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Efficacy and Safety of Split Peroneal Tendon Lateral Ankle Stabilization

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ABSTRACT

Chronic lateral ankle instability is a common condition. Split peroneal tendon lateral ankle stabilization, a modification of the Chrisman-Snook procedure, is biomechanically stable and often used for severe and/or recurrent chronic lateral ankle instability. The purpose of the present study was to evaluate the efficacy and safety of this technique. Specifically, the midterm recurrence of instability and postoperative complications, such as stiffness, neurologic pain, and wound healing complications, were evaluated. We evaluated 30 consecutive procedures with a minimal follow-up period of 1 year. The mean follow-up period was 25 ± 13 (median 19, range 13 to 62) months. Five patients (17%) developed recurrent ankle instability, of whom 4 underwent revision surgery. One superficial infection and two wound disruptions developed. Two patients experienced stiffness and eight (27%) surgically induced neurologic complaints, such as sural neuritis. Finally, 2 patients developed complex regional pain syndrome.

Lateral ankle instability is a common condition. Often the condition is the result of an old severe inversion ankle sprain, hyperflexibility, or an underlying cavovarus deformity. Typically, those with chronic lateral ankle instability have exhausted conservative measures, such as immobilization, physical therapy, and bracing. Many have also undergone primary surgical repair of the lateral collateral ligaments. Once these fail, a more involved procedure is often necessary.

A split peroneal tendon lateral ankle stabilization procedure is a surgical procedure that stabilizes the lateral ankle by transferring a portion of one of the peroneal tendons to augment the lateral ankle soft tissue structures. Many have described similar techniques (1–7); however, the safety and efficacy of this procedure have not been extensively studied.

The purpose of the present study was to evaluate the efficacy and safety of the split peroneal tendon lateral ankle stabilization procedure. Specifically, the midterm recurrence of lateral ankle instability and postoperative complications, such as stiffness, neurologic pain, and wound healing complications, were evaluated.

Patients and Methods

Consecutive patients who had undergone lateral ankle stabilization using the split peroneal tendon lateral ankle stabilization procedure from April 2009 to December 2013 were enrolled in the present study. All the procedures were performed and/or supervised by a single surgeon (the primary author, N.S.). The surgeon performs surgery at 3 facilities, but only the medical records from 1 institution (Central Texas Veterans Affairs Health Care System), where lateral ankle instability was most prevalent according to the surgeon's log, were reviewed. The medical records were retrospectively reviewed by the surgeon to identify developing complications after the procedure.

One ankle per patient was enrolled. If a patient had undergone 2 procedures on different ankles, only the first case was included. If a patient had undergone bilateral procedures, only the data from the right ankle were reviewed. This measure was taken to eliminate duplication of patient characteristics. The inclusion criteria were receipt of the procedure during the study period and age ≥18 to ≤80 years. The exclusion criteria were no history of chronic lateral ankle instability and <12 months of follow-up after the procedure.

After enrolling patients according to the selection criteria, the demographic data, physical and radiographic examination results, postoperative complications, and follow-up length were evaluated. Specifically, age, body mass index from the weight and height data at surgery, whether the patient had undergone previous surgical treatment related to the current condition, the presence of cavus foot (determined from

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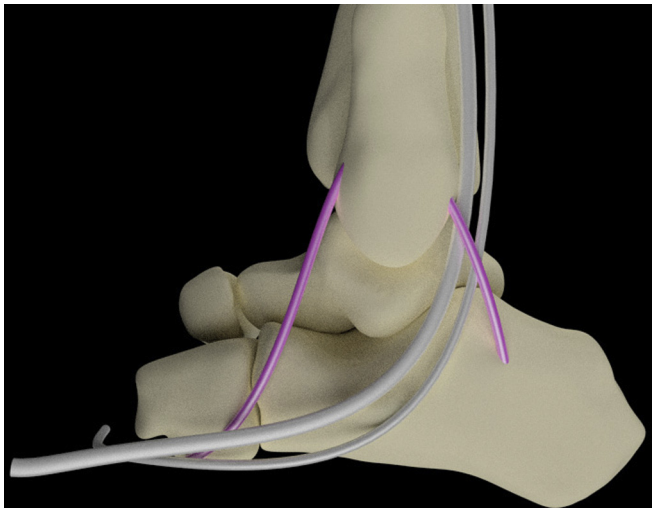

Fig. 1. A schematic view of the lateral ankle stabilization procedure we evaluated in the present study.

the clinical and radiographic findings), adjunctive procedures, recurrence, and other complications were recorded. The timing of their first weightbearing and of "back to shoes without restriction" after the procedure were also recorded.

All the data were evaluated with descriptive analyses using the R statistical package (R, Developmental, Core, Team. R: A Language and Environment for Statistical Computing 2012; http://www.R-project.org) by the primary author (N.S.).

Indication for Split Peroneal Tendon Lateral Ankle Stabilization

The indications for the split peroneal tendon lateral ankle stabilization procedure included failure of previous lateral ankle stabilization such as a Broström procedure, chronic ankle instability with excessive flexibility as determined by the surgeon, underlying severe cavus foot deformity, concomitant peroneal tendon subluxation or tear, and obesity. This procedure was not typically used as the primary procedure in those without an underlying deformity or ligamentous laxity. The surgeon typically prefers arthroscopic primary repair of the lateral collateral ligaments for those with primary, less severe cases.

Procedure

The patient is placed either in a lateral decubitus position or the supine position with the patient under general anesthesia. With the patient placed in the lateral decubitus position, the operative ankle is placed on top. When the patient was in a supine position, a bump would be placed under the ipsilateral hip to internally rotate the operative lower extremity. A thigh tourniquet was used.

At that point, we determined how much tendon would be needed for lateral ankle stabilization (Fig. 1). Using a string, rope, or tape, such as an umbilical tape, the planned transfer is visualized on the lateral ankle (Fig. 2). The string, rope, or tape is then placed along the peroneal tendons at the native site to determine the extent of the incision proximally (Fig. 3).

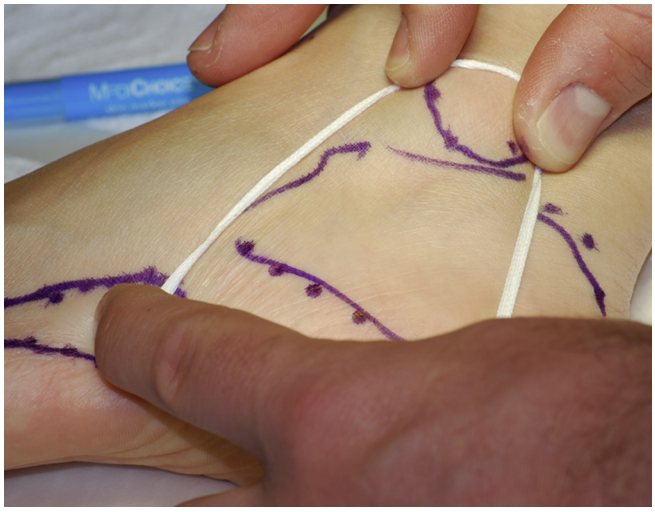

Fig. 2. Using an umbilical tape, a planned transfer was visualized on the lateral ankle.

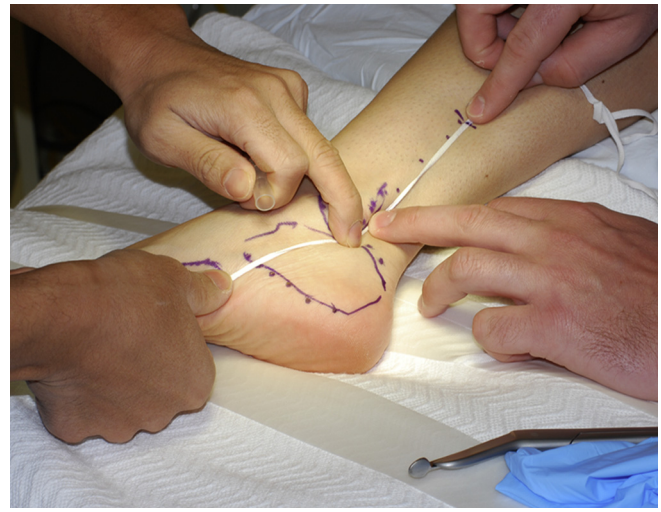

Fig. 3. The marked umbilical tape was placed along the peroneal tendons at the native site to determine the extent of the incision proximally.

We have typically used either 1 of 2 incision approaches: a less-invasive approach or an open approach. With the open approach, 1 long curvilinear incision along the peroneal tendons from the fifth metatarsal base area to the retromalleolar area and a smaller 3-cm incision where the peroneal tendon is harvested are used (Fig. 4). With the less-invasive approach, we have used 4 smaller incisions of <3 cm. One incision is created over the place at which the tendon would be harvested proximally, one at the retromalleolar area, one at the anterior aspect of the lateral malleolus, and one lateral to the cuboid just proximal to the fifth metatarsal base (Fig. 5).

In earlier years, more open procedures were performed. However, more recently (starting in the beginning of 2013), the use of the open technique has been limited to those requiring simultaneous peroneal tendon synovectomy, repair, or excision of a low-lying muscle belly.

For these approaches, either the longus or brevis tendon is split longitudinally at the proximal incision and the posterior half harvested. We have more often used the longus tendon unless the brevis tendon has already split longitudinally from a tear.

At that point, the split tendon is retrieved from the distal incision. A whipstitch is placed on the tip of the split tendon, and the suture is pulled through the peroneal tendon sheath from the distal incision. The split tendon can be retrieved from the retromalleolar incision before it is retrieved from the most distal incision.

Once the split tendon has been retrieved all the way to the distal incision, a tunnel is created from the subcuboid area to the anterior aspect of the lateral malleolus. The split tendon is then rerouted through the tunnel from the subcuboid area to the anterior lateral ankle.

Next, a through-and-through drill hole is created in the lateral malleolus anteriorly to posteriorly. The hole is started from the area of the anterior talofibular ligament origin, exiting posteriorly and laterally just above the peroneal tendon groove, lateral to the remaining peroneal tendons. The split tendon is then passed through the lateral malleolus anteriorly to posteriorly.

At that point, with the ankle placed in the neutral position, an interference screw is inserted into the lateral malleolus anteriorly to posteriorly to secure the transferred tendon. Next, another through-and-through drill hole is created in the calcaneus laterally to medial plantarly. The split tendon is then passed through this hole and pulled from the medial side, with the ankle placed in the neutral position, and another interference screw is placed in the calcaneus from the lateral aspect to secure the tendon.

Postoperative Protocol

Typically, patients are required to stay non-weightbearing for 3 weeks until the incisions have healed. Patients are then initially allowed to weight-bear with a controlled ankle motion walker with or without crutches. The patients are also instructed to perform a range of motion exercise of the ankle only in the sagittal plane. At approximately 6 to 8 weeks, patients are typically allowed to return to regular shoes, as long as they are able to ambulate comfortably using the controlled ankle motion walker. Patients are also allowed to perform frontal and transverse plane range of motion exercises.

Results

We identified 32 procedures in 30 patients (22 males [73%] and 8 females [27%]). The mean age and body mass index were 40 (range 24