16.3 Rotational high tibial opening wedge osteotomy for medial knee arthritis

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Purpose: Median opening wedge osteotomies address coronal plane unloading, but require additional manipulation if they are to address unloading lesions in the front or back of the medial tibial plateau. We compared a standard medial opening wedge osteotomy with a novel medial opening osteotomy utilizing a 1.5 cm allograft wedge rotated posteriorly 45 degrees to unload a posterior tibial lesion, and rotated anteriorly 45 degrees to unload an anterior tibial lesion.

Methods and Materials: Sawbone experiment: We utilized an experimental measurement fixture to measure possible corrections by different wedges and rotations. Case Report: A patient with bilateral varus knees was treated with staged posterior rotational wedge osteotomies and microfracture for diffuse medial femoral condyle lesions and posterior 2x2 cm tibial plateau lesions.

Results: Sawbone Experiments: Posterior rotation of a 1.5 cm medial wedge flattened the tibial sagittal slope 12 degrees to unload posterior lesion and created 12 degrees of valgus correction. Anterior rotation of a 1.5 cm medial wedge increased the sagittal slope 15 degrees and created 13 degrees of valgus correction. Case Report: Medial 1.5 cm allograft wedge were rotated posteriorly. The patient had correction on the right from 9 degrees varus to 6 degrees valgus with flattening of the tibial slope from 12 degrees to 8 degrees, and on the left from 8 degrees varus to 3 degrees valgus with flattening of the posterior slope from 12 degrees to 2 degrees.

Conclusions: Modification of a conventional opening wedge osteotomy can better unload anterior or posterior medial tibial plateau lesions frequently encountered in the varus knee.

16.4 Effect of high energy extracorporeal shock waves treatment on joint cartilage

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Purpose: Extracorporeal shock waves have been established as common mode of treatment for periarticular affections such as calcifying tendinitis and epidymitis under radiial melas. We were interested in the effect of high energy extracorporeal shock waves on hyaline cartilage. Side effects of extracorporeal shock waves are known to range from bone contusion to microfracture to rupture up to full articular cartilage damage. Increase in effect of high energy shock waves on joint cartilage has not been examined yet on a molecular basis.

Methods and Materials: The right hip joint of 18 adult Sprague-Dawley rats was treated with 1500 extracorporeal shock waves of 0.5 mJ/mm² in vivo. The left hip joint and two untreated animals served as control. Contact radiographs were taken before and after extracorporeal shock wave application. At 1, 4 and 10 weeks after treatment the animals were sacrificed. Samples were fixed, decalcified and embedded in paraffin. 4μm sections were stained with H&E and Safranin-O. For immunohistochemistry a polyclonal antibody against rat tenascin-C was used.

Results: Plain radiographs did not show changes of the hip joints treated with extracorporeal shock waves. Regarding histology we found a slight staining of the extracellular matrix. Immunohistochemical staining for tenascin-C showed an increased signal for tenascin-C with a strong pericellular staining of chondrocytes for the group 4 and 10 weeks after shock wave treatment. The hyaline cartilage of the control group showed no pericellular staining, only a slight staining of the extracellular matrix.

Conclusions: According to our results signal for tenascin-C was found to be increased in hyaline cartilage after high energy extracorporeal shock wave treatment. Tenascin-C which is an anti-adhesion molecule found in the cartilage undergoing remodeling has been shown to be increased in osteoarthritis. We conclude that high energy extracorporeal shock waves cause an increase in tenascin-C which might be a first sign of degeneration in joint cartilage. The effects of extracorporeal shock waves on cartilage have to be further examined.

16.5 Clinical Outcome: 49 Consecutive Meniscal allografts

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Purpose: To examine an eleven-year series of meniscal allografts for clinical outcomes

Methods and Materials: Chart review on 49 consecutive meniscal allografts from January of 1995 to March of 2005. Time for inclusion was 12 months to 140 months. We attempted to contact all subjects to obtain pre-op, now and best ever Lysholm scores. Records of patients who had second looks. A review of most recent postoperative x-rays was done. Single tailed Student-t was used to evaluate scores. Joint spaces were measured on the most recent follow-up x-ray using the contralateral side as a control.

Results: We contacted 42 patients; 7 patients were lost to follow-up. Thirty-five medial and 7 lateral menisci were replaced. Nine patients had concomitant ACL reconstruction or thermal plication. One had concomitant OAT procedure. Twenty patients had second look arthroscopy. Ten patients had retears of the implant. Ten patients had other pathology. Three advanced to unicompartmental or total joint replacement. There is significant difference between the pre-op and subsequent Lysholm scores (P<.0001). There was no significant difference between the best ever and present Lysholm scores (P=.10).

Conclusions: Meniscus transplantation caused significant clinical improvement overall. There is minimal deterioration over time. X-ray results do not show progression of osteoarthritis.

16.6 In vivo differentiation of reparative tissue in patients after different cartilage repair procedures by means of cartilage T2 assessment at 3 Tesla MRI

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Purpose: To evaluate in vivo T2-mapping in a preliminary study as potential non-invasive tool for differentiation of cartilage repair tissue after different cartilage repair procedures.

Methods and Materials: Twenty-two patients treated with microfracture(MFX) or matrix-associated autologous chondrocyte transplantation(MACT) (ten in each group) were enrolled. For comparability patients of each group were matched by age(MFX:40.0±10.0years; MACT:40.0±10.0years) and post-operative interval(MFX:28.6±5.2months; MACT:27.0±3.1months). Magnetic resonance imaging(MRI) was performed on a 3 Tesla MR scanner, T2 maps were calculated from a multi-echo spin echo(SE) measurement. Quantitative mean T2 values were calculated within the cartilage repair area and within cartilage sites seen as morphological normal articular cartilage. Additionally taking the zonal organisation into consideration, regions of interest were subdivided into deep, middle and superficial. Differences between cartilage sites and groups were calculated by analysis of variance using a three-way ANOVA.

Results: Quantitative T2 assessment of normal native hyaline cartilage showed similar results for all patients and a highly significant trend in increasing T2 values from deep to middle to superficial zone (p<0.001). In cartilage repair areas after MFX mean T2 was significantly reduced (p<0.05) whereas after MACT mean T2 was not reduced (p=0.05). For zonal variation repair tissue after MFX showed no significant trend between different depths (p=0.847) in contrast to repair tissue after MACT were a slightly significant increase from deep to superficial zone (p=0.045) could be observed.

Conclusions: Quantitative T2 mapping seems to be sensitive to differences in repair tissues formed after different surgical cartilage repair procedures and may be used as non-invasive follow-up method after cartilage repair.