

The durability of anterior cruciate ligament reconstruction with the patellar tendon

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ABSTRACT

Thirty patients operated on because of insufficiency of the ACL were objectively evaluated twice, 2 and 5 years after operation. The results were mostly good with regard to knee stability and function. No change in the outcome could be seen over the years.

ACL ruptures are among the most common sports injuries.⁴⁵ Conservative, nonoperative treatment,^{4,15,19,23,32} as well as early diagnosis and surgical repair,^{28,40,43} have been suggested in the past. Regardless of treatment the functional results are fair in most cases, even in those with residual instability.^{2,26,37} However, several investigators propose that such instability will cause injuries to the semilunar cartilages which would then lead to degenerative joint disease.^{12,13,20,27,36,41}

The aim of surgery is mainly to prevent subluxation in the lateral compartment, described by Hey Groves¹⁷ in 1917 and Palmer⁴¹ in 1938, and labelled "the pivot shift" by Galway et al.⁴¹ in 1972. It is probably this type of instability that causes the symptoms occurring after ACL injuries.

Specific tests for the evaluation of anterolateral rotatory instability (ALRI) have been suggested,^{18,35,42} the pivot shift among them. Reconstructive procedures have been extra-articular,^{1,3,10,21,30} intraarticular,^{5-8,11,17,24,27,29,33,34,39} or combined.⁹ Lately, artificial implants also have been tried. The results in the short term are usually good, but with time it appears that stability is lost and, again, the function impaired.^{16,25,38}

The objective of the present study was to evaluate intra-articular ACL reconstruction with patellar ligament grafting, with special attention directed to the tendency of elongation, increased ALRI, and impaired function with time.

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MATERIALS AND METHODS

Thirty consecutive patients (22 male, 8 female) with a mean age of 27 (range, 17 to 41) were included in the study. Most of the injuries (28 of 30) were associated with sports, mainly with soccer (18).

Two-thirds of the patients had been operated on earlier because of semilunar cartilage lesions or had had a meniscus removed in conjunction with the reconstructive procedure. Also, 10 patients had articular cartilage lesions in weight-bearing parts of the femorotibial articulation. In three instances these injuries were deep, full thickness cartilage wounds. Six patients had signs of concomitant medial collateral ligament injury which had been treated with pes anserinus transfer.

None of the patients had subsequent knee injuries during the period under investigation. Only patients with a stable contralateral knee were included in the investigation.

Operative technique

The method of reconstruction used was a modification of the procedures of Brückner⁶ and Broström et al.,⁵ and involved using the medial third of the patellar tendon. The periosteum, with the bone and tendon still attached to the tibial tuberosity, was pulled through a drill hole through the tibial condyle to the original attachment of the ACL. It was then pulled through the joint to another drill hole far back on the medial aspect of the lateral femoral condyle, with the intention of finding an isometric position. Nonabsorbable sutures were tied extraarticularly proximally and laterally to the femoral condyle with the knee flexed 30° to 40°. The synovium and the retinaculum were closed with interrupted absorbable sutures (Fig. 1).

Postoperative care

Full weightbearing was permitted immediately after the operation and a plaster knee cast in 30° of flexion was

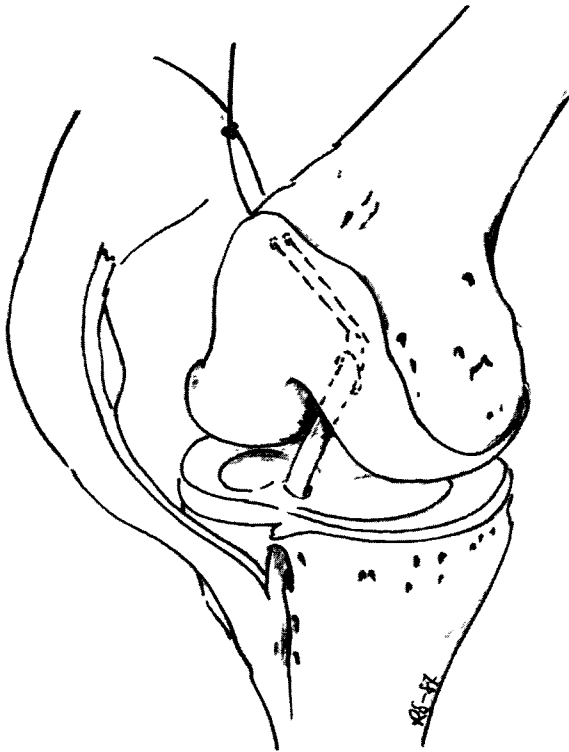


Figure 1. Schematic drawing demonstrating the operative procedure.

applied and worn for 6 weeks. Exercise of the hamstrings, the quadriceps, and the hip muscles was undertaken during the cast fixation period and supervised by a physiotherapist. The patients were permitted to return to daily activities and keep-fit physical activity when pain and swelling of the joint had subsided. The range of motion was over 90° and the force of the thigh muscle was at least 85% of that of the contralateral side measured with the Cybex II equipment. Elite athletic activity was not encouraged until 1 year after operation.

All patients were reexamined twice, with an average interval of 36 months between examinations. The average *early* followup was 21 months after operation (range, 19 to 62) and *late* followup was at an average 57 months (range, 42 to 98)—almost 5 years after operation.

The clinical follow-up examination included the following tests of stability: valgus and anterior drawer in 90° and 20° of flexion (Lachman), the ALRI test, pivot shift test,¹⁴ and jerk test¹⁸ or flexion-rotational drawer test (FRD).³⁵ The contralateral knee was always used as control. Even a small difference between the end point positions in the Lachman test was regarded as positive and indicating instability. The anterior drawer was measured using a graded caliper designed to fit the knee in 90° of flexion and which would record the movement of the tibial tuberosity in relation to the patella.^{2,44} These measurements were accurate to within 1 mm. The difference between the uninjured and injured knees was then calculated.

Knee function was rated with the Lysholm³¹ score, with 100 as the maximum score and 82 as the limit for classification as good/excellent.

RESULTS

Preoperative instability had been measured in 23 of the cases. There was a reduction of instability after surgery; this remained unchanged over the years (Table 1).

After 5 years the drawer test was still positive in 21 patients and the Lachman test still positive in 26 patients. The ALRI test remained positive over the years in five cases (Table 2).

Subjective symptoms and function did not change with time. Three patients who had episodes of giving way after surgery were among those five who still had a positive ALRI test. There was no change between the examinations.

Knee function measured as the Lysholm score also remained constant over the years, changing only from a median 93 (q_1 – q_3 , 86–96) to 92 (q_1 – q_3 , 84–95). Time until resuming keep-fit exercise was 30 ± 7 weeks.

DISCUSSION

There have been few long-term studies of intraarticular reconstruction of the ACL,²² but many short-term studies with a followup of only a few years have been done.^{5–8, 11, 17, 24, 27, 29, 34} There is no consensus with regard to the durability of these reconstructions. Some investigators propose that stability is lost and that knee dysfunction recurs with time.^{16, 25, 38} In the present study the outcome of the operation was measured twice by the same investigator, each followup after a substantial time lapse. The outcome of the evaluation was almost identical for both of the follow-up examinations, with only minor differences in score values. Also, the concept of the pivot shift, ALRI instability as being closely related to the subjective feeling of giving way was supported by the data of this study. It was this variable

TABLE 1
Anterior drawer at 90° flexion, measured difference (mm) between injured knee and contralateral (control) knee

Position of the tibia	Preoperative ^a	Early followup ^b	Late followup ^c
Inward rotation	3.0 ± 1.9	1.1 ± 2.4	0.8 ± 1.6
Neutral	3.5 ± 2.5	1.6 ± 2.4	1.1 ± 2.0
Outward rotation	4.9 ± 3.2	1.3 ± 2.4	0.9 ± 2.0

^a N = 23.

^b N = 30.

^c N = 30.

TABLE 2
Number of positive findings of instability^a

Test	Preoperative	Early followup	Late followup
Anterior drawer	30	21	21
Lachman	30	22	26
ALRI	29	5	5

^a N = 30.

especially that was affected by the procedure and the effect remained unchanged over the years.

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