Minimally Invasive Surgical Technique for Ankle and Rearfoot Stabilization in Patients with Hypermobile Ehlers-Danlos Syndrome

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Statement of Purpose

The purpose of this study was to describe and illustrate the use of a minimally invasive technique for the treatment of ankle injuries in patients with hypermobile Ehlers-Danlos syndrome (hEDS) who benefit from a minimally invasive procedure supplementing the lateral ankle ligaments while limiting hypertrophy.

Methods and Hypothesis

A retrospective review was conducted on 15 consecutive patients previously diagnosed with hEDS who presented with painful lateral ankle instability and ankle pain. Patients were included if they had undergone ankle instability surgery within the last 12 months after surgery to assess pain level, functional capabilities, and ankle sprain frequency. We hypothesized that patients would experience improvement in pain, less frequent ankle sprains, and limited activity after surgery.

Procedure

The surgical technique consisted of a posteromedial incision less than one centimeter in length made over the lateral aspect of the sinus tarsi and a stab incision made over the lateral calcaneus according to the incision of Blauer Ligament (Fig. 1). Short incision was carried down to the level of bone through each incision. A guidewire was placed within the sinus tarsi and the appropriate position for incision was determined over the navicular and talus. Two titanium bone anchors were introduced through the stab incision over the sinus tarsi and into the distal fibula (Fig. 2). Another titanium bone anchor was introduced through the stab incision and inserted into the talus at the junction of the talar neck and a flat. Final titanium bone anchor was inserted through the stab incision over the calcaneus, and the incision was closed. The anchors from the incision are tied to the fibers from those incision to the talus and secured together and the sutures from the other flat anchor and those from the calcaneal anchor are tied together while holding the foot in slight eversion (Fig. 4 and 5). The incision was closed using a combination of absorbable and non-absorbable sutures in several layers.

Literature Review

Ehlers-Danlos syndrome (EDS) is a heterogeneous group of connective tissue disorders (1-3). The Ehlers-Danlos syndrome type III (hEDS) is characterized by hyperextensibility, and tissue fragility (5). There is no known general etiology and therefore the diagnosis of the disorder is made clinically using tools such as the Broad criteria to access hypermobility. (7-10). Hyperextensible EDS is associated with the most debilitating musculoskeletal manifestations including pain, joint instability, and soft tissue injury (11). Recurrent dislocations are common in patients with the Ehlers-Danlos syndrome and may occur from early, often leading to degenerative joint disease and functional impairment (6, 12, 13). A significant portion of musculoskeletal complaints in patients with hypermobile Ehlers-Danlos syndrome with ankle pain reported (14). Foot appearance and functionality are severely affected by the pathology of the disorder, which are often managed poorly by the orthopedic community. Unfortunately, there is no known general etiology and therefore the diagnosis of the disorder is made clinically using tools such as the Broad criteria to access hypermobility. (7-10).

Ehlers-Danlos syndrome is a hereditary disorder that may be caused by changes in genes that affect the structure or function of collagen, the major protein found in connective tissue. Collagen is a major component of the skin, bones, cartilage, and tendons.

The most common variant of Ehlers-Danlos syndrome is type IV, which is characterized by joint hyperextensibility, and tissue fragility (1). The most common variant of Ehlers-Danlos syndrome is type IV, which is characterized by joint hyperextensibility, and tissue fragility (1). Joint hyperextensibility refers to a condition in which the joint is more flexible than normal, allowing the joint to be extended beyond its normal range of motion (1). Tissue fragility refers to a condition in which the tissues of the body are more prone to tearing or breaking than normal.

Results

At greater than six months after surgery, 97% of patients with hEDS showed improvement in pain and function, with 12% reporting no limitations in activity. Specifically, 79% of patients reported less difficulty in any ability on one or both feet, and 86% reported no limitations after completion of the surgery. 60% of patients were able to return to normal activities, and only 2% of patients required custom-made braces after surgery. Eighty percent of patients no longer used assistive devices after surgery. All 19 patients reported decreased frequency of ankle sprain since surgery with 88% reporting no sprain post-operatively.

Analysis and Discussion

Given the soft tissue fragility and wound healing complications found in patients with EDS, a minimally invasive surgical technique addressing the hypermobility while not on the risk of further ligamentous tearing is needed (12). To our knowledge, a combination of 12 mm titanium bone anchors was previously used in the treatment of foot and ankle instability in EDS. A single case study did report using a bone anchor placement technique to address ankle instability in patients with EDS (10). However, since hEDS and EDS have been deemed indistinguishable, the two disorders are now classified together under the category of NEDS (non-EDS) disorder type (13-15). Unfortunately, there is no known general etiology and therefore the diagnosis of the disorder is made clinically using tools such as the Broad criteria to assess hypermobility. (7-10).

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