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Fibronectin-Aggrecan Complex as a Marker for Cartilage Degradation in Non-Arthritic Hips

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Summary:
Patients requiring microfracture for full thickness cartilage defects showed significantly higher levels of FAC as compared to those without significant cartilage damage.

Abstract:
Introduction:
Hip pain is common in the general population. Structural disorders such as femoroacetabular impingement have been proposed as a cause of cartilage damage and subsequent early osteoarthritis (OA). Hip arthroscopy in the face of arthritis has been shown to have inferior outcomes. Hip synovial fluid cytokine concentrations may be helpful in predicting cartilage damage and thus determining those most appropriate for arthroscopy versus arthroplasty.

Methods:
Patients with Tonnis grade 2 or greater hip OA and those without hip arthritis (Tonnis grade 0) were identified from patients undergoing either hip arthroscopy or arthroplasty. Those with a history of prior surgery, inflammatory arthritis, crystalline arthropathy, or previous trauma to the involved hip were excluded. Prior to surgery, radiographs were obtained and patients completed functional questionnaires (modified Harris Hip score [HHS], Western Ontario and McMaster Universities Arthritis [WOMAC] Index, and the International Hip Outcomes Tool [iHOT-33]). Synovial fluid was collected at the time of portal establishment for those undergoing hip arthroscopy and following arthrotomy for the arthroplasty group. Analytes included fibronectin-aggrecan complex (FAC), interferon-gamma (IFN-gamma), interleukin (IL-6), IL-1 receptor agonist (IL-RA), IL-1b, monocyte chemotactic protein 1 (MCP-1), eotaxin, macrophage inflammatory protein 1ß (MIP-1ß), interferon-inducible protein 10 (IP-10), platelet derived growth factor - BB (PDGF-BB), regulated upon activation normal T-cell expressed and presumably secreted (RANTES), tumor necrosis factor - alpha (TNFa), and vascular endothelial growth factor (VEGF). Variables recorded were Tonnis grade, center edge angle of Wiberg, and labrum and cartilage pathology. An a priori power analysis indicated that 14 patients in each group would yield a Power of 0.80 for detecting a difference in FAC concentration. Mann-Whitney U Test and regression analyses were used with an alpha value of 0.05 set as significant.

Results:
A total of 36 patients were included (18 arthroplasty, 18 hip arthroscopy). In the arthroplasty group, there were 9 males and 9 females with an average age of 60.4 ± 11.9 years. The arthroscopy group consisted of 5 males and 13 females with an average age of 37.5 ± 11.3 years. FAC was the only analyte to show a significant difference between those with and without OA (0.80 ± 0.2 vs. 1.09 ± 1.4 ug/ml, $p<0.001$). There was no significant correlation between the analytes and any of the pre-operative functional assessment scores. FAC had significantly higher concentration in those without radiographic evidence of OA undergoing microfracture versus those with lesser chondral pathology

(2.40 ± 1.6 vs. 0.77 ± 1.2 ug/ml, p = 0.03). A FAC concentration of 2.18 ug/ml was 75% sensitive and 84% specific in predicting microfracture for those with hip pain but without radiographic evidence of OA (area under receiver operating characteristic [ROC] curve = 0.87).

Conclusion:
There was a significant difference in FAC concentration between patients with and without radiographic OA. In addition, patients requiring microfracture for full thickness cartilage defects showed significantly higher levels of FAC as compared to those without significant cartilage damage. This data suggests that FAC may be useful in predicting cartilage pathology in those patients with hip pain but without radiographic evidence of arthritis.