

Primary repair in posterior cruciate ligament injuries

A retrospective study of 32 consecutive patients with acute injury of the posterior cruciate ligament (PCL) treated by primary repair is presented. Only six patients had isolated injuries of the PCL, five of these as avulsion of a bone fragment from the tibia. The remaining 26 patients sustained combined ligament injuries, including 18 total ACL tears. All ruptured ligaments were repaired.

At follow-up after 4 (1-7) years, function in 26 patients was excellent-good and in six fair-poor.

Moderate or severe posterior instability was found in seven patients by clinical examination but their function was as good as in those with stable knees. Inferior functional results, however, were more often related to rotatory instability. Primary repair of PCL-injuries, including all associated ligament injuries, is recommended.

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Injuries to the posterior cruciate ligament (PCL) of the knee are relatively infrequent. Most authors recommend primary operative repair, but there have been a few larger series with documented results (Trickey 1968, Meyers et al. 1975, Hughston et al. 1980, Moore & Larson 1980). Lately the value of primary operative treatment has been questioned (Dandy & Pusey 1982).

The present retrospective study was performed to evaluate the results of primary operative treatment.

Patients and methods

During 1976-81, all patients with PCL injuries diagnosed within 4 weeks were treated by primary repair. Five patients could not be traced or lived too far away for follow-up. The remaining 20 males and 12 females were 27 (13-60) years.

Twenty-three out of 32 repairs were performed during the first week post-injury, and only three after more than 2 weeks.

In three patients the knee was dislocated on admission. By examination in epidural or general anaesthesia, a posterior drawer sign was present in 24 patients, while instability by varus or valgus stress in full extension was found in 19 patients. In eight patients an avulsion of the PCL with a displaced bone fragment from the tibia was diagnosed radio-

graphically. In four patients the PCL tear was not diagnosed preoperatively, but found during repair of medial collateral and/or anterior cruciate ligament tears. No arthroscopies were performed in this series.

An isolated injury of the PCL was found in only six patients, five as avulsion of a bone fragment from the tibia. The remaining 26 patients sustained combined knee ligament injuries including total anterior cruciate ligament (ACL) in 18, tears of the medial collateral ligament and/or capsule in 22, and tear of the lateral collateral ligament and/or capsule in six patients. In 11 patients a peripherally detached meniscus was found, and a meniscus tear was diagnosed in only three cases.

Operation

All ruptured ligaments were repaired. ACL or PCL ruptures were sutured by using a pull-through technique with drill holes in the femur or tibia, as described previously (Strand et al. 1984). In isolated PCL injuries with a bone fragment, a posterior incision was used (Abbot & Carpenter 1945) and the fragment re-attached by a screw or cerclage. The knee was immobilized in a plaster cast for 6 weeks, after which mobilization and gradually increasing weight-bearing were instituted, usually supervised by a physiotherapist.

Follow-up

The follow-up examination was performed during April 1983, 4 (1–7) years postoperatively; the follow-up time was less than 2 years in only three patients. Medial-lateral and antero-posterior stability was tested as described by Hughston et al. (1976), the results being recorded as the difference from the normal knee and graded as 0, 1+, 2+ or 3+ instability. Anterolateral rotatory instability (ALRI) was assessed by the Slocum test (Slocum et al. 1976) and graded as positive (instability) or negative. The functional results were assessed using the Lysholm knee-scoring scale (Lysholm & Gillquist 1982), 100 points representing optimal knee-function. A score >90: points was classified as excellent, and a score of 77–90 points as a good result (Odensten et al. 1983). The results were analyzed statistically by the Fisher exact probability test and the Wilcoxon two-sample test at a 0.05 significance level.

Results

Two wound infections occurred: one superficial and one deep.

The results of stability testing are shown in Table 1. Five patients had ALRI. Two patients had a flexion deficit exceeding 30 degrees, and one patient a loss of extension of more than 10 degrees.

The functional result was graded as excellent in 20, good in six, and fair/poor in six patients; the median knee score was 93 (46–100) points.

Seven patients had symptoms of instability (giving way), four of them during daily activities. Clinical examination revealed ALRI in three, AMRI in one, and moderate (2+) posterior drawer in two of these patients. In the last patient no objective instability was found.

Of the seven patients with a moderate or severe posterior drawer, five had excellent functional results, without symptoms of instability. No difference was found concerning knee score values between this group and the 18 patients with stable knees (as defined by a negative or 1+ antero-posterior or medial-lateral instability and a negative Slocum-test).

The six patients with ALRI/AMRI had lower knee score values than the patients with stable knees; only one of these patients obtained excellent function.

Table 1. Number of patients with antero-posterior and medial-lateral instability at follow-up

Test	0	1+	2+	3+
<i>Anterior drawer</i>				
In neutral rotation	24	5	3	0
In external rotation	29	1	2	0
In internal rotation	29	3	0	0
<i>Posterior drawer</i>				
In neutral rotation	14	13	4	1
In external rotation	16	9	6	1
In internal rotation	29	3	0	1
<i>Valgus stress</i>				
Extended	32	0	0	0
In 20 degrees flexion	23	8	1	0
<i>Varus stress</i>				
Extended	32	0	0	0
In 20 degrees flexion	30	2	0	0

The instability was graded as the difference compared to the uninjured knee. 0 = No instability, 1+ = <5 mm, 2+ = 5–10 mm, 3+ = >10 mm (Hughston et al. 1976).

Out of five patients with isolated PCL-injuries with a bone fragment, the fragment healed in anatomical position in four, resulting in excellent function. In one patient, in whom the fragment was displaced, function was found to be poor.

Discussion

In this series, like that of Hughston et al. (1980) and Moore & Larson (1980), the PCL-injury was combined with other ligament tears in most patients. One half of the combined injuries were caused by skiing accidents.

The six isolated PCL injuries were all caused by traffic accidents resulting in a direct blow against the anterior upper tibia; two of these patients sustained a fracture of the femoral shaft, while one patient had a posterior dislocation of the hip.

Our results of primary repair were generally good, and in accordance with those of Meyers et al. (1975), Hughston et al. (1980) and Moore & Larson (1980). Five patients with ALRI as revealed by a positive Slocum-test and one patient with significant AMRI had less satisfying results, mainly due to symptoms of instability. This is in accordance with our previous series of primary repaired ACL-ruptures (Strand et al. 1984) and indicates that the integrity of

other ligaments is at least as important as the PCL for optimal knee function following PCL injuries.

The relative importance of primary suture of the PCL in combined injuries was difficult to evaluate in our study. Of the six patients with a 2+ and the single patient with a 3+ posterior drawer test, only two had symptoms of instability, and no clear correlation between functional result and posterior drawer sign was established. Hughston & Degenhardt (1982) and Insall & Hood (1982) stated that isolated PCL insufficiency rarely causes serious functional instability. These authors stressed, however, that PCL insufficiency often results in pain of patellofemoral origin. Although this was a relatively frequent complaint among our patients, no clear correlation was revealed between pain and posterior instability in our series.

In combined injuries including the PCL, there are no convincing reports of conservative treatment. Thus, based on our results, we recommend primary repair of all ruptured ligaments.

In isolated PCL-avulsions with a displaced bone fragment, the functional results were excellent in all cases in whom the fragment united. In accordance with most authors (Trickey 1968, Meyers 1975, Torisu 1977, Satku et al. 1984), we recommend primary repair using a posterior incision in such cases.

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