PRIMARY REPAIR OF THE LATERAL ANKLE LIGAMENTS

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Introduction

The acute inversion injury of the lateral ankle ligaments is a frequently encountered injury. Historically such injuries have been managed via immobilization/casting or active physical therapy. The most profound complications of these methods of conservative therapy include persistent symptoms of pain and/or chronic instability of the affected ankle.

In efforts to maximize functional and mechanical stability of the injured ankle, as well as to relieve post injury pain syndromes, repair of ruptured lateral ankle ligaments has been reported in the literature for well over thirty years.

Following an acute injury each patient is evaluated via standard radiography to rule out lateral malleolar or talar transchondral fracture. Should these examinations prove negative, each case of suspected ligamentous injury is evaluated via stress ankle radiography. Routinely this includes both inversion stress examination, as well as anterior drawer stress radiographs. (Fig. 1, Fig. 2).

Significant inversion stress instability and anterior subluxation of the ankle mortise are diagnostic of biligamentous (anterior talofibular and calcaneofibular) rupture. Frequently stress radiography will also demonstrate small avulsion fracture fragments from either fibular or talar ligamentous attachments.

Typically, primary repair of the acute lateral ankle ligamentous disruption is undertaken in the active, athletic individual with high activity expectations. As an alternative we also employ the delayed primary reconstruction of the lateral ankle. This is done in specific instances of chronic lateral ankle instability (with demonstrable radiographic instability), and in cases of protracted post injury pain syndromes affecting the lateral ankle.

The Procedure

Surgical anatomy is normally distorted following the acute injury by profound edema, ecchymosis, and subcutaneous hematoma. Therefore, the exact dimensions and orientation of the fibular malleolus are diagrammed with a skin marking pen. Then the prospective positions of the anterior talofibular and calcaneofibular ligaments are identified and mapped. The anterior talofibular ligament courses from the distal 1.5 cm of the malleolus anteriorly to the talar neck. The calcaneofibular ligament originates from the distal fibular malleolus coursing distally and posteriorly to its insertion into the calcaneus.

Utilizing these landmarks the skin incision is drawn from just inferior to the fibular malleolar tip, extending anteriorly along the skin lines through the sinus tarsi, curving superior and anterior to the lateral extent of the extensor tendons. This will allow full exposure and visualization of the lateral ankle.

In the authors' experience this procedure is readily performed under local anesthesia with I.V. sedation (specifically Versed). An ankle/hematoma block is routinely employed utilizing a mix of Marcaine plain and Xylocaine with Epinephrine solution. Similarly, we have found that in employing anatomic dissection techniques the procedure may be performed without the use of a tourniquet. Finally it is sometimes possible to perform the procedure on an outpatient basis.

The skin incision is made along the course described previously. Two nerves are routinely encountered, the intermediate dorsal cutaneous nerve and the sural nerve. The intermediate dorsal cutaneous nerve lies in the subcutaneous tissue at the anterior extent of the incision line just lateral to the extensor tendons. The sural nerve courses posteriorly to the lateral malleolus. Therefore, the skin incision and subsequent dissection should proceed with caution in an effort to protect these structures.

As the incision is deepened through the superficial fascia the amount of subcutaneous hematoma begins to be fully appreciated. Dissection is continued through the subcutaneous layer with care taken to identify and ligate vascular structures that have been traumatically ruptured, and to protect all nerve branches coursing through the operative site.

Dissection proceeds to the level of the deep fascia.

Fig. 1. Inversion stress radiograph positions tibial and fibular malleoli parallel to x-ray cassette.

Fig. 2. Anterior drawer stress radiograph positions tibial and fibular malleoli perpendicular to x-ray cassette.

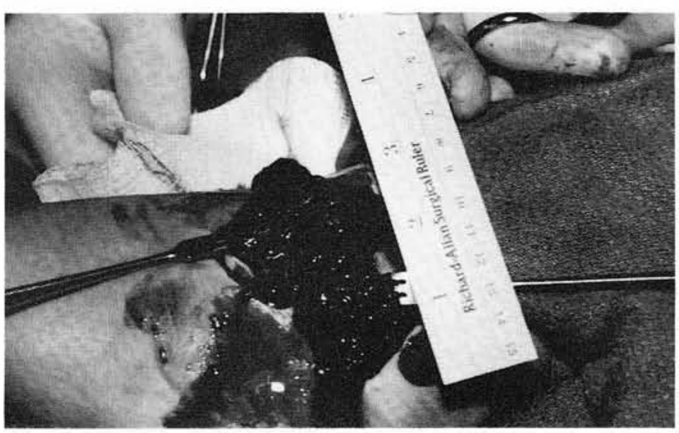

Fig. 3. Evacuation of acute hemarthrosis can prevent prolonged post traumatic course of recovery.

The fascia is identified as a distinct fibrous layer specialized posteriorly as the peroneal retinaculum. Frequently following a severe inversion injury the deep fascia including the peroneal retinaculum have been traumatically ruptured. It is important to fully visualize the deep fascia and appreciate defects in the retinaculum because only with anatomical repair of this layer at closure, does one minimize the potential for subluxation of the peroneal tendons. Should the fascia remain intact, however, it is penetrated at a point just proximal to the peroneal retinaculum and incised in the same orientation as the skin incision.

Following incision of the deep fascia, the ankle joint capsule is the next layer encountered. Routinely the capsule has been ruptured traumatically, quite feasibly across the anterior ankle joint. This too must be identified to facilitate accurate repair at closure.

At this point, in the usual post traumatic case, a significant hemarthrosis or hemorrhagic effusion is expressed from the ankle joint (Fig. 3). A thorough lavage of the operative site is recommended to facilitate visualization of any intact components of the ankle joint capsule. These are then incised sharply. With posterior retraction of the peroneal tendons, the calcaneofibular ligament is readily visualized. Anteriorly, the anterior talofibular ligament is also examined visually.

One of three separate scenarios of ligamentous disruption must be appreciated. Either the ligaments have been avulsed from their origins at the fibular malleolus or torn from their insertions at the lateral aspects of the talus or calcaneus. This might also generate avulsion fracture fragments or may rupture the ligament at mid-point.

Under anterior drawer stress the lateral talar dome is visually examined. Any evidence of transchondral fracture is dealt with appropriately. Then with inversion stress, the posterior talofibular ligament is identified and examined. This ligament is infrequently disrupted, as the lateral malloelus is more prone to fracture prior to posterior ligament failure.

Following exhaustive examination of the lateral ankle with full appreciation of all pathological anatomy, repair maneuvers are undertaken.

Any avulsion fracture fragments are excised if in evidence. Should either ligament be avulsed from its origin or insertion it should be replaced primarily via one of several methods. The repair may be as simple as suturing the ligament back to periosteal tissue of the fibula, talus, or calcaneus as appropriate. Should this not prove feasible, however, the ligaments may be re-attached via trephine bone plugs, drill hole reapproximation, or

AO screw and polyacetal washer as necessary. In the usual case of mid-body rupture, the ligamentous disruption is repaired utilizing an over and over technique with non-absorbable suture of choice (routinely 0-Tevdek, Ethibond, Mersilene). These repairs must be performed with the foot held and maintained in full dorsiflexion and eversion.

Following precise anatomic restoration of both the anterior talofibular and calcaneofibular ligaments, the ankle capsule is repaired in full utilizing 2-0 absorbable (Dexon) over and over sutures. This repair is also performed with the foot dorsiflexed and everted to facilitate postoperative ankle stability. The repair of the ankle capsule also tends to cover any non-absorbable suture material utilized in repair of the ligamentous structures.

After the capsule has been repaired laterally and anteriorly as necessary the deep fascia must be reapproximated. The peroneal retinaculum must be sutured anatomically to preclude postoperative subluxation of the peroneal tendons. The deep fascial reapproximation is performed utilizing a 3-0 absorbable (Dexon) suture in an over and over fashion.

Several subcutaneous simple absorbable sutures are then employed for wound support. Superficial fascial closure is performed utilizing a 4-0 absorbable running suture. And finally skin is repaired with a 6-0 subcuticular suture. The incision is supported with skin tapes for six weeks. A Jones compression cast is applied for 72 hours postoperatively.

At three days postoperatively a dressing change is performed. A synthetic, non weight-bearing cast is employed for 10-14 days postoperatively. Weightbearing is allowed in the cast from week two through week four. At four weeks postoperatively, the cast is replaced with an Air Cast training brace and full ambulation is encouraged.

Six weeks postoperatively, all dressings are removed and the patient is returned rapidly to full function.

Summary

The appropriate application of primary lateral ankle ligament repair, operative evacuation of ankle hemarthrosis, and appropriate postoperative management yield a dependably stable postoperative ankle joint mortise. This brings full rapid relief of post traumatic symptoms of pain. Return to full function can be expected within six to eight weeks postoperatively.

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