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Clinical Observational Study for the Effects of Anterior Cruciate Ligament Rupture and Reconstruction on Articular Cartilage of Knee

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Purpose

To investigate the effects of anterior cruciate ligament (ACL) rupture and reconstruction on articular cartilage of knee by observing the change of articular cartilage before and after the reconstruction of ACL.

Materials and methods

About 1400 cases of ACL rupture received reconstructive ACL surgery assisted with arthroscopy from December of 2000 to December of 2004, 639 of which had second-look arthroscopy because of taking away the hardware, and as a result of that, the study of retrospective case series were performed. Sites and degrees of cartilage lesions in two surgeries were documented to confirm the articular cartilage change. Grouping the cases by age, occupation, sex, material of reconstruction, time before reconstruction, whether or not combined with other injure, injure of meniscus and value of KT2000 after reconstruction respectively, and then analyzed it. The cases of ACL rupture combined only with cartilage injury were selected, and the change of cartilage injury degree after reconstruction was observed. The cases of ACL rupture not combined with other injuries were also selected, cartilage injury degree after reconstruction was observed too.

Results

(1). 683 sites of cartilage lesions were found by arthroscopy at ACL reconstruction (average time was 21 months varied from 0.1 to 360

months) of 639 patients. Most cartilage lesions were in the patella, while the following records come from medial condylar and trochlea. 454 cartilage lesions were added at second-look arthroscopy after ACL reconstruction (average time was 14 months varied from 5 to 52 months). Most cartilage lesions were in patella-femoral joint and were at the second degree. All cartilage lesions incidence were increased after reconstruction but the medial condylar had no change ($p < 0.05$). (2). The risk of cartilage lesions had no significant difference between male and female cases at ACL reconstruction ($p > 0.05$). The augmenting of cartilage lesion degree in patella occurred more easily in female cases at second-look arthroscopy ($p < 0.05$). (3). The incidence of cartilage lesion increased and the degree was aggravated after ACL rupture in the course of aging. The augmenting of cartilage lesion degree was not significantly different at second-look arthroscopy among 4 groups with different ages ($p > 0.05$). (4). The risk of cartilage lesion was not significantly different between athlete and non-athlete cases at ACL reconstruction ($p > 0.05$). The augmenting of cartilage lesion degree was not significantly different between the two groups at second-look arthroscopy ($p > 0.05$). (5). The augmenting of cartilage lesion degree was not significantly different between the two groups which had different graft respectively (patella-tendon and hamstring-tendon) at second-look arthroscopy ($p > 0.05$). (6). The augmenting of cartilage lesion degree in patella-femoral joint occurred more easily in the patients with other combined ligament injuries at second-look arthroscopy ($p < 0.05$). (7). Cartilage lesions increased and the degree was aggravated over time after ACL rupture. The augmenting of cartilage lesion degree was not significantly different among 5 groups with different time at second-look arthroscopy ($p > 0.05$). (8). The augmenting of cartilage lesion degree was not significantly different between the two different KT2000 value groups at second-look arthroscopy ($p > 0.05$). (9). The risk of cartilage lesion was not significantly different between light meniscus injury group and the no meniscus injury group and the risk of cartilage lesion in medial and lateral compartments were graver in severe meniscus injury group than in other two groups at ACL reconstruction ($p > 0.05$). The augmenting of cartilage lesion degree was not significantly different among 3 groups at second-look arthroscopy ($p > 0.05$). (10). Degree of cartilage injury increased in trochlea at second-look arthroscopy for the patients only combined with cartilage injury ($p < 0.05$). The augmenting of cartilage lesion degree was not significant in other

positions ($p > 0.05$). (11). 64 sites of cartilage lesions were found after ACL reconstruction in 70 patients with pure ACL rupture without combined injuries. There were 50 sites (78.1%) of cartilage lesions in patella femoral joint and 47 sites (73.4%) of cartilage lesion were at 2 degree. (12). Less 4 degree cartilage lesions were found still in medial and lateral compartments than in patella femoral joint and more 4 degree cartilage injury alleviated to 2~3 or nearly to 0 degree in medial and lateral compartments than in patella femoral joint at second-look arthroscopy. But neither of them had statistical difference ($p > 0.05$). Less 2~3 degree cartilage lesions developed into 4 degree and more 2~3 degree cartilage lesions alleviated to nearly 0 degree in medial and lateral compartments than in patella femoral joint at second-look arthroscopy ($p < 0.05$).

Conclusion

1. After ACL rupture, The cartilage lesions were not significantly different among different sexes and different occupations. Cartilage lesions increased and the degree was aggravated by the course of aging and time over. Combined with meniscus injury had more severe cartilage lesions in medial and lateral compartments. 2. At second-look arthroscopy after ACL reconstruction, cartilage lesions increased to a certain extent, and they were mainly in patella-femoral joint most of which were light cartilage lesions. The augmenting of cartilage lesion degree in patella-femoral joint occurred more easily for female cases and the patients combined with other injuries. The augmenting of cartilage lesion degree was not significantly different among different ages, different time before reconstruction, different occupations, different KT2000 value after reconstruction, different material of reconstruction and whether or not resecting meniscus respectively. 3. Degree of cartilage lesion in part was alleviated after debridement during the ACL reconstruction surgery. Degree of cartilage lesion was more obvious alleviated in medial and lateral compartment than in patella femoral joint.

Key Words: Anterior cruciate ligament, Rupture, Reconstruction, Articular cartilage .