The clinical, radiographic, histological and ultrastructural results after Anterior Cruciate Ligament reconstruction using autografts

AKADEMISK AVHANDLING

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Av

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Leg. Läkare

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Professor Jan Ekstrand, Hälsouniversitetet, Linköping

Avhandlingen baseras på följande delarbeten:

I. Does the patellar tendon normalise after harvesting its central third?
A prospective long-term MRI-study
Svensson M, Kartus J, Ejerhed L, Lindahl S, Karlsson J.
Am J Sports Med. 2004; 32; 34-38.

II. Ultrastructural collagen fibril alterations in the patellar tendon 6 years after harvesting its central third.
Svensson M, Movin T, Rostgård-Christensen L, Blomén E, Hultenby K, Kartus J.
Am J Sports Med. 2007; 35; 301-306.

III. A long-term serial histological evaluation of the patellar tendon in humans after harvesting its central third.
Svensson M, Kartus J, Christensen LR, Movin T, Papadogiannakis N, Karlsson J.
Knee Surg Sports Traumatol Arthrosc. 2005; 13; 398-404.

IV. A prospective comparison of bone-patellar tendon-bone and hamstring grafts for anterior cruciate ligament reconstruction in female patients.
Svensson M, Sernert N, Ejerhed L, Karlsson J, Kartus J T.
Knee Surg Sports Traumatol Arthrosc. 2006; 14; 278-286.

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The principal aims of the study were to perform a long-term analysis of the patellar tendon structure after harvesting its central third as an autograft during ACL reconstruction. The patellar tendon underwent long-term serial morphological evaluations using MRI, histological evaluations at two and six years and ultrastructural evaluation six years after the harvesting procedure. Furthermore, the results after ACL reconstruction using BPTB or ST/G autografts were compared in a prospective study in a group of exclusively female patients.

All the patients underwent a standardised rehabilitation programme involving full range of motion exercises and full weight-bearing immediately after the reconstruction.

Nineteen patients underwent serial MRI examinations of the donor site six weeks, six months, two years and six years after the harvesting procedure. The study revealed that the patellar tendon had not normalised morphologically, compared with the contralateral side, up to six years after the harvesting procedure.

Seventeen patients underwent an ultrasonography-guided biopsy procedure of the central and lateral parts of the patellar tendon at the donor site, two and six years after the harvesting procedure. On both occasions, an increase in cellularity and vascularity and deterioration in fibre structure were found in the biopsy specimens from both the central and lateral parts of the patellar tendon at the donor site compared with normal control tendons.

Biopsy specimens from 13 patients obtained at six years were also evaluated using transmission electron microscopy. The extracellular matrix was more heterogeneous in the specimens from both the central and lateral parts of the patellar tendon, compared with normal control tendon. Moreover, significantly more small fibrils were found in both the central and lateral parts of the patellar tendon, compared with normal control tendons.

In a prospective study involving 63 female patients, donor-site morbidity in the form of knee-walking problems was significantly more common after using the BPTB autograft than after using the ST/G autograft. In terms of knee laxity and functional outcome, no significant differences were registered.

To summarise, the patellar tendon does not appear to regain normal morphology, histology and ultrastructure, up to six years after harvesting its central third. It appears that there is a long-standing effect on the entire tendon and not just the central part from where the graft was initially harvested.

Key words: anterior cruciate ligament, surgery, histology, biopsy, ultrastructure, radiology
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