All Arthroscopic Brostrom Repair using Bio-Inductive Biocomposite Scaffold Graft

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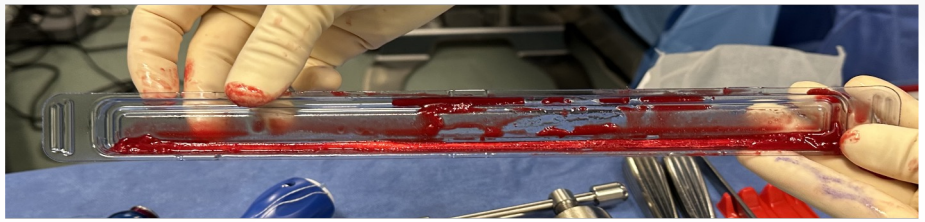
Purpose

The purpose of this study is to report the use of a bio-inductive biocomposite scaffold graft for an all arthroscopic brostrom repair.

Introduction

Ankle sprains are one of the most common problems seen in the emergency department in the United States annually, with an incidence of 2 million patients per year [1]. While most of the time patients are able to heal with immobilization and range of motion exercises, almost 40% of patients go on to developing chronic ankle instability [2]. The pathophysiology behind chronic ankle instability is often correlated with either a chronically torn or attenuated anterior talofibular ligament (ATFL), which 73% of the time is the damaged ligament [3]. Repair of the ATFL has historically been described by Brostrom with repair of the ligament directly and with augmentation utilizing the inferior extensor retinaculum [4]. Over the past decade, the use of synthetic augmentation has been popularized as its strength has shown it is much stronger than the native ATFL and is able to protect the ankle from inversion injuries [5]. While suture tape augmentation is strong, it has been found in both the knee and hand literature to also provide stress shielding which ultimately decreases healing of the native tissue [6-7]. There has been increased research in the utilization of dynamic ligament augmentation with products that more closely mimic human anatomy and physiology. These dynamic ligament constructs in theory reduce stress shielding but do not sacrifice mechanical strength or integrity. In fact, the use of a bio-inductive biocomposite scaffold graft has been documented in shoulder/knee literature with good results [8]. In this case report we present the use of bio-inductive biocomposite scaffold graft for lateral ankle stabilization through an all arthroscopic approach, which would be the first of its kind.



Surgical Technique

We present a 59-year-old female who presents with chronic ankle instability of the left ankle. She exhausted conservative measures and elected to proceed with operative repair. Pre-operative x-rays and MRIs were completed prior to operative fixation. She was brought into the operating room suite and placed on the operating room table in the supine position with well-padded thigh holder and tourniquet. Bone marrow aspirate was collected and applied overlying the implant and allowed to soak. The joint was insufflated with 10 cc of normal sterile saline. Arthroscopic ankle portals were then created in standard fashion. Utilizing a 4.0mm arthroscope and 3.5mm arthroscopic shaver, joint examination was performed and debrided thoroughly. The anterior aspect of the fibula was then visualized and debrided to allow for insertion of the bone anchor. Accessory portals were created over the lateral ankle joint and a 4.5mm bone anchor was inserted into the fibula with the bio-inductive biocomposite scaffold graft attached. This was then shuttled subcutaneously and attached to a bone anchor. Our tension was dialed out with the foot in neutral position as not to overtighten. This was then inserted into a bone tunnel drilled through the talus. We then utilized two independent suture anchors side by side from the augmentation bone anchor in the fibula to repair the ATFL and utilizing the inferior extensor retinaculum. This was tightened with the foot in slight eversion positioning. Incisions were irrigated and closed in standard fashion. She was ultimately made non weight bearing for 1 week due to her need for deltoid repair secondary to global instability, and then progressed to weightbearing as tolerated in a CAM boot until post op week 4. Physical therapy was then started and transitioned to an ankle brace. By post op month 3 she was ambulating in sneakers without pain.

Figure 1: Implant in fibula, preparing for insertion to talus

Figure 2: Shuttle of implant subcutaneous to talus

Figure 3: Placement of fibula implant

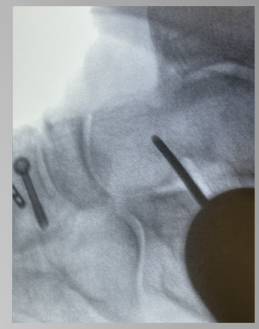


Figure 4: Placement of talus implant

Analysis & Discussion

This is the first case study of its kind to describe the use of this novel bio-inductive biocomposite scaffold graft for lateral ankle stabilization through an all arthroscopic approach. Dynamic ligament augmentation has seen increased popularity over the past half decade due to its ability to more closely mimic human anatomy and physiology. Dynamic ligament augmentation has been found to reduce stress shielding and allows normal human anatomy to heal. The bio-inductive biocomposite scaffold graft allows for the native ATFL repair and utilizes the augmentation as a collagenous scaffold. As technology continues to advance, the foot and ankle surgeon should continue to utilize products to improve patient outcomes.

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Disclosures: None