

Accessory soleus muscle mimicking a soft tissue tumor

A report of 2 patients

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An accessory soleus muscle is rare, and may present as a soft tissue tumor at the ankle. We report 2 patients in whom the diagnosis was not considered until after surgical exploration. Magnetic resonance

imaging (MRI) after biopsy clearly identified muscle tissue, and electromyography showed normal motor unit activity.

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Anomalous muscles may simulate soft tissue tumors, but are often not included in the differential diagnosis because of their rarity. They occur mostly in the upper limbs (Thomas 1958, Jones 1959, Lipscomb 1960, Saitta and Baum 1962, Dunn and Evarts 1963). In 1965, Dunn described 2 patients with bilateral accessory soleus muscles behind the medial malleolus. Since then, some 30 other patients, all young, have been reported. In most cases the diagnosis was made after surgical exploration.

Case 1

A 25-year-old woman visited the hospital because friends had noticed a swelling at her right ankle. She did not have any complaints, nor could she remember any trauma. Examination revealed a firm subcutaneous mass, 5 × 3 cm, at the posteromedial side of the ankle. The mass became tight on plantar flexion of the foot (Figure 1 A). A similar, but smaller swelling, 3 × 1 cm, at the left ankle was not noticed at that time. CT



Soft-tissue swelling at the posteromedial side of the right ankle (after incisional biopsy) in Case 1.



Magnetic resonance imaging in Case 2 gave a definite diagnosis of normal muscle tissue.

showed a mass posteromedial the ankle, which could not be distinguished from surrounding muscle. An accessory muscle was not considered, and a biopsy was taken to exclude a malignant tumor. At surgery, the swelling proved to be a muscle with a separate aponeurosis and a short tendon, which inserted in the calcaneus. A microscopic examination showed a normal skeletal muscle. After wound healing, MRI and electromyographic studies were done. The final diagnosis was accessory soleus muscle.

Case 2

A 23-year-old man visited the outpatient clinic because of a swelling at his right ankle of 6 months' duration. The swelling was not painful except when he was running. There was a firm subcutaneous mass, 6 × 4 cm, at the posteromedial side of the ankle anterior to the Achilles tendon. The joint had a full range of motion. On the assumption of a soft tissue tumor, CT was performed, which confirmed the presence of a mass anteromedial to the Achilles tendon with the same density as muscle tissue. To exclude a sarcoma, an incisional biopsy was taken during which normal skeletal muscle was observed. Microscopic examination of the tissue confirmed this finding. Wound healing was uneventful. Postoperatively, the patient did not have any complaints. A follow-up examination at 1.5 years showed that the swelling was unchanged. At the same time, a small swelling was found at the left ankle.

Electromyographic studies revealed motor neuron activity on plantar flexion in both the gastrocnemius and the accessory soleus muscle. Stimulation of the tibial nerve in the popliteal fossa produced a response in both muscles, indicating a common innervation. MRI studies (Figure 1 B) confirmed the diagnosis of accessory soleus muscle.

Discussion

Anomalous muscles may present as soft tissue tumors and cause unnecessary surgery. In the lower limbs, almost all the reported anomalies are anatomic variations of the soleus muscle. The soleus muscle inserts into the medial part of the Achilles tendon (Cummins et al. 1946). In the embryo, the single anlage of this muscle may split and an extra fasciculus or even a supernumerary muscle may ensue (Gordon and Matheson 1973). These anomalies have been

described in anatomic textbooks (Ternowsky and Sadikow 1926, Lang and Wachsmuth 1972). They were often not clinically apparent, but were usually discovered during routine anatomic dissections.

A supernumerary, or accessory, soleus muscle seems to be rare. In a large series of Achilles tendon dissections, not one accessory soleus muscle was reported (Cummins et al. 1946). Although an accessory soleus muscle is presumably present at birth, it has not been reported in children under 9 years of age (Bonnell and Cruess 1969). The swelling and the onset of symptoms may be due to the increase in muscle mass during adolescence or to vigorous physical training (Romanus et al. 1986).

The most common reported symptom was pain (Romanus et al. 1986). No patient had pain when resting, but most people experienced an aching pain on strenuous activity. This has been thought to be a claudicatory type of pain due to borderline blood supply to the muscle (Gordon and Matheson 1973). However, postexercise swelling of the engorged muscle inside the fascial sheath could certainly have been the pain-producing mechanism, because patients became asymptomatic following biopsy with splitting of the overlying fascia (Ger and Sedlin 1976). With the aim of circumventing surgery, additional examinations have been performed. Ger and Sedlin (1976) reported the electromyographic examination of an accessory soleus muscle after surgical exploration. They found simultaneous motor-neuron activity in both the soleus and the accessory soleus muscle on forceful plantar flexion. Stimulation of the posterior tibial nerve was followed by a response of both muscles with approximately the same latency.

In our patients, we used the gastrocnemius muscle instead of the soleus muscle, but the electromyographic findings were similar to those of Ger and Sedlin (1976). CT can clearly identify muscle tissue (Dokter and Lindau 1981); this was also observed in both of our patients. Because soft tissue tumors and muscle tissue may have the same attenuation at CT (Pettersson et al. 1987), a biopsy was considered necessary to exclude malignancy in our cases. However, in neither patient was intravenous contrast used during the scanning.

MRI has superior tissue-characterization properties, and gave a definite diagnosis of normal muscle tissue in both patients. Pettersson (1987), who published the first report on the MRI findings of an accessory soleus muscle, stated that the MRI appearance is sufficiently characteristic to obviate biopsy. Imaging in the sagittal plane is an extra advantage of MRI.

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