CHAPTER **34**

SUPINE GASTROCNEMIUS RECESSION

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INTRODUCTION

Ankle equinus is defined as the limitation of passive ankle joint dorsiflexion to less than that of a right angle between the leg and foot. The condition was originally described in spastic conditions, such as cerebral palsy. In 1914, the condition was described by Hibbs in association with the pes planovalgus foot deformity. This was expanded on by Root, who described the biomechanics of equinus and the associated foot deformities.

ANATOMY

The superficial group of the posterior crural muscles is composed of the gastrocnemius, soleus and plantaris muscles. The gastrocnemius and soleus muscles form a tripartite muscular mass that becomes the Achilles tendon (triceps surae). The area of the gastrocnemius aponeurosis, where the muscle becomes a broad flat tendon, is where a gastrocnemius recession is performed. Other pertinent anatomy to be familiar with when performing this procedure is the sural nerve, peroneal communicating nerves, and the small saphenous vein. These structures are located on the lateral side of leg at the level of the gastrocnemius aponeurosis, within the superficial fascia. At this level the soleus is still muscular in nature and lies deep to the gastrocnemius aponeurosis. The plantaris tendon is directly medial to the gastroc-soleal complex.

BIOMECHANICS

The gastrocnemius and plantaris muscles cross three joints: the knee, ankle and subtalar joint, while the soleus muscle crosses only the ankle and subtalar joints. When the gastrocnemius muscle is described functionally, it is thought that its effects are only significant at the ankle and knee, not at the subtalar joint. This is true if the subtalar joint is in neutral. In a pronated (or pronating) foot, the axis of the subtalar joint becomes more perpendicular to that of the gastrocnemius muscle, allowing for this motion to be exaggerated. This muscular complex contracts near the end of the contact period and continues to contract through the beginning of propulsion. The gastrocnemius muscles allows for knee flexion, while the gastrocsoleal complex leads to heel lift. It is right before heel lift that maximum dorsiflexion is required. If adequate dorsiflexion is not attained, this can result in knee flexion or pronation of the subtalar joint.

CLINICAL EVALUATION OF EQUINUS

Ankle equinus is evaluated by having the patient in a supine position with full extension of the knee and the subtalar joint in neutral or slightly supinated. It is important to not have the subtalar joint pronated. The angular relationship is then assessed between the lateral aspect of the leg and rearfoot. The Silfverskiold test is taught to help one differentiate between an isolated gastrocnemius equinus and a gastrocsoleal equinus. This is often taught to help determine if a tendoAchilles lengthening (TAL) or gastrocnemius recession should be performed. The majority of non-spastic types of equinus are amenable to a gastrocnemius recession and do not need a TAL. The TAL is commonly associated with overcorrection, which can lead to many other problems. If the gastrocnemius muscle is lengthened through the aponeurosis, this will often allow a subsequent relaxation of the underlying soleus muscle. Another problem with the Silfverskiold test is that is does not account for other posterior structures that may be tight, including the deep flexors, peroneal tendons, posterior ankle joint capsule, or ligamentous structures.

It is important to also rule out other forms of equinus. The spastic type equinus is usually straightforward to identify through proper neurological history and examination. Osseous equinus, resulting from an underlying bony block, can be ruled out by radiographic examination with a "charger view." Pseudoequinus can also mimic ankle equinus. This is the plantarflexion of the forefoot or midfoot that may appear as ankle joint equinus. Non-spastic ankle equinus is often seen in association with the pes planovalgus foot type. It can also be isolated in toe-walkers or acquired from prolonged use of high heeled shoes or prolonged casting in a plantarflexed position. When in association with a cavus foot, again it is important to make sure ankle equinus is not confused with a pseudoequinus.

GASTROCNEMIUS RECESSION: PRONE VERSUS SUPINE

For years, the open type of gastrocnemius recession has been performed with the patient in a prone position. This allows for excellent visualization of the aponeurosis. When this is performed in conjunction with other procedures, positioning can be difficult and dangerous. If one procedure is performed prone and the other supine, then the patient will have to be "flipped" intraoperatively. There are risks of contamination, as well as risks of extubation or falls during this maneuver. This is also commonly a concern from an anesthesia standpoint due to potential risks. Extra manpower is needed to flip the patient and may not always be readily available, which can increase your operating time. When performing this procedure from a supine position, the risks of these complications can be lowered.

SUPINE GASTROCNEMIUS RECESSION

Using this technique, a linear incision is made over the medial aspect of the gastrocnemius aponeurosis, which can be easily palpated as the proximal Achilles tendon begins to broaden (Figures 1 and 2). Another way to estimate incision placement is the half-way point between the superior aspect of the calcaneus and the inferior edge of the muscular mass of the calf (Figure 3). Dissection is carried to the level of the deep fascia. It is important to note in this area, especially in children, the subcutaneous fat is very thick, and sometimes appears to be two layers. Adults generally have less subcutaneous tissue in this area (Figure 4).

Once the deep fascia is visualized, a linear incision is made at the medial edge of the gastrocnemius aponeurosis. This can be easily identified by passively dorsiflexing and

Figure 1. A linear incision will be made over the medial aspect of the gastrocnemius aponeurosis, which can be easily palpated as the proximal Achilles tendon begins to broaden.

Figure 2. Linear incision.

Figure 3. Another way to estimate incision placement is to mark the half-way point between the superior aspect of the calcaneus and the inferior edge of the muscular mass of the calf.

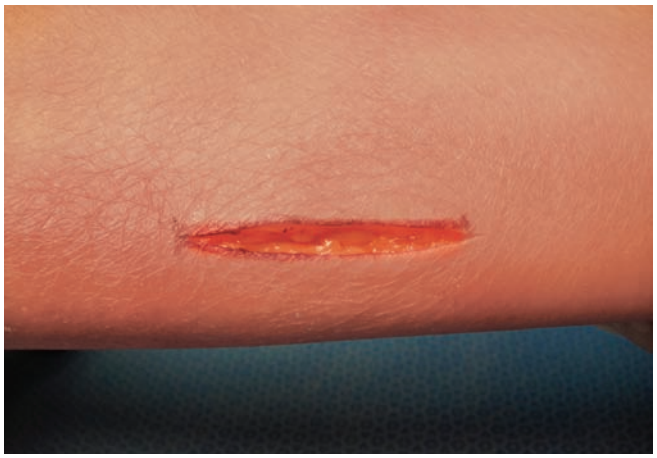

Figure 4. Dissection is carried to the level of the deep fascia.

plantarflexing the ankle (Figure 5). Once the fascia is incised, the paratenon is also incised. Blunt dissection is used to separate the fascia and paratenon from the aponeurosis (Figure 6). The author recommends using a malleable type retractor to elevate the paratenon/fascia from the aponeurosis. This will protect the neurovascular structures on the lateral side of the leg (Figure 7). The plantaris tendon is sectioned at the medial aspect of the aponeurosis (Figure 8). A Strayer type recession is then performed from medial to lateral through the gastrocnemius aponeurosis (Figure 9). It is also recommended that for fibers of the aponeurosis that are lateral and difficult to visualize, that a Metzenbaum scissor is used to feel the bow-stringing of the tendon, and then used to cut a couple of millimeters at a time (Figure 10). It is important to remember that your assistant must keep a dorsiflexory force on the foot, and the knee is kept in an extended position. The surgeon can then palpate the area to ensure there has been adequate release of the aponeurosis. Once adequate, the recession is complete, the aponeurosis will gap and the underlying soleus muscle belly can be seen (Figure 11). The amount of length obtained will depend on the amount of deformity, as well as the ability for the other posterior structures to relax once the gastrocnemius aponeurosis is sectioned. The paratenon and deep fascia are sutured with 3-0 absorbable suture. Once this layer is closed, put the ankle joint through a range of motion to ensure adequate gliding of the underlying tendon /muscle.

Patients are kept nonweightbearing for one to three weeks, depending on the patient and the deformity. If other adjunctive procedures are performed, these will determine the length of immobilization.

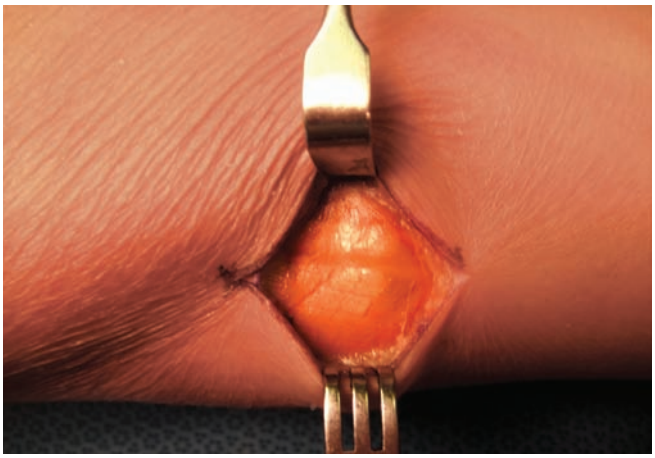

Figure 5. Once the deep fascia is visualized, a linear incision is made at the medial edge of the gastrocnemius aponeurosis.

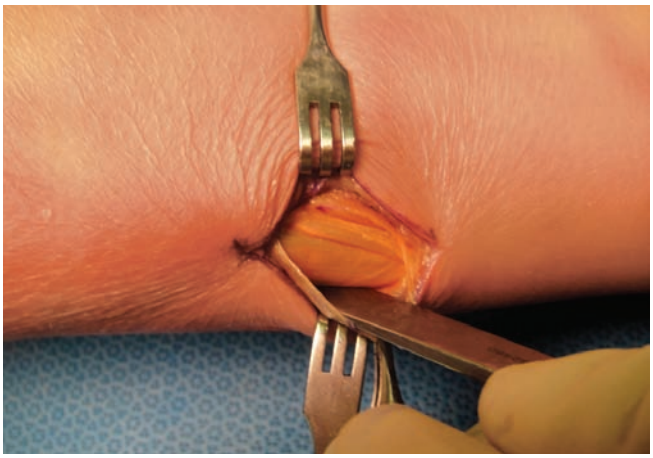

Figure 6. Blunt dissection is used to separate the fascia and paratenon from the aponeurosis.

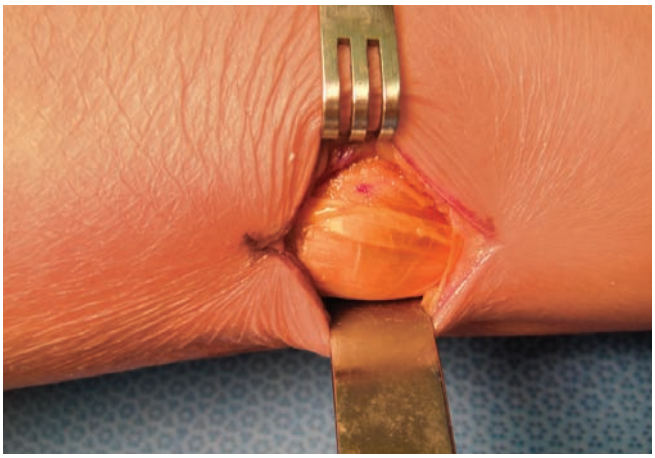

Figure 7. A malleable type retractor is used to elevate the paratenon/fascia from the aponeurosis.

Figure 8. The plantaris tendon is sectioned at the medial aspect of the aponeurosis.

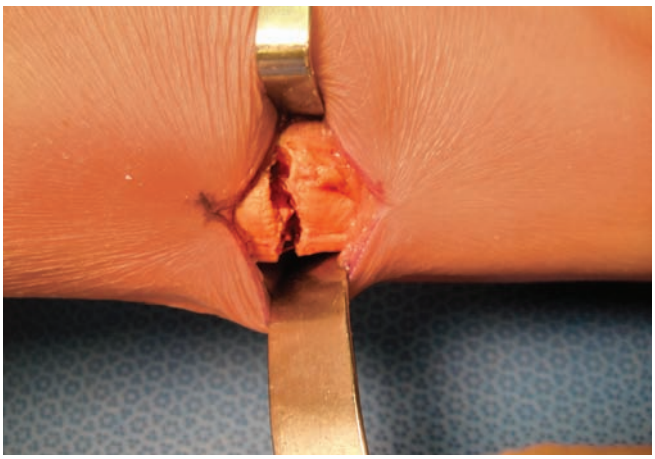

Figure 9. A Strayer type recession is performed from medial to lateral through the gastrocnemius aponeurosis.

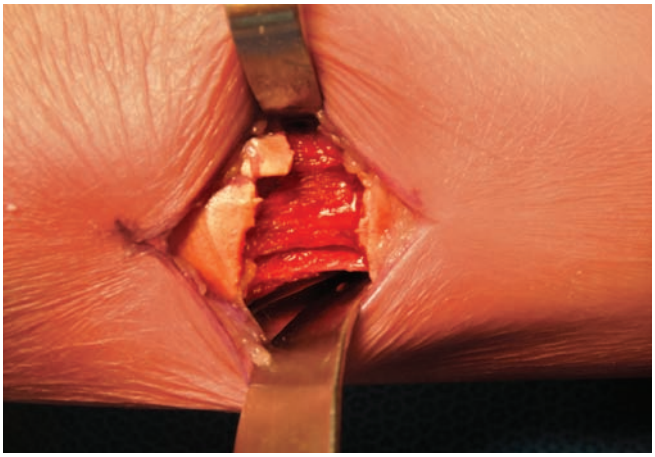

Figure 11. The aponeurosis will gap and the underlying soleus muscle belly can be seen.

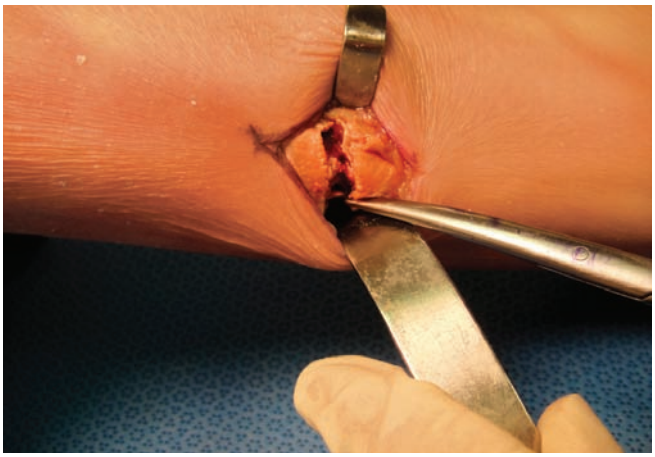

Figure 10. A Metzenbaum scissor is used to feel the bow-stringing of the tendon.

OTHER TIPS

Because you are essentially working in a hole, elevating the table as close to eye level will help to better visualize the lateral fibers of the aponeurosis. Also, if you do not have multiple assistants, I recommend that you place everything that will be needed for the procedure on a mayo stand within your reach. Your assistant will be placed on the lateral side of the leg. One hand is used to retract the superior soft tissues, while the other is used to dorsiflex the foot. Have your assistant maintain this position for the duration of the procedure. The surgeon will control the inferior retractor (malleable) and the blade or scissors. The leg can be externally rotated to help with visualization, but it is imperative that the knee remain extended.