418 THE CLINICAL ASSOCIATIONS OF KNEE CARTILAGE DEFECTS IN AN OBESE POPULATION

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Purpose: To generate hypothesis regarding the associations of knee cartilage defects in an obese population with and without OA.
Methods: Obese subjects (BMI > 30) were recruited from laparoscopic adjustable gastric banding or exercise and diet weight loss programs. ACR clinical criteria for OA knee were determined. MRI assessment was conducted on a 3T machine (Magnetom Trio; Siemens, Erlangen, Germany) at baseline. Cartilage defects were graded according to an established protocol at medial tibial, medial femoral, lateral tibial, lateral femoral and patellar sites (grade 0−4). Composite scores for medial tibiofemoral, lateral tibiofemoral and whole compartments were obtained. All subjects completed a general health and musculoskeletal (MSK) questionnaire, WOMAC, SF-36, AQoL, Moorehead-Ardelt Quality of Life Questionnaire II (developed in an obese population), and Multidimensional Assessment of Fatigue. Physical assessment was conducted by a single assessor. The MSK questionnaire assessed joint pain; activity level at work, home and leisure; medication use; previous injury and previous surgery. Physical assessment parameters included: range of knee and hip motion; crepitus; alignment; quadriceps strength; waist, hip and knee circumference. Correlations between cartilage defect scores and MSK outcomes were obtained (Stata software). Regression analysis corrected for age, gender, BMI and presence of knee OA.
Results: There were 111 subjects (78 women and 33 men) with mean BMI 39.9±5.8 and mean age 51±12 years. Fifty-three (48%) subjects met ACR criteria for knee OA. Knee cartilage defects were significantly associated with BMI ($p < 0.03$), presence of knee OA ($p < 0.0001$), knee pain ($p < 0.05$), and duration of knee pain ($p < 0.01$) in the medial tibiofemoral and whole compartments. There was statistically significant association with BMI and the lateral tibiofemoral compartment ($p < 0.01$). Significant associations were also seen with physical function, role physical, bodily pain and general health on SF-36 ($p < 0.05$); pain, stiffness and function on WOMAC ($p < 0.0001$); and medication use and independence subscale ($p < 0.02$) on AQoL for both the medial tibiofemoral and whole compartments. The association between knee cartilage defects, and BMI ($p < 0.04$) and knee OA ($p < 0.0001$) remained significant in the medial tibiofemoral and whole compartments on regression analysis. ICCs for intra-observer reproducibility were >0.98 for all compartments.
Conclusions: Knee cartilage defects scores are significantly associated with BMI, knee OA, the presence and duration of knee pain. Cartilage defects are also significantly associated with a number of quality of life measures indicating clinical significance. They provide a time-efficient means of assessing articular cartilage which is reproducible. With the rising prevalence of obesity, it is important to assess the natural history of cartilage defects in the obese population, a group at risk for both incident and prevalent OA.

419 LOCATION AND MAGNITUDE OF CARTILAGE THICKNESS LOSS IN OA PROGRESSORS

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Purpose: A 2 year study to compare change in cartilage thickness in non OA and OA subjects, also provides an opportunity to identify individuals with significant decrease in cartilage thickness, i.e., progressors. Examination of only progressors may lead to better understanding of the location and magnitude of changes in cartilage thickness over during clinical trials. The objective of this study was to identify subjects with significant medial cartilage thickness decrease over two years and assess the location and magnitude of their decrease.
Methods: In the A9001140 study, 152 female subjects were imaged at 7 clinical centers using Siemens Magnetom Trio and GE Signa Excite magnets. Double oblique coronal acquisitions were obtained at baseline and 2 years, using water excitation spoiled gradient echo sequences ($1.0 \times 0.31 \times 0.31\ mm^3$ resolution). Segmentation of femoro-tibial cartilage morphology was performed using proprietary software (Chondrometrics, Germany). Change in medial cartilage thickness (ThCtAB.aMe) over 24 months was measured for the whole compartment (cMFTC, MFTC), the femoral and tibial plates (cMF, MT), 3 subregions of the femoral plate (ccMF, ecMF, icMF) and 5 subregions (central, exterior, interior, anterior and posterior) of the tibial plate (cMT, eMT, iMT, aMT, pMT). Kellgren and Lawrence grades (KL) were observed on standing anteroposterior (AP) and Lyon Schuss (LS) radiographs of the knee.
The 77 subjects with KL = 0 scores on both AP and LS radiographs were viewed as an unambiguous healthy group and defined as non OA subjects. Of the remaining 75 subjects, 13 had KL = 0 only on the AP radiographs, 4 were KL = 1, 30 were KL = 2, and 28 were KL = 3. While some subjects had AP KL = 0, for convenience this group was defined as the OA group. Progressors were defined as subjects with a larger decrease in a cartilage thickness measure than expected from examination of non OA distribution. Normalized values (z-scores) were generated for non OA and OA subjects by subtracting the mean and standard deviation of the non OA subjects. Specifically, the normalized values were translated to p values from the normal distribution and small p values were taken as indication of progression. Multiple comparisons adjustments were made using false discovery rate methods ($\alpha = 0.1$) for non OA and OA groups separately. Normality plots were used to check if annualized rates of change in cartilage thickness for the non OA group were normally distributed. Summary statistics regarding frequency and magnitude of progression in different KL Groups and knee regions were computed.
Results: 28% of the OA group were progressors, compared to 2.6% of the non OA group. Using AP radiograph KL scores, 20% of KL2s were progressors compared to 46% of KL3s. Twelve of the 23 progressors had significant progression in a single subregion, while 4 had significant progression in 4 or more subregions. Approximately 10% of subjects had significant progression when observing compartments (cMFTC, MFTC), while 5−8% had progression when observing medial plates (cMF, MT). The subregion with highest observed frequency of progression was eMT (65% of progressors) followed by ccMF (35%). Mean percent annualized rate of change in progressors ranged from −0.6% (pMT) to −5.9% (eMT) with 4 of the subregions having annual percent decrease in thickness greater than 3%. Rate of change in non progressors ranged between −0.3 to 0.7%.
Conclusions: Over 2 years many subjects do have a significant decrease in cartilage thickness, but the decrease tends to be localized (1 subregion). Although two subregions, eMT and ccMF, are the most frequently observed locations for decrease in cartilage thickness, all subregions, except pMT, are observed to have important decreases in some subjects.

420 DUAL ENERGY X-RAY ABSORPTIOMETRY ANALYSYS CONTRIBUTE TO PREDICT HIP OSTEOARTHRITIS PROGRESSION

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Purpose: To determine if parameters obtained from dual energy X-ray absorptiometry (DXA) contribute to predict progression of hip osteoarthritis (OA) and to test if the differerence between affected (OA) hip and contralateral hip adds to this prediction.
Methods: The study group involves the “Glucosamine sulphate on osteoarthrtis long term” (GOAL) cohort from which we took 189 patients that met the American College of Rheumatology clinical criteria for hip osteoarthritis ands were included after their first visit to the Phycisian. DXA images, X-rays and pain and function scores (WOMAC) were obtained from all patients at inclusion and after 2 years follow-up.
Software was developed for DXA analysis at different regions of interest in the femoral head and proximal femur. We performed first a logistic regression analysis to test if Kelgren and Lawrence scores (KL) can predict ‘progression’ of OA, with the outcome ‘progression’ defined as 20% joint space narrowing or when patients received a total hip replacement within the two years follow-up period. In addition we tested if (1) DXA parameters contribute to the prediction of progression and (2) parameters that use the difference between the affected and contralateral hip of the patient contribute to the prediction. All the models were corrected for the variables gender, age, weight and height. We used −2log likelihood test, R square Nagelkerke and Areas Under the Receiver operator characterictic curves (ROC) to compare the models.
Results: The model that included the DXA variables was significantly better in predicing hip OA progression than the model with KL score of the affected side alone ($p < 0.01$). The addition of DXA differences within hips slightly added to the prediction of progression ($p < 0.05$).
The difference in bone mineral density (BMD) and bone mineral content (BMC) in the superior and medial part of the femoral head between the