Particulated Juvenile Cartilage Allograft Transplantation PJCAT is a new technique whereby 1mm cubes of juvenile cartilage allograft tissue pieces, containing live cells within their native extracellular matrix, are secured with fibrin adhesive into a talar osteochondral lesion. The tissue is marketed by Zimmer as DeNovo® NT Natural Tissue Graft (Zimmer, Inc., Warsaw, IN).

Unlike the OATS procedure, PJCAT uses particulated cartilage pieces instead of osteochondral plugs, which means that it is not necessary to be perpendicular to the cartilage surface for implantation. Also, there is no donor site morbidity at the knee. We have found that the juvenile cartilage cells unlike their adult counterparts are robust and better able to grow and produce GAG. The cartilage is considered immune privileged and there is a minimal chance for immunological reaction. Since the pieces are fixed with fibrin glue in the defect they require no impact trauma during insertion, which maintains viability. Also surface geometry is created by molding the surface off the tibial surface, which can reproduce the optimal contour unlike the frequent mismatch seen with some autograft, or allograft transplants. Finally the pieces can be placed in the anterior 2/3 of the talus without an osteotomy, which avoids the complications of delayed union, mal-union, non-union and hardware pain.

The cartilage pieces are obtained, in compliance with Good Tissue Practice from neomort donors average age of 3 years, ranging in age from newborn to age 13 years. No stillborn or fetal tissue is used. Standard disease screening is performed on each lot.

The first implant at The Union Memorial Foot and Ankle service was October 2008. As of May 2012 we had performed more than 82 cases. There are 56 cases with follow-up ranging from 12 to 44 months. Many of these patients received PJCAT treatment due to continuing symptoms after earlier marrow stimulation or OAT procedures. Overall, after the PJCAT treatment, the patients have expressed satisfaction and reported improvement in pain and function. MRI images taken at one year follow up in the majority of patients show progressive resolution of the talar edema and a cartilage
cap. The bony aspect of the defect typically still looks abnormal especially as it is often filled with a combination of bone and cartilage.

Four patients had a second-look arthroscopy or arthrotomy. Two had impingement by fragments of cartilage and one for removal of anterior ankle osteophytes. At the time, the grafts were intact. One patient had posterior ankle symptoms that were persistent from before the index PJCAT. On inspection this lesion was well healed and the surface looked good. In two of these three cases biopsies were performed and read by independent pathologist and showed hyaline cartilage. An additional patient underwent a revision PJCAT procedure at 9 months from the index procedure. This patient developed a large cyst in the talus. At the time of reoperation, the previous PJCAT graft appeared like the surrounding cartilage, but was partially loose, likely due to the large cystic cavity below. During the revision surgery, the cavity was filled with bone graft and an additional PJCAT procedure was performed. Improvement of pain and function can be seen up to 2 years after surgery. Prospective and retrospective IRB approved studies of the UMH patients are on going.

Conclusion: Although there is some issues regarding limited supply, cost, reimbursement and disease transmission, the technique has been found in our institution to improve pain and function in patients with lesions that have failed marrow stimulation or OATS, shoulder lesions with at least one dimension >10 mm or primary lesions with at least one dimension >15 mm. The lack of additional surgical morbidity at the donor site and at the implantation site by minimizing the need for an osteotomy has been a large advantage.

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