, but magnetic resonance imaging showed a relatively well-defined enhancing lesion in the plantar soft tissues extending from the master knot of Henry to the posterior tibialis tendon. After orthopedic oncologic evaluation and workup, the patient was ultimately treated with a transtibial amputation, and no evidence of recurrence or metastatic disease was seen at 6-month follow-up. (J Am Podiatr Med Assoc 100(3): 216-219, 2010)

*Division of Podiatric Medicine and Surgery, Department of Orthopaedics, The University of Texas Health Science Center at San Antonio, San Antonio, TX.

Corresponding author: Thomas Zgonis, DPM, Division of Podiatric Medicine and Surgery, Department of Orthopaedics, The University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Dr, MCS 7776, San Antonio, TX 78229. (E-mail: zgonis@uthscsa.edu)
frequently demonstrated. The margination of these tumors is variable, but areas of invasion of the surrounding structures should be sought. Encasement of vascular and tendon structures can occur, as can invasion of surrounding bony structures. When contraindications for MRI exist, CT can be used instead.\(^6\) Metastases are uncommon, but they occur generally involving the lungs and lymph nodes. Usually, there are few anatomical barriers, and synovial sarcoma can spread to surrounding tissues. However, small lesions that are noticed early in the distal lower extremity are less likely to metastasize because of limited blood supply. Lymph node involvement has been reported in large studies\(^5,7\) to occur in 3% to 27% of patients. Some authors\(^5,8\) have suggested sentinel node mapping with a sampling of lymph nodes. Tumor biopsy is commonly performed for definitive histologic diagnosis of the tumor.\(^6\)

Synovial sarcoma is named for its microscopic resemblance to synovial tissue and is thought to arise from pluripotential mesenchymal cells.\(^8\) Several distinct histologic types have been described, including classic biphasic, monophasic fibrous, monophasic epithelial, and poorly differentiated. Several studies\(^9,10\) demonstrate a more favorable cancer survival rate for the biphasic histologic subtype versus the monophasic subtype.

In addition, some studies\(^8,10\) using cytogenetics have proved that certain molecular genetic features are related to the course of the disease and, thus, may be used as a prognostic indicator. At least 90% of patients have a specific translocation not seen in other sarcomas. This translocation involves the SYT gene on chromosome 18 and the SSX1 or SSX2 gene on chromosome X.\(^10\)

**Case Report**

We describe an uncommon case involving a monophasic variant of a synovial sarcoma that presented as a slow-growing soft-tissue mass with an atypical nerve type of pain on the medial plantar aspect of the right foot and ankle.

A previously healthy 40-year-old woman had been seen by other treating physicians because of increasing deep pain in the right foot. The patient had no history of trauma to the area. At initial presentation to the outpatient clinic, she had severe pain about the medial portion of her right foot and ankle for approximately 2.5 years that worsened during the past 6 months. Footwear modifications were tried, but the patient could not tolerate arch supports and complained of radiating pain from the right foot into her leg. Her family history was unremarkable, but she did have a surgical history of melanoma excision. Physical examination revealed exquisite tenderness on palpation over the medial arch of her right foot, with slight soft-tissue enlargement and edema. However, no discrete mass was palpable. She had no palpable lower-extremity lymph nodes, and her neurovascular status was grossly intact.

Radiographs of the right foot and ankle were unremarkable except for soft-tissue swelling over the dorsal forefoot (Fig. 1A and B). An MRI without contrast revealed a soft-tissue mass in the medial deep plantar surface of the foot. It was poorly defined, diffusely enhanced, and moderately heterogeneous. The region of abnormal signal intensity was located deep to the posterior tibialis tendon at the navicular attachment. Because a synovial or ganglion cyst could not be excluded, a subsequent MRI with contrast was performed for enhanced visualization of the soft-tissue mass. The MRI with contrast study showed a 1.3 × 1.1 × 1.5-cm relatively well-defined enhancing lesion in the plantar soft tissues abutting the flexor digitorum and flexor hallucis longus tendons at the level of Henry's knot extending superiorly to the posterior tibialis tendon. This study favored synovial sarcoma over a giant cell tumor of the tendon sheath (Fig. 1C). The patient was referred to the orthopedic oncology department for metastatic workup and further investigation. Further studies, including CT of the abdomen and pelvis, showed no signs of intra-abdominal or pelvic metastatic disease. However, the contrast-enhanced chest CT revealed multiple small pulmonary nodules that could not exclude metastatic disease given the patient's history.

The patient proceeded with an incisional biopsy, which revealed a preliminary diagnosis of synovial sarcoma. At scanning magnification, the hematoxylin and eosin–stained sections from the tumor showed cellular proliferation of spindle-shaped cells arranged as fascicles, with the suggestion of a storiform growth pattern in some areas. No epithelial elements were identified. Also, no prominent vascular component was present (Fig. 1D). At high power, the spindle-shaped cells showed elongated, oval nuclei and indistinct cytoplasm. Some areas showed increased numbers of mast cells (Fig. 1E). An immunohistochemical stain for epithelial membrane antigen showed strong and diffuse positivity in the tumor cells (Fig. 1F). Other immunohistochemical stains, including S-100, were negative in the tumor cells (Fig. 1G and H). The morphological features and immunohistochemical profile were consistent with a synovial sarcoma, monophasic variant. A right transtibial amputation was then performed as the definitive treatment; the
patient healed uneventfully and without any further surgery after more than 6 months of follow-up. A repeated chest CT at the last visit showed no evidence of metastatic disease in the thorax.

Discussion

This case report is of particular interest because malignant tumors originating in the foot are not commonly reported in the podiatric medical literature. This patient had a long history of nerve type of pain in the presence of a slowly growing plantar and medial soft-tissue pedal mass. Synovial sarcoma of the foot is commonly misdiagnosed because it is slow growing, has a benign appearance on imaging studies, can vary in size, and causes pain similar to that associated with trauma. Retaining awareness of this tumor is essential particularly when evaluating young or athletic patients aged 15 to 40 years. Last, appropriate imaging diagnosis, referral, and consultation for metastatic workups are also essential for diagnosis and optimal treatment.

Figure 1 A–D. Preoperative right foot (A) and ankle (B) views at initial presentation with an unremarkable appearance except for a reported soft-tissue swelling over the dorsal forefoot. C, A T1-weighted sagittal magnetic resonance image with contrast showing the relatively well-defined enhancing lesion in the plantar soft tissues of the right foot. Histologic features were consistent with a monophasic-variant synovial sarcoma. At scanning magnification, the hematoxylin and eosin–stained sections from the tumor showed cellular proliferation of spindle-shaped cells arranged as fascicles, with the suggestion of a storiform growth pattern in some areas. D, No epithelial elements were identified. (Figure continues on next page.)