

Anterior cruciate ligament resection and medial meniscectomy result in multifocal cartilage degenerations

Abstract

Damage to the meniscus and the anterior cruciate ligament alters the pattern of loading in the knee joint and frequently leads to cartilage degeneration and osteoarthritis. This study aimed to evaluate the area of greatest impact after traumatic osteoarthritic induction at the knee joint in sheep model. Osteoarthritis was induced unilaterally at the right hind knee of six sheep by surgical resection of the anterior cruciate ligament and medial meniscus. After 3 weeks recovery period, sheep were exercised once daily by running a 100 meters distance on a hard surface for 3 weeks. Gross and histological assessments were done. Six regions examined were; the patella, patella femoral groove, medial femoral condyle, lateral femoral condyle, medial tibia plateau and lateral tibia plateau. Their mean International Cartilage Repair Society grading was: 2.5 ± 0.42 , 3.3 ± 0.17 , 2.25 ± 0.38 , 1.33 ± 0.25 , 2 ± 0.37 and 1.5 ± 0.22 respectively. The control from all samples scored zero at the above regions. The lesions at various regions were significantly higher compared to the control ($p < 0.05$). Patella femoral groove was significantly higher compare to all other regions except for Patella. Lateral femoral condyle was the least ($p < 0.05$). Histological staining revealed defined osteoarthritic changes. Total excision of medial meniscus and anterior cruciate ligament followed by exercise regime induced osteoarthritis in the affected knee joint. The changes in pattern of degeneration, affected patella femoral groove the most; followed by the patella and medial femoral condyle, then medial tibia plateau, lateral tibia plateau and lastly the lateral femoral condyle.

Keyword: Tissue engineering; Sheep model; Osteoarthritis; ICRS; Meniscus; Ligament; Cartilage; Histology