Juvenile Chondrocyte Allograft for Treatment of Osteochondral Lesions of the Talus

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Introduction & Objective

In 1886 Franz König coined the term “osteochondritis dissecans” in describing loose bodies found in the knee. In 1922, Kappis described this pathology within the ankle joint. Causes of osteochondral lesions include local avascular necrosis, vasculopathies, acute trauma, chronic microtrauma, endocrine or metabolic factors, degenerative joint disease, joint malalignment, and genetic predisposition.¹ Osteochondral lesions of the talus (OLT’s) are a common injury, and have been shown to occur in up to 50% of acute ankle sprains and fractures.² Current data suggests trauma as the most common cause.

Current surgical treatment options for OLT’s include debridement, marrow stimulation, osteochondral autograft, fresh osteochondral allograft, and particulated juvenile cartilage allograft transplantation. Treatment strategy depends on several variables including lesion size, containment of the lesion, the lesion location, and prior procedures. Lesions greater than 1 cm and uncontained shoulder lesions are considered difficult lesions to treat.³ Treatment of large lesions (>1.5cm) is challenging because of the poor potential of cartilage for regeneration and weak biomechanical properties of fibrocartilage created by procedures that stimulate the bed of the defect.⁴

Common disadvantages of many of these procedures is the development of fibrocartilage (rather than hyaline cartilage), access difficulty, donor site morbidity, necessity for malleolar osteotomies, and the need for multiple procedures.⁵ DeNovo® NT Graft (Zimmer, Inc.) uses particulated allogenic juvenile cartilage secured with a fibrin adhesive. DeNovo® NT is composed of immature juvenile articular chondrocytes which have greater metabolic activity and the capability of regenerating hyaline cartilage.⁶ DeNovo® NT eliminates the need for harvesting and is intended for the repair of articular cartilage in a single stage procedure.

Case Report

53 year old male with a history of numerous inversion type ankle injuries and a several year history of right ankle pain. Patient failed all prior non-operative care. CT scan showing large (>1cm), postero-lateral shoulder osteochondral lesion of the talus (fig. 1-3).

After adequate debridement and preparation of the lesion, the decision was then made to perform an ankle arthroscopy by simply extending the anterolateral portal for adequate visualization during graft application.

The foot was positioned maximally plantar-flexed. The lesion was then cleaned and dried. A thin layer of fibrin sealant was then applied to the base of the lesion (fig. 6). After a 2 minute drying time, the graft pieces were then placed into the lesion and on top of the fibrin (fig. 7). The manufacturer recommends at least 50% of the lesion be covered uniformly with graft tissue.

Surgical Technique

The ankle joint was accessed through standard anteromedial and anterolateral portals. Arthroscopy revealed a loose, delaminated osteochondral lesion in the posterolateral talus dome (fig. 4). The loosely adhered articular cartilage was debrided to stable borders. The damaged cartilage was removed down to subchondral plate (fig. 5). The manufacturer recommends at least 50-60% of cartilage lesion be contained by a border of native cartilage.

The tissue pieces were then spread evenly and gently tapped into the fibrin bed (fig 8).³ The graft was then allowed to sit in the lesion for several minutes as the fibrin cured. An additional application of fibrin glue was then applied evenly over the graft surface (fig. 9).³ Once final drying was complete, the ankle was slowly put through gentle range of motion to establish a smooth, contoured surface (fig. 10). Patient was maintained non-weight bearing 6 weeks then transitioned to protected weight bearing in a cast boot followed by formal physical therapy program.

Discussion

Treatment of larger lesions can be quite challenging. There are multiple procedures for the treatment of OLT’s. Chondrocyte allograft of OLT’s is a single stage procedure that stimulates the growth of hyaline cartilage within the lesion, eliminates the potential for donor graft site morbidity, and may be performed through a less invasive arthroscopic approach. DeNovo® NT Graft has shown promising results in the treatment of osteochondral lesions of the knee.¹ however further clinical research to assess the efficacy in the ankle is needed.

References
