A Novel Surgical Technique for Repair of Osteochondral Lesions of the Talus: A Case Report

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STATEMENT OF PURPOSE

The purpose of the present case report is to describe the clinical course of a patient who underwent repair of a talar osteochondral lesion with debridement and placement of autogenous bone graft mixed with allogeneic, decellularized, placental-derived, particulate human tissue, followed by placement of a decellularized, dehydrated human amniotic membrane allograft over the surface of the graft.

LITERATURE REVIEW

The beneficial effects of amniotic membranes in orthopedic surgery is widely recognized. It has long been attributed to decreases in wound complications and scar formation (1), and more recently, animal studies have indicated its ability to differentiate into chondrocytes and osteocytes, among other cells (1-6).

In a sheep model, full-thickness cartilage defects were created in a weight-bearing area, and were treated with amniotic membranes that were either fresh, cryopreserved or cryopreserved and cultivated with bone marrow mesenchymal stem cells. After comparison with a control group receiving no treatment, the three treatment groups all showed histological analysis similar to healthy cartilage (4). Similarly, researchers were able to observe type II collagen formed in non-cartilage tissue in mice when they transplanted human amniotic membrane cells, either along with BMP-2 or with a collagen scaffold (5). In a lab setting, researchers were also able to identify presence of collagen, and differentiation to osteoblasts as well as mineralization when human amniotic membrane was cultured in a chondrogenic or osteoblastic medium, respectively (2,3).

Based on findings such as these, we hypothesized that this patient's pain and return to activity would improve following surgical debridement of an osteochondral lesion of the medial shoulder of the talus with placement of autogenous bone graft mixed with allogeneic, decellularized, placental-derived, particulate human tissue, followed by placement of a decellularized, dehydrated human amniotic membrane allograft over the surface of the graft.

CASE STUDY

Table 1: Patient Demographics

Lesion Location	Medial Talar Shoulder
Age	50
Gender	Female
BMI	49
Smoking Status	Current Smoker
PMH	Type II Diabetes, Myofascial Pain Syndrome, Peripheral Neuropathy
Concomitant Procedures	Medial malleolar takedown, Harvest of autogenous bone graft
Pre-Op Pain	7/10
Pain at Final Follow-Up	0/10

Figure 1. Pain across Time

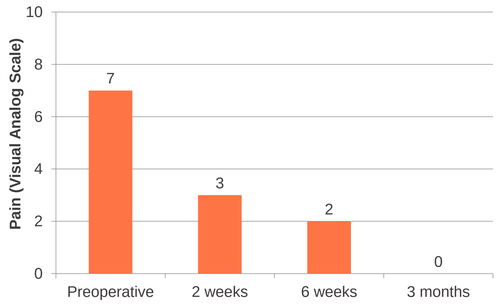


Figure 2. Preoperative MRI
2 OCD lesions of the talus immediately adjacent to one another measuring 7.5 x 6.5 x 9.0 mm and 3.5 x 3.5 x 5.0 mm in size are visualized on T1 and T2 weighted images.

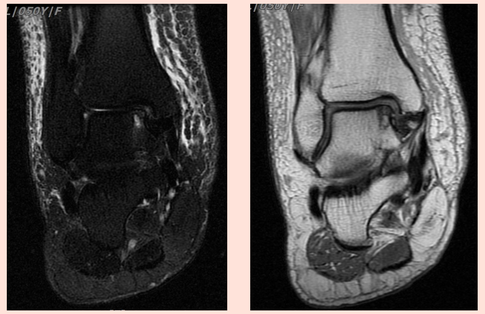
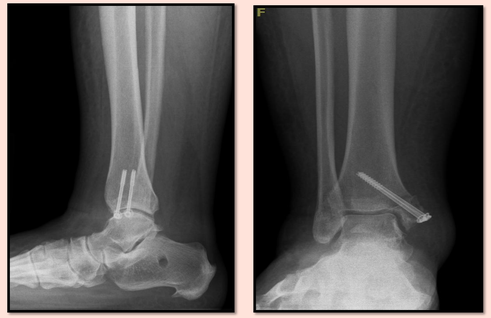


Figure 3. 2 Month Postoperative Radiographs
Medial malleolar OCD graft appears consolidated on plain radiographs



ANALYSIS & DISCUSSION

The patient in this case report was treated for an osteochondral lesion of the medial shoulder of her talus by using autogenous bone graft mixed with a decellularized, dehydrated, placental-derived human particulated allograft followed by placement of an acellular, dehydrated human amniotic membrane allograft. She was evaluated subjectively and radiographically pre- and post-operatively. By the week 8 follow up, she was reporting no residual pain in her ankle and resumed regular activity.

Use of amniotic membranes in orthopedic surgery is gaining in popularity due to its well-recognized benefits in decreasing wound complications and scar tissue formation (1). As noted under the Literature Review portion of this poster, investigators are also noting its usefulness in repairing cartilaginous defects. Amniotic membranes contain undifferentiated amniotic epithelial cells, fibroblasts and mesenchymal cells. Fibroblasts can differentiate into chondrocytes, among other cells (6). In vivo and in vitro studies have demonstrated this effect (2-6). We used this knowledge in planning the surgical repair of the patient in this case report.

Although we cannot histologically ascertain the regeneration of subchondral bone or cartilage at the site of her defect, we are pleased with her subjective and radiographic outcomes. The longevity of our patient's satisfaction is to be determined, but the preliminary findings are promising. Although there are several studies which report the ability both in vitro and in vivo for human amniotic membrane to differentiate into chondrocytes and osteocytes, there are no human studies to date which show substantial evidence of a similar technique being employed to treat osteochondral lesions in living subjects. Studies in living human subjects would need to be based solely off of subjective and radiographic findings, such as this case report. A study with large sample size and a long term follow up would provide more convincing results, but this case study provides an excellent result in an isolated patient with short term follow up.

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