TENDON INJURIES ABOUT THE FOOT AND ANKLE IN THE ATHLETE

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Diagnosis of specific tendon injuries about the foot and ankle is at times difficult. However, the prolonged morbidity associated with the chronic condition makes the careful assessment of these injuries a worthwhile and rewarding task. In general, the pathology of tendon structures can be divided into two general groups.

1. Peritendinous injury—i.e. injury to the fibrous coverings and supporting structures about the tendon.
2. Injury to the tendon structure itself.

By far, the former is the more common situation, however, chronic inflammation of the peri-tendinous structures leads to degenerative injury to the tendon itself. A discussion of some common tendon pathology in the athlete follows.

Clement and associates reported the incidence of overuse injuries in the running athlete (1). They found that the ten most common overuse injuries included achilles peritendonitis, tibialis posterior tendonitis, and peroneal tendonitis.

General Definitions

Tendonitis — This is a generalized term referring to inflammation in or about a tendon. It is more appropriately subdivided into terms which define which portions of the tendonous structures are inflamed.

Peritendonitis — Inflammation of the peritenon. Usually refers to peritendonous structures outside of the tendon sheath.

Tenosynovitis — Inflammation of the synovial sheath about a tendon.

Stenosing tenosynovitis — A condition in which chronic inflammation within a tendon sheath has resulted in narrowing of the tendon sheath with impingement upon the tendon itself. Acute trauma to the tendon sheath can also cause this condition.

Achilles Tendonitis

The relatively straight course of the tendo Achillis obviates the need for a true sheath structure. Instead the tendon is invested in a loose connective tissue lining called the paratenon. The paratenon is a very vascular structure which becomes quite thickened and gelatinous in appearance upon insult (Fig. 1).

Signs and Symptoms

Traditionally, the athlete describes pain in the posterior leg along the course of the tendo Achillis. The pain may be poorly localized and occur anywhere between the myotendinous junction and calcaneal insertion. The pain tends to occur early during physical activity and resolve as the activity continues. Morning stiffness is common. Description of pain is in the posterior heel and leg, worse upon "getting out of bed".

Pain upon palpation may occur along the entire length of the achilles tendon. Localized signs of erythema, edema, and occasional nodularity may be felt. Gastrocnemius or gastrosoleus equinus is often associated with the condition and should be ruled out.

Treatment

Conservative treatment is usually successful in these patients. The athlete is encouraged to rest the part by either total abstinence from exercise or decreasing activity. Exercises which place excessive load on the posterior muscle group such as jumping or running uphill are discouraged. A heel lift in patients with gastrosoleus or gastrocnemius equinus or limb-length discrepancy will often relieve symptoms.

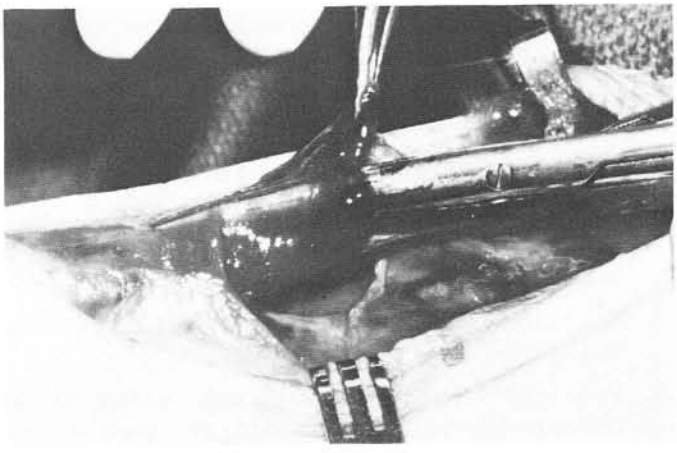

Fig. 1. Peritenon of Achilles tendon is inflamed and gelatinous in appearance in this patient suffering an injury to tendon.

Physical modalities including local ice application and ultrasound, combined with stretching exercises have been advocated. Anti-inflammatory medications may be helpful (2). Local corticosteroid injection is contraindicated due to high incidence of weakening and rupture of the tendon.

Surgical indications are few. In recalcitrant cases exploration will be necessary. Excision of diseased tissue should be carried out in a longitudinal fashion to prevent shortening of the tendon structure. In some cases, gastrocnemius recession or tendo Achillis lengthening may be necessary to prevent recurrence.

Tibialis Posterior Tenosynovitis

The tibialis posterior tendon is the main decelerator of pronation and accelerator of supination. For this reason patients who have structural or functional causes of excessive pronation are more likely to suffer overuse of this muscle-tendon complex. The tibialis posterior tendon passes through the tarsal canal and has a sheath which aids in the gliding function of tendon as it passes posterior to the medial malleolus. Inflammation may occur anywhere along the course of the tendon. The most common areas are retromalleolar and at the site of insertion at the midtarsal level.

Signs and Symptoms

As would be expected pain occurs with any activity which requires the tibialis posterior to resist the pronatory forces of weightbearing. Pain at rest following exercise occurs as the condition becomes chronic in nature. Localized erythema, edema, and calor may be present. These often resolve rapidly and may be absent.

Manual muscle testing of the tibialis posterior will often but not always reproduce the pain of the enthesitis but not that of the tenosynovitis. Palpation of plantar medial navicular and medial cuneiform can assist in differentiating insertion pain from retromalleolar tenosynovitis. Tenography can be performed to visualize stenosis of the tendon sheath if present.

Treatment

In the acute situation supportive taping and wedging with soft arch support may be helpful. Pain at the tendinous insertion may, however, be exacerbated by placing an additional arch support within the running shoe.

Custom-made orthotic devices are often the treatment of choice. In our experience, maximum effect and patient acceptance occurs when the patient has been successfully treated for the acute situation with taping, non-steroidal anti-inflammatory drugs, and rest. In some cases local injection with corticosteroids has been helpful but limiting the injections to three at two week intervals is suggested.

Determination of the etiology of pathologic pronation is the keystone to successful treatment. Structural deformities related to untreated calcaneovalgus and accessory ossicles of the navicular may require surgical treatment. Equinus from any cause results in excessive midtarsal pronation. If present it should be identified since patients with the problem poorly tolerate attempts to arrest hypermobility. Appropriate surgical procedures addressing the equinus may be necessary in a minority of patients. In such cases it is essential to identify the cause of equinus, (osseous vs. soft tissue).

Peroneal Tenosynovitis

The occurrence of pain about the peroneal tendons is similar in many ways to that of the tibialis posterior tendon. But, for the most part a reverse foot deformity is responsible for this condition. Excessive supination and lateral weightbearing common to the running athlete predisposes to this injury. The peroneus brevis and peroneus longus tendons course laterally down the leg behind the lateral malleolus within a common sheath which then splits as the tendons course to the respective insertions into the fifth metatarsal tuberosity and first metatarsal base respectively. The tendons are held in place behind the fibula by a superior retinaculum and inferiorly by continuous fibers of the inferior extensor retinaculum. Injury may occur secondary to overuse or by direct trauma to the lateral ankle.

Signs and Symptoms

Placing passive stretch on the peroneal tendons by plantarflexing and inverting the foot results in pain at the site of inflammation. In some cases the pain can be elicited upon palpation to the tendon structures. Tightness of the peroneal tendons is suggestive of tarsal coalition which should be ruled out.

At this point it should be noted that the majority of running shoes are made to prevent excessive pronation. In some instances these shoes may exacerbate peroneal tendonitis in the patient with a moderate to severe rearfoot varus deformity by causing excessive and/or prolonged lateral weightbearing. The peroneal tendons are thus required to work excessively to maintain a plantar grade foot and resist inversion. Gait and running analysis will be helpful in identifying the patient with this condition. Proper shoe prescription may be the only treatment necessary in this situation.

Stenosing tenosynovitis may occur at the retro-malleolar region. This most commonly results following direct trauma to the lateral ankle and is diagnosed by a positive history and limitation of excursion of the peroneal tendons. Peroneal tenography has been described as a diagnostic as well as therapeutic modality. Surgical tenolysis is rarely necessary and if performed must be done with care to

restore the anatomic retaining structures to prevent tendon subluxation.

Anteriro Subluxation of the Peroneal Tendons

Dislocation of the peroneal tendons is one tendinous injury about the ankle which has received a fair amount of attention in the literature. It is the one acute and chronic condition which is amenable to surgical repair. Numerous procedures have been devised and mixed results are reported. The condition may be congenital or post-traumatic. Most commonly, it is the result of a snow skiing accident (3).

Signs and Symptoms

The most frequently encountered complaint is a snapping or popping sensation at the posterolateral ankle region. The popping may be simply an annoying sensation described most often by the congenitally affected or it may be associated with disabling pain.

In severe cases, there is ankle instability and inability to ambulate on the affected side until the tendons are either spontaneously or surgically reduced.

Pronounced localized pain and edema may make diagnosis of the injury difficult in the acute case. Often a misdiagnosis of lateral ankle disruption is made due to the similarity of presenting symptoms. Pain in the acute situation will be most pronounced along the posterior aspect of the distal fibula. Passive dorsiflexion and eversion of the foot on the leg will usually result in palpable dislocation of the peroneal tendons over the fibular malleolus. This may also be produced by asking the standing patient to flex the knees with the feet externally rotated.

Radiographic Examination

Radiographic interpretation may be helpful since in some instances avulsion fracture of the fibula malleolus due to pull from the superior retinaculum may occur (Fig. 2). A mortise view of the ankle best reveals the flake-like cortical fracture and has been termed pathognomonic of this injury. It should be noted that dislocating the tendons at the time of x-ray may be helpful in revealing this fracture since the tendons will interpose between the malleolus and the fragment. Failure to perform such examination may explain the high degree of discrepancy in the reported incidence of this fracture.

Computerized tomography has been used by Szczukowski and associates (4). The choice of conservative versus operative treatment was based somewhat on the CT evaluation.

Treatment

Conservative treatment has been for the most part unsuccessful. Few authors have advocated conservative therapy in the chronic situation and most are pessimistic in regards to its use in the acute situation as well. Casting both weightbearing and non-weightbearing for a period of 4-6 weeks has been reported.

Surgical treatment for dislocating peroneals can be divided into soft tissue and osseous procedures. These methods used alone or in combination have been reported by numerous authors.

Anatomic Considerations

Appreciation of the anatomy about the posterolateral ankle allows a better understanding of pathology and surgical approach to this injury.

The peroneal tendons course distally in close approximation to the posterior aspect of the fibula. The peroneus longus is superficial to the brevis to the level of distal tip of fibular malleolus. At the level of the malleolus a thickening of the crural fascia forms the superior peroneal retinaculum. The retinaculum originates from the lateral border of the malleolus and courses to attachments into the tendo Achillis and posterolateral calcaneus. In addition to this retaining structure a groove in the posterolateral fibular malleolus acts to maintain the peroneal tendons in their proper position. Occasionally this groove is shallow or even absent.

When the peroneal tendons sublux, they do so beneath the superior retinaculum and periosteum of fibular malleolus previously torn from their bony attachments. If a cor-

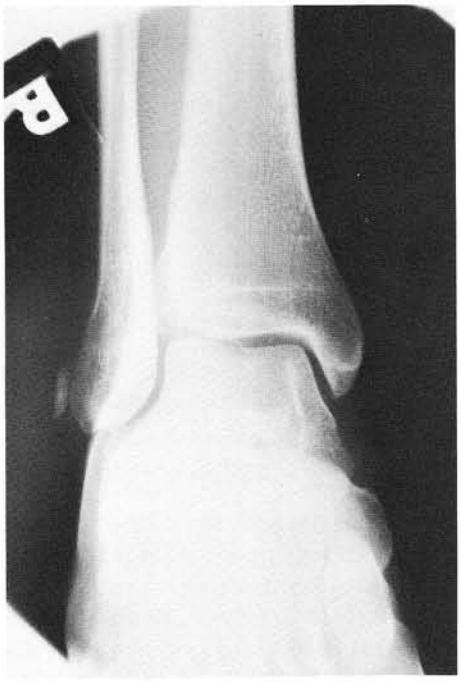

Fig. 2. Small flake-like avulsion fracture is seen lateral to fibular malleolus and is pathognomonic of peroneal retinaculum injury.

Fig. 3. Peroneal tendon can be seen to be anteriorly displaced over fibular malleolus.

tical avulsion fracture has occurred the tendons lie deep to the fragment and adjacent to the exposed cancellous boney surface (Fig. 3).

Treatment

In cases where a shallow or absent peroneal groove is discovered, a deepening of the groove is suggested. Methods of constructing a peroneal groove have been described by Kelly, DuVries, and others (5-7).

In almost all cases reattachment or reinforcement of the superior peroneal retinaculum should be performed. One of the more popular methods of reinforcing the retinaculum was described by Jones (1932) (8). This method employed a strip of tendo Achillis detached proximally and routed through a trephine hole in the fibular malleolus. The tendon slip surrounded the peroneal tendons and was sutured to itself (Fig. 4A & B).

A soft tissue method utilized at Doctors Hospital is shown in Figure 5. The method was described by Earle and associates in 1972 and is simple to perform (9). Deepening of the peroneal groove is performed as deemed necessary. The peroneal tendons are then repositioned in the groove. Three to five drill holes are made along the posterolateral aspect of the fibula. A non-absorbable 2-0 synthetic suture is then placed through each drill hole. Retinaculum and periosteum are tightly sutured into place. This method restores the anatomic relationships present prior to the injury. Postoperative management involves splinting in a below-knee cast. The patient remains non-weightbearing for 4 weeks with crutch or walker assistance. Absorbable skin sutures obviate the need for windowing the cast to remove sutures.

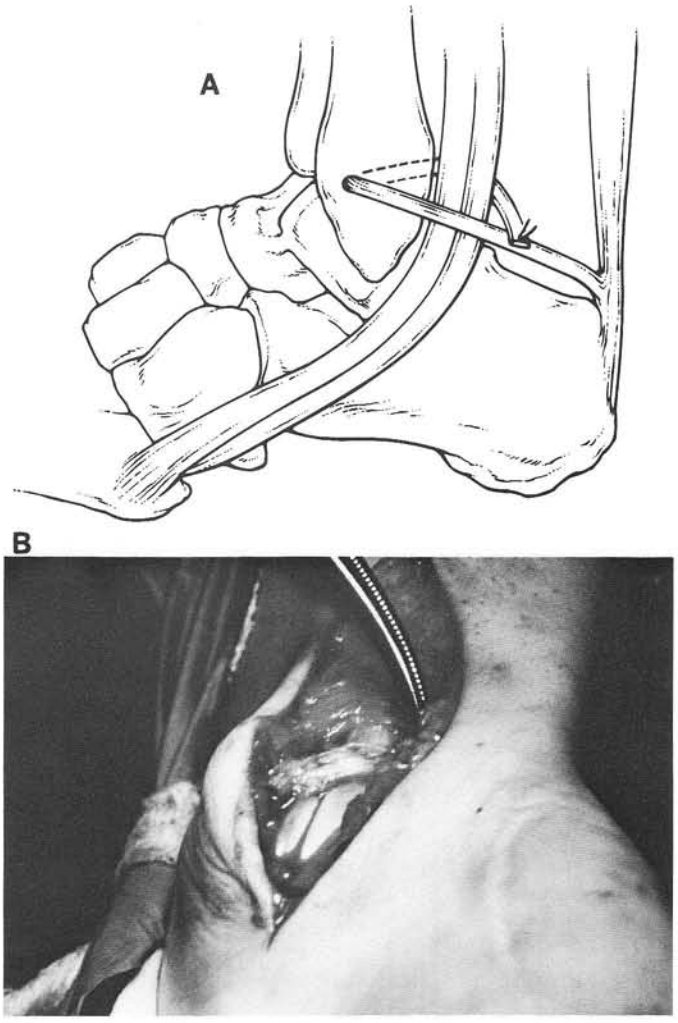

Fig. 4. A. & B. Ellis Jones peroneal retinacular repair is depicted. Tendon graft from tendo Achillis is employed as reinforcement of superior peroneal retinaculum.

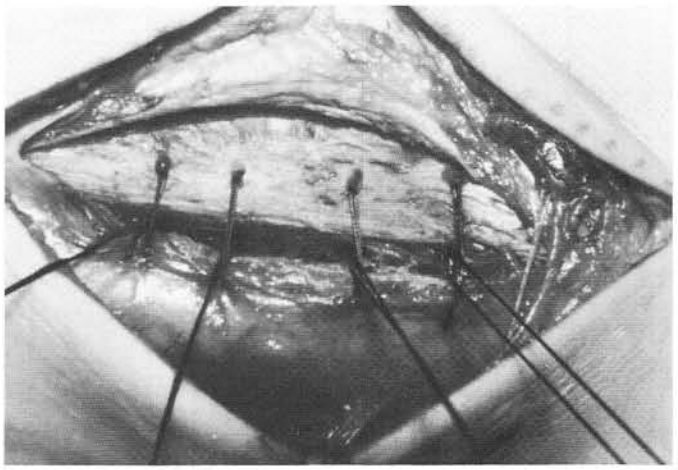

Fig. 5. Anatomic restoration of avulsed deep fascia, periosteum, and retinaculum is goal of the procedure shown. Non-absorbable sutures placed through drill holes in posterolateral aspect of distal fibula are used to repair deep fascial structures.

Summary

Tendinous injuries about the foot and ankle are relatively common in athletes. Prompt aggressive therapy is the key to returning the athlete to activity. Recognition of the injury requires careful assessment by the sports medicine physician if a chronic debilitating condition is to be avoided.

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