ISOLATED RUPTURE OF THE POPLITEUS WITH POSTERIOR TIBIAL NERVE PALSY

WILLIAM B. GEISSLER, SALVATORE R. CORSO, RICHARD B. CASPARI

From Orthopaedic Research of Virginia

We report the case of a 59-year-old man with severe knee pain and inactivity to flex his toes or invert his plantar flexed foot after an external rotation injury to his knee. MRI showed rupture of the popliteus with a haematoma compressing the neurovascular bundle in the proximal calf, and electromyography demonstrated signs of an axonotmesis of the posterior tibial nerve. There was progressive nerve recovery over 24 weeks.

Isolated rupture of the popliteus should be considered in any patient with an acute haemarthrosis, lateral tenderness and a stable knee, especially after an external rotation injury.

ANATOMY

Popliteus arises from the posteromedial surface of the proximal tibia, and the direct expansion of the semimembranosus insertion blends into its medial aponeurosis. The popliteus tendon is inserted into the lateral femoral condyle and the head of the fibula as part of the arcuate ligament complex. Insertion of the popliteus into the lateral meniscus is disputed. Stäubli and Birrer (1990) describe the presence of superior and inferior popliteomeniscal fascicles but Tria, Johnson and Zawadsky (1989) reported that 82.5% of cadaver specimens showed no major attachment from the popliteus into the lateral meniscus and questioned any protective role in withdrawing the meniscus from the joint space during knee flexion.

The function of the popliteus in initiating and maintaining internal rotation of the tibia on the femur was first described by Last (1950), and has been confirmed by gait and electromyographic studies (Basmajian and Lovejoy 1971; Mann and Hagy 1977). Popliteus is an important stabiliser of the posterolateral corner of the knee: when it is stimulated electrically, it produces an active 'pivot shift' (Peterson, Pitman and Gold 1984).

The sciatic nerve divides into its main branches, the tibial and common peroneal nerves, in the lower third of the thigh. The tibial nerve enters the popliteal fossa, lying superficial and lateral to the popliteal artery and vein. It has four or five muscular branches arising between the two heads of the gastrocnemius, supplying it and the soleus, plantaris, and popliteus. At the level of the knee joint, the tibial nerve is in close association with the popliteal artery, and then passes deep to the arch of the soleus, being closely applied to the popliteus. Distal to popliteus, the nerve supplies more muscular branches, either separately or by a common trunk, to the soleus, tibialis posterior, flexor digitorum longus, and flexor hallucis longus. The branch to the last muscle accompanies the peroneal artery.

CASE HISTORY

A 59-year-old former professional player of American football complained of severe pain in the right knee and swelling of his leg two days after an injury sustained while playing tennis. He recalled an external rotation twisting injury to his partially flexed knee. He had no previous history of an injury to this knee.
Figure 1a – A T1-weighted sagittal MR scan of the right knee showing enlargement of the popliteus image (long arrow). The neurovascular bundle passes along the posterior border of the muscle (short arrow). There is an area of increased signal intensity in the upper part of popliteus, probably representing subacute haemorrhage (curved arrow). Figure 1b – A T2-weighted sagittal MR scan shows a diffuse increase in signal in the enlarged popliteus which probably represents oedema (curved arrow).

On examination, there was a moderate effusion and pain at the extremes of motion. There was well-localised tenderness along the posterolateral joint line, but no mediolateral or rotatory instability. There was no active motor function of the tibialis posterior, flexor digitorum longus, or flexor hallucis longus, but normal function of the gastrocnemius and soleus. Sensation was reduced over the medial and plantar aspects of the foot. The compartment pressures were equal to those in the contralateral leg. Radiographs showed advanced degenerative changes in the knee. A venogram demonstrated obstruction of the deep venous system at knee level with the appearance of extrinsic compression: no intraluminal filling defects were identified. MRI showed rupture of the popliteus muscle with a haematoma in the proximal calf pressing against the neurovascular bundle (Figures 1 and 2).

After six weeks of conservative management, the patient had decreased pain, but no neurological improvement. Electromyography showed denervation of tibialis posterior, flexor digitorum longus, and flexor hallucis longus consistent with axonotmesis of the posterior tibial nerve. At 12 weeks, he had developed paraesthesia radiating down the medial calf into the medial plantar aspect of his foot and Tinel's sign was positive at mid-calf level. Repeated electromyography showed no signs of reinnervation of the calf musculature. By 18 weeks the patient...
was able to flex his toes and invert his plantar-flexed heel, and electromyography showed reinnervation of the tibialis posterior and the flexor digitorum longus. Function of the flexor hallucis longus was regained at 24 weeks.

DISCUSSION

Isolated rupture of the popliteus is rarely diagnosed, but the increased use of MRI for knee injuries will make its diagnosis more common. The mechanism of injury in our patient, as previously reported, involved sudden external rotation of the tibia with a partially flexed weight-bearing knee (Rose and Parisien 1988). The possibility of such an isolated rupture should be considered in any patient who presents with an acute haemarthrosis and a stable knee.

In other reported cases, arthroscopy was used to make or confirm the diagnosis (Naver and Aalberg 1985; Rose and Parisien 1988; Gruel 1990). Burstein and Fischer (1990) performed MRI in their patient and showed an area of increased signal in the popliteus and a collection of fluid between this muscle and the lateral head of the gastrocnemius. Arthroscopy was performed after the patient's symptoms recurred. The popliteus tendon appeared to be normal when viewed through the lateral compartment and the rupture was only seen when the arthroscope was placed in the lateral gutter. Gruel (1990) confirmed this observation in two patients with popliteus tendon avulsions associated with an osteochondral fragment.

Management of isolated rupture of the popliteus is not well defined. A repair was performed in one reported patient (Rose and Parisien 1988). Our patient, and all the others managed conservatively, did well.

Conclusions. The diagnosis of isolated rupture of the popliteus should be considered in any patient with an acute haemarthrosis and a stable knee, especially after a forced external rotation injury.

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REFERENCES


