Background: There have been several histological studies of the Leeds-Keio ligament in anterior cruciate ligament reconstruction, but there have been few of the Leeds-Keio ligament in the extra-articular portion.

Aims/Methods: To report the histological and ultrastructural findings of two cases of medial patellofemoral ligament reconstruction using the Leeds-Keio ligament, removed 6.1 years and 8.7 years after implantation.

Results: In both cases, the tissue over the Leeds-Keio ligament was ligament-like tissue. Electron microscopy showed that the diameter of the collagen fibrils in the tissue over the Leeds-Keio ligament was unimodal in the case investigated 6.1 years after implantation but bimodal in the case investigated after 8.7 years.

Conclusions: The tissue over the Leeds-Keio ligament may continue to grow with prolonged periods of mechanical stress.

The Leeds-Keio (LK) ligament (Neoligaments, Leeds, UK), which is made of polyester as an open weave mesh-like structure, was developed as an alternative anterior cruciate ligament. Several histological studies of reconstructed anterior cruciate ligament LK ligaments have shown that the fibroelastic response to the LK ligament usually lacks axial orientation inside or immediately adjacent to the artificial ligament. We histologically examined the extra-articular reconstructed medial patellofemoral ligament (MPFL) using the LK ligament and a medial retinaculum slip coverage in 15 specimens, one to nine years after transplantation, and showed that the tissue over the artificial ligament was mature only in specimens taken more than five years after surgery. In addition, we found that it was extremely important to investigate the reconstructed MPFL using the electron microscope.

This report presents the histological and ultrastructural findings of two Leeds-Keio MPFL grafts gathered 6.1 years and 8.7 years after implantation.

CASE REPORT

Two female patients aged 14 and 26 years underwent extra-articular MPFL reconstruction using the tape-type LK ligament and medial retinaculum slip coverage for recurrent patellar dislocation. The LK ligament was placed through the patellar tunnel and the two bundles were fixed to the anatomical MPFL femoral attachment using double stapling. Then the medial retinaculum slip (10 mm wide and 6–8 cm long with the patellar side intact) was covered over the LK ligament. Biopsies of the reconstructed MPFL were performed at the time of staple removal (with consent), 6.1 years and 8.7 years after surgery, respectively. The small biopsies—1.5 mm wide, 6 mm long, and 4 mm deep—were performed parallel to the longitudinal axis at the middle of the ligament and only the tissue over the LK ligament was selected for specimens. For light microscopy, the specimens were stained with haematoxylin and eosin and elastica von Gieson. For electron microscopic examination, a transmission electron microscope (JEM-1010, Nihon Densi, Tokyo, Japan) microscope was used.

Pathology

In both cases, sufficient connective tissue macroscopically ensheathed the whole prosthetic ligament, and the LK polyester fibres could not be seen from the surface. In both cases, light microscopy showed that the tissue over the LK ligament was made up of longitudinally aligned collagen fibre bundles with spindle shaped nuclei, hypovascularity, and crimp patterns. In the elastica von Gieson stained specimens, small numbers of elastic fibres were seen in the tissue over the LK ligament. In both cases, transmission electron microscopy showed that the collagen fibrils in the tissue over the LK ligament were regularly orientated in the transversely sectioned area. However, collagen fibril diameter distribution was different in two cases. In case 1 (6.1 years after implantation), the collagen fibrils were uniform and approximately 30–45 nm in diameter (fig 1), whereas in case 2 (8.7 years after implantation).

Abbreviations: LK, Leeds-Keio; MPFL, medial patellofemoral ligament
имплантированные), они были бимодальными и имели диаметр приблизительно 25–40 нм в меньшем и 50–70 нм в большем диапазоне.

**ДИСКУССИЯ**

Многие исследователи отмечали, что имплантированные крестовидные связки или аллогрфты имеют гистологическое и биохимическое сходство с нормальными крестовидными связками. Однако, бимодальное распределение коллагеновых волокон в нормальных связках было впервые описано в работе, в которой было показано, что у кроликов, которым было удалено 6.1 года после операции, коллагеновые волокна имели бимодальное распределение. Кроме того, многие электронно-микроскопические исследования показывают, что волокна в имплантированных кроликах имеют бимодальное распределение, с диаметром меньшее 25–40 нм и большее 50–70 нм, что совпадает с нормальными связками.

**РУССКИЙ КОММЕНТАРИЙ**

В нашем исследовании, показано, что ткань над крестообразной связкой может продолжать расти с длительными периодами механического воздействия.

**ЗАКЛЮЧИТЕЛЬНЫЕ ЗАМЕТКИ**

Мы изучали гистологические и электронно-микроскопические особенности двух случаев медиальной пателлофеморальной связки (MPFL). В обоих случаях, ткань над крестообразной связкой имела бимодальное распределение коллагеновых волокон, с диаметром 25–40 нм и 50–70 нм. Также был показан, что ткань над крестообразной связкой продолжает расти с длительными периодами механического воздействия.

**СОКРАЩЕНИЯ**

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