Geographic Mapping of Meniscus and Cartilage Lesions Associated with ACL Injuries

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Introduction: The patterns of meniscus and cartilage lesions and how they are affected by the time course from injury to surgery and patient sex have been studied in anterior cruciate ligament (ACL) injured knees. However, these studies have relatively small sample sizes, undefined entry criteria, several surgeons grading the lesions, and have not adequately characterized the precise locations and severity of cartilage and meniscus injuries. The objective of this investigation was to build on these earlier studies and determine the association of patient sex, age at the time of surgery, and time between injury and anterior cruciate ligament reconstruction ACLR (surgical delay) with frequency and location of meniscus and femoral articular cartilage lesions seen at the time of the ACLR procedure.

Materials and Methods: This was a retrospective study of 1209 consecutive patients who underwent a primary ACLR between 1984 and 2002. Individuals who sustained a grade 3 MCL, LCL or PCL injury recorded at the time of surgery were excluded. Ligament, cartilage, and meniscus injuries were documented by the same individual (RJJ) at the index surgery with the use of anatomic maps. Meniscus injuries were assessed with the system presented by Cooper et al. (Figure 1) Articular cartilage injuries were classified according to location (ICRS mapping system; Figure 1), grade (IKDC grading system), and size (small <5mm; medium >5mm < 10mm; or large > 10 mm). The data were analyzed using chi-squared tests, Wilcoxon rank sum tests, and log-linear analysis followed by Binomial tests of cell frequencies. Significance levels were set at 0.05.

Results: Of the 1209 patients that underwent ACLR, 1104 met the entry criteria. Thirty-nine percent of the subjects were female, and the mean age at the time of surgery was 26.1 (range: 12 to 56). Seven-hundred and twenty-one subjects had meniscus injuries: There were no meniscus injuries in 382 subjects, medial or lateral meniscus injuries in 537 subjects, and both medial and lateral injuries in 185 subjects. Four-hundred and seventy-two subjects suffered articular cartilage injuries: There were no cartilage injuries (femur or tibia) in 627 subjects, medial meniscus injuries in 537 subjects, and both medial and lateral injuries in 185 subjects. Surgical delay was associated with grade and size of injury (grade only p=.05, size only p=.005, both combined p=.005). The pattern was that a greater than 1 year surgical delay resulted in a greater proportion of large and grade 3 lesions.

Discussion: Surgical delay results in increased injury (increased lesion size and grade) to intra-articular structures. Most articular cartilage lesions occur on the middle of the medial and lateral femoral condyles, and more lesions occur on the medial compared to the lateral femoral condyle. A majority of meniscus lesions occur in the posterior lateral region. Males and subjects with longer surgical delay have more medial meniscus injuries, while females and subjects with short surgical delay have more posterior lateral meniscus injuries.