

Peroneal Tendon Subluxation

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INTRODUCTION

Peroneal tendon subluxation/ instability can be challenging to diagnose depending on the level of disruption and deformity present. Subtle cases will appear in the clinical setting similar to a lateral ankle sprain. This can cause a delay in care and poorer outcomes for patients.

ANATOMY

The peroneus longus and brevis muscle bellies travel posterior to the fibula and fibular groove. At the fibular groove they are combined into one sheath; they separate usually at the level of the peroneal tubercle. They are bound superiorly by the superior peroneal retinaculum (SPR) and inferiorly by the calcaneofibular ligament (CFL) and the inferior peroneal retinaculum (IPR). The superior peroneal retinaculum has fibers that extend superiorly, posteriorly, and medially approximately 3.5 cm from the distal tip of the fibula (1). These fibers will merge with the deep transverse fascia of the leg. The retromalleolar groove can be multiple shapes, most commonly it is concave. Other shapes include flat, convex, or with a ridge. Some authors attribute groove shape to causing peroneal subluxation. Another theory involves fibular rotation. An externally rotated fibula allows for relaxation of the SPR and would allow for subluxation more than an internally rotated fibula. An internally rotated fibula instead leads to longitudinal tears (2). A magnetic resonance imaging (MRI) study by Adachi and colleagues demonstrated no significant difference in the shape of the groove for patients with and without subluxation (3). Two other anatomic variants to discuss include a low lying muscle belly or accessory muscle, such as a peroneus quartus. Overcrowding can with extra the muscle or tendon in the SPR and can lead to instability (4).

CLINICAL PRESENTATION

The most common mechanism is a dorsiflexed foot with contraction of the peroneal tendons. This injury is more common in athletes than non-athletes. Acute symptoms include swelling, bruising, popping, or snapping sensations or sounds. Chronic injuries will show subluxation or complete dislocation with a provocation test with or without pain. Patients in either scenario will have a complaint of instability.

IMAGING AND CLASSIFICATION

Radiographs can be used to identify an avulsion and rule out fracture. Computed tomography (CT) scan and MRI are both viable options for evaluation. MRI better evaluates the health of the peroneal tendons and CT scan demonstrates the shape and position of the fibula and fibular groove. While advanced imaging is a great adjunct, the diagnosis is mainly clinical. For more subtle injuries where the tendons do not completely sublux or dislocate the fibula, dynamic ultrasound can be used for diagnosing intrasheath instability (5).

Eckert and Davis created a classification in 1976 for SPR injuries (6). Grade I injuries involve elevation of the retinaculum from the lateral malleolus and the tendons can dislocate between the bone and periosteum. Grade II injuries involve the fibrocartilaginous ridge elevating with the retinaculum and tendon subluxed between it and the fibula. Grade III injuries involve a cortical fibular avulsion along with the retinaculum. In 1987 Oden modified the classification (7). Grade II involved a tear of the retinaculum as opposed to periosteal elevation, and a Grade IV injury was added, involving a tear of the SPR from its posterior attachment.

NONOPERATIVE TREATMENT

Recommendations include immobilization in a short-leg nonwalking cast with the foot plantarflexed and inverted for 6 weeks or longer. This is then followed by aggressive physical therapy. Most studies show minimal improvement after conservative management. Escalas, et al showed that only 26% of cases improved with conservative management (8).

OPERATIVE MANAGEMENT

Direct Repair

Direct repair of the SPR can be accomplished with simple suture or application of bone anchors. This is ideal in an acute injury setting and in athletes. Some surgeons recommend utilizing less suture material and using a minimalistic approach. This can be combined with repair of the tendons if needed. It is important to ensure that suture

material is limited to prevent intra-tendinous foreign body reaction and later tendinosis. It is also imperative to ensure that the repair does not entrap the tendons.

Indirect Repair

Indirect repair can be accomplished with tendon grafting, or rerouting with a goal of reinforcing an incompetent SPR. This is usually reserved for revision cases. This can involve using a portion of the peroneus brevis tendon, a peroneus quartus tendon if present, slip of the Achilles tendon, or allograft (9,10).

Fibular Groove Deepening, Bone Block, Fibula Osteotomies

Fibular groove deepening has gained popularity over bone block and fibular osteotomies, which usually leave bleeding bone in the surgical site and can lead to complications (11). The original groove deepening was described by Zollner and Clancy (12). It involved creating an osteoperiosteal flap of the fibula and curetting out some of the cancellous bone. Newer techniques do not involve a periosteal flap. Shawen and Anderson popularized utilizing a drill bit to ream the fibula and then tamp to deepen the groove (11). The groove deepening via reaming with a drill and then tamping does have a learning curve. It is recommended to use fluoroscopy guidance and to use a cannulated drill to ensure that the drill does not fracture through the cortex or that it is in the gutter. The drill bit can be used to ream the distal 2 to 3.5 cm of the fibula, and then a tamp is used to deepen the groove. It is imperative to do this without creating osseous ridges or areas that could potentially irritate or impinge on the peroneal tendons and lead to pathology later. After the groove is deepened, then the SPR can be repaired as well as the peroneal tendons and any low lying muscle belly removed.

Yasui et al wanted to compare reoperation rates and wound complications between patients who underwent a fibular osteotomy versus soft tissue procedures for peroneal tendon dislocations (13). The study demonstrated a low and similar reoperation rate between the two techniques. No statistical difference was identified. Studies show that patients requiring tendon repair as well as repair of the SPR and groove deepening require a longer period of time to return to their activities. Ogawa found poorer outcomes and longer return to activity in patients requiring peroneal tendon repair versus isolated peroneal tendon subluxation repairs (14). Saxena and Ewen showed similar results with patients (15).

In conclusion, diagnosis of peroneal tendon subluxation can be difficult or delayed pending who performs the patient evaluation. Prompt diagnosis and treatment are key to success. This can be achieved with a thorough clinical examination and advanced imaging. Conservative and surgical treatments demonstrate improved outcomes for patients with surgical intervention showing greater improvement than conservative. Most often surgeons are implementing groove deepening procedures via a drill bit instead of traditional osteotomies and periosteal flaps. If the peroneal tendons require repair due to a tear, patients will have a longer recovery postoperatively. More studies are needed to decipher the ideal surgical management.

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