The Outcome of Partial Meniscectomy on Joint Space Width: Data from the Osteoarthritis Initiative

INTRODUCTION:
Osteoarthritis is characterized by a loss of articular cartilage due to a non-immune related etiology, resulting in inflammation and painful movement of the affected joint. In the United States, it is the most common cause of disability. However, the exact cause is still unknown [1], and numerous researchers throughout the world are trying to quantify its pathophysiology in order to manipulate its course.

The knee is commonly afflicted with osteoarthritis, and its dysfunction inhibits activities of daily living as well as sports and recreation. Clinical diagnosis of osteoarthritis is made based on pain in the affected joint; however, diagnostic imaging, including X-ray and MRI, can demonstrate joint space narrowing [1] and a reduced articular cartilage volume in osteoarthritic joints. It has been difficult to achieve a thorough study quantifying these joint measures due to dropout and small variations within types of surgery [2]. The Osteoarthritis Initiative is a multicenter study of individuals with osteoarthritis or at risk of developing osteoarthritis which addresses this unmet need [3].

While multiple studies have investigated the relationship between meniscectomy and joint space narrowing, none have compared patients undergoing arthroscopic meniscectomy with matched controls. We hypothesize that joint space width decreases more in patients who have meniscectomy than in matched controls over a one-year period in the OAI cohort.

METHODS:

Data Source: The Osteoarthritis Initiative (OAI) is a prospective cohort study sponsored by the NIH. The OAI follows 4,796 patients, ages 45-79, who are at risk for and presenting with osteoarthritis. Details of the study design are publicly accessible at http://oai.epi.ucsf.org/dataload/docs/StudyDesignProtocol.pdf [4]. This study uses data from the OAI public use data sets. Approval by the institutional review board (IRB) was obtained from the Osteoarthritis Initiative. Informed consents were administered by the Osteoarthritis Initiative. All data used for this study was de-identified by the Osteoarthritis Initiative. Internal exemption to work with the de-identified data was approved by the internal IRB specific to this study.

Study Design: Retrospective Cohort Study.

Selection Criteria: The Osteoarthritis Initiative cohort was queried for subjects who underwent meniscectomy after study enrollment. Subjects with surgery prior to enrollment or non-meniscectomy surgery during the follow-up period were excluded. Knees were treated independently, so one subject could have both knees included if bilateral meniscectomy were performed. The database was queried for each of the three available years of follow-up. Three control knees were matched to meniscectomy knees using the same exclusion criteria as above while matching for subcohort, gender, study site, age (+/- 5 years), side (left/right) and year of study.

DISCUSSION:

By considering joint space width as a diagnostic tool, we allow ourselves to methodologically solve a number of previously unanswered questions regarding osteoarthritis. In the past, a study demonstrated a 1.2 mm decrease in joint space width at an average follow-up of 12 years, when compared to controls [5]. However, another study compared joint-space width of 37 patients pre- and 2 days post-meniscectomy. There was no statistically significant decrease in joint space width, suggesting that the loss may be due to a degenerative process after the meniscectomy as opposed to removal of the meniscus itself [6].

Utilizing radiographic joint space measurements led us to the conclusion that meniscectomy leads to loss of joint space width much earlier than previously suggested. This may be due to the increased contact stress between the tibia and femur, damaging the articular cartilage in the knee joint, resulting in symptoms of osteoarthritis and joint space narrowing. However, this may also be the outcome of loss of the interposed meniscus, and thus not reflect true cartilage loss. Partial meniscectomy could also cause dysfunction in the remaining meniscus, possibly resulting in extrusion or flattening, which then manifests as joint space narrowing. In the future, we propose to complete an MRI analysis of cartilage volumes in order to differentiate the etiologies of joint space narrowing. Comparing reduction in cartilage volume between subcohorts can further display meniscectomy’s impact on knee function later in life.

REFERENCES:

4. The Osteoarthritis Initiative.