8) TITLE: Development and Validation of an Intra-Operative Grading System to Define the Role of Synovitis after Meniscal Knee Injury

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INTRODUCTION: The post-operative course for a small subset of patients undergoing arthroscopic surgery for an acute meniscal tear is characterized by persistent inflammation and delayed functional activity. We hypothesize that synovial inflammation may play a role in the post-operative inflammation.

OBJECTIVE: The purpose of this study is: 1) to develop an intra-articular scoring system for assessing the anatomic and morphologic pattern of synovial changes in patients with acute meniscal injuries; 2) develop and apply a histologic synovial scoring system that permits classification and quantification of synovial inflammation and 3) correlate synovial histology and extent of synovial inflammation with the clinical outcomes over a two-year period.

METHODS: 25 patients with acute meniscal tears underwent arthroscopy. They had no clinical or radiographic evidence of OA. Synovial biopsies were obtained from the medial and lateral gutters and suprapatellar pouch. The tissue samples were analyzed by H&E staining. Video and photographic documentation of the synovial lining was obtained from the regions of the biopsy sites and the findings utilized to develop the synovial scoring system. SF-12, Lysholm and VAS questionnaires were administered pre-operatively and at 4, 12, and 24 months, post-operatively. Synovial biopsies were evaluated by three blinded reviewers (pathologist, 2 rheumatologists) using a quantitative scoring system to evaluate lymphocytic inflammation, vascularity, presence of detritus, fibrosis, mucoid change, fibrosis and synovial inflammation.

RESULTS: Preliminary histopathological analysis of the tissue obtained from the three biopsy sites (medial and lateral gutters and the suprapatellar punch) has been performed and post-operative patient outcomes are continuing to be monitored. Follow-up studies are ongoing. We have selected four individuals who have exhibited differential clinical post-operative courses, two with benign outcomes who have returned to full activity without residual clinical problems and two patients with persistent post-operative signs of inflammation. Until the study is complete, the final correlation of the histopathological findings with the injury site and the results of the visual synovial scoring will not be unblinded.

CONCLUSION: Although the findings are preliminary, comparison of the synovial histological scores in the patients with or without post-operative clinical inflammation revealed striking differences. These findings provide evidence that synovial inflammation has predictive value with respect to post-operative clinical outcomes. The presence of synovial inflammation in this group of patients is not a novel finding. Previous reports have not rigorously examined the extent or the characteristics of the synovial inflammation. These findings have not been correlated with the visual appearance of the synovium and articular cartilage surfaces. The ability to identify patients pre-operatively who are predisposed to a more prolonged and intense post-injury inflammatory synovial reaction, would allow clinicians and investigators to focus their attention on developing strategies for early therapeutic interventions to reduce inflammation and decrease the risk of subsequent development of progressive OA. In addition, these analyses should provide insights into the underlying mechanisms involved in the role of inflammation and tissue injury and their relationship to OA pathogenesis

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