Knee Surg, Sports Traumatol, Arthroscopy (1993) 1:17–19

Knee Surgery
Sports Traumatology
Arthroscopy

Late results following proximal reinsertion of isolated ruptured ACL ligaments

F. Genelin, A. Trost, C. Primavesi, P. Knoll

Unfallkrankenhaus, Dr. Franz-Rehrlplatz 5, A-5020 Salzburg, Austria

Abstract. Between 1982 and 1984, 49 patients with fresh isolated proximal ruptures of the anterior cruciate ligament (ACL) were operated on in the Trauma Hospital, Salzburg. The operation was performed within 1 week of trauma. The operational technique used was proximal reinsertion of the ruptured ACL alone. Postoperatively the knee was immobilized for 6 weeks in an above-the-knee plaster cast. We were able to re-examine 42 of the 49 patients 5–7 years after injury. In addition to a clinical examination, testing with a KT-1000 arthrometer was performed. The objective and subjective results we found were evaluated using the Lsyholm score and OAK knee evaluation form. We found 12 (29%) absolutely stable knee joints. We accepted a KT-1000 result of up to 3 mm as satisfactory, and 81% of our patients were in this category. The same percentage (81%) scored between 85 and 100 points on the Lysholm scale. Only 52% scored over 90 points on the OAK form. Subjectively only 6 patients (14%) were dissatisfied with their result.

Key words: Proximal ACL reinsertion – Late results

Zusammenfassung. Zwischen 1982 and 1984 wurden im Unfallkrankenhaus Salzburg 49 Patienten mit frischen isolierten proximalen Rupturen des vorderen Kreuzbandes operiert. Die Operation erfolgte bei allen Patienten innerhalb der 1. Woche nach dem Trauma. Die von uns durchgeführte Operationstechnik war die alleinige proximale Reinsertion des gerissenen vorderen Kreuzbandes über 2 Bohrkanäle transossär bzw. über einen transossären Bohrkanal und „over the top". Die postoperative Ruhigstellung erfolgte im Oberschenkelgehgipsverband für insgesamt 6 Wochen. 42 unserer 49 operierten Patienten konnten wir zwischen 5 und 7 Jahre postoperativ nachuntersuchen. Dabei wurde neben der klinischen Stabilitätsprüfung auch eine Stabilitätsprüfung mit dem KT 1000 durchgeführt. Die objektiven und subjektiven Ergebnisse wurden nach dem Lysholm Scale und nach dem OAK-Bogen ausgewertet. Dabei fanden wir in 29% absolut stabile Kniegelenke. Gibt man sich mit einem KT 1000 Meßwert bis zu 3 mm zufrieden, so fielen 81% unserer Patienten in diese Kategorie. Der Lysholm Score lag ebenfalls bei 81% und über 85 Punkten. Im OAK-Bogen wiesen lediglich 52% über 90 Punkte auf. Subjektiv waren nur 14% unserer Patienten mit dem Ergebnis unzufrieden.

Introduction

Over the course of time, a ruptured anterior cruciate ligament (ACL) leads to considerable joint instability in the majority of patients [8, 9]. It can also be the triggering trauma for degenerative processes in the knee joint [1].

Numerous therapeutic and functional possibilities have been described for the treatment of a fresh ACL rupture [1–3, 6, 10–13, 15]. For proximal avulsions the following have been put forward: reinsertion alone, reinsertion plus augmentation with autologous grafts, reinsertion plus augmentation with synthetic ligaments, primary ACL graft. In addition, a specific rehabilitation and training programme has been discussed.

Up until now, proximal reinsertion alone has been the therapeutic procedure for fresh proximal avulsion of the ACL in our hospital. To check our therapeutic approach, we have re-examined 42 out of 49 patients 5–7 years after operation, all of whom had suffered an isolated ACL rupture and had been operated on in our hospital.

Patients and methods

Between 1982 and 1984, 49 patients who had suffered fresh isolated proximal ACL ruptures were operated on in the Trauma Hospital, Salzburg. In all cases surgery was performed within 1 week of trauma, in most cases within 3 days. Thirty patients were male, 19 female; the average age was 27 years. Injury was seen twice as often in left knees as in right knees.

The main cause of injury was sports-related accidents; 43% were skiing accidents (Table 1).

The operational technique followed was proximal reinsertion of the ruptured ACL alone. Via a parapatellar medial arthrotomy 5 cm in length, the anterior ACL stump was taken in two portions, then reinserted transosseally through two holes which had been drilled from the lateral femoral condyle down to the proximal reinsertion site using an aiming rule.

Postoperatively the knee was immobilised in 20° flexion in a split above-the-knee plaster cast. This was exchanged after 1 week

Dedicated to Prof. Dr. H. Möseneder on his 60th birthday

Correspondence to: F. Genelin

Table 1. Causes of knee injury in 49 patients

Skiing	43%
Soccer	14%
Other sports	38%
Traffic accidents	5%

for a closed walking cast. The total length of time for which the knee joint was immobilised was 6 weeks.

We were able to re-examine 42 of the 49 patients 5–7 years after injury. In addition to a clinical examination, a test with the KT-1000 arthrometer was performed. Anteroposterior and lateral X-rays of the operated knee joint were taken and compared with the preoperative X-ray pictures. The objective and subjective results were evaluated using the Lysholm scale and the OAK knee evaluation form [5, 7, 14].

Results

Clinical examination showed absolutely stable knee joints in 29%, a + Lachman test in 52%, an anterior drawer sign, also in 52%, and a ++ Lachman test in 19%. A Pivot shift was present in 19%.

X-ray findings were grade I arthrosis in 38%, and grade II arthrosis in 14% (Ahlbäck grading system). In four patients lateral joint line opening of 1 mm compared to the uninjured side was found, in four 2 mm opening, and in four 3 mm opening.

Thigh circumference was similar in both legs in 57% (Table 2). Investigation of stability with the KT-1000 showed bilaterally equally stable knees in 12 (i.e. 29%) patients, a difference between the injured and uninjured knee of 3 mm in 52%, a difference of up to 5 mm in 14.2%, and one of up to 10 mm in 4.8%.

Thirty-two (76.1%) patients had a compliance index of 0, 2 (4.8%) a compliance index of 1 mm, 6 (14.3%) a compliance index of 2 mm and 2 (4.8%) a compliance index of 10 mm.

Active quadriceps displacement was in 12 cases (28.6%) 0 mm, in 10 (23.8%) 2 mm, in 12 (28.6%) 5 mm and in 8 (19%) 8 mm.

Eighteen patients (43%) were free of complaints, 10 (24%) were sensitive to changes in the weather, 4 (9.5%) complained of hypersensitivity in the n. infrapatellaris region, 4 (9.5%) complained of occasional pain and 6 (14%) reported episodes of the knee's giving way. Twenty-eight of our re-examined patients (66.6%) were able to take part in sporting activities as before, 12 had had to reduce their sporting activities, and 2 had given up sports altogether.

Eighteen patients (43%) scored 95–100 points on the Lysholm scale [5, 14], 6 (38%) 85–94 points, 4 (9.5%) 65–74 points and 4 (9.5%) 55–64 points. On the OAK evaluation form [7], 52% of our patients attained more than 90 points, 29% 81–90 points, 9.5% 71–90 points and 9.5% less than 70 points.

Table 2. Thigh circumference of injured leg compared to that of non-injured leg in 42 patients

	Percentage of patients
Equal	57.0
+ 1 cm	4.8
+ 2.5 cm	4.8
− 1 cm	14.3
− 2 cm	9.5
− 3 cm	4.8
− 4 cm	4.8

Discussion

A critical analysis of these re-examination results shows a considerable discrepancy between the figures for absolute stability and subjective freedom from complaints: we find 12 (29%) objectively absolutely stable knee joints and 18 (43%) patients who report no subjective complaints whatsoever. Taking a Lachman result of + or a KT-1000 result of up to 3 mm as satisfactory, 81% of our patients were in this category. The same percentage, 81%, scored between 85 and 100 points on the Lysholm scale. By contrast, only 52% of our re-examined patients scored over 90 points on the OAK evaluation form.

Subjectively, only 6 patients were dissatisfied with the results of treatment. An analysis of our cases of absolutely stable knees and the free-of-complaint knee joints showed that of the 12 patients with absolute stability only 6 were free of complaints, and of the 18 free-of-complaint patients only 8 had an absolutely stable knee joint.

In comparison to results published by others [1–4], our results seem to be significantly better, the reason for which is probably that our investigation was restricted entirely to proximal avulsion injuries of the ACL. Nevertheless we believe that, even with the same operational technique, the results can be improved still further by early postoperative treatment with a continuous passive motion machine, combined with a brace providing limited knee joint motion.

So far, we have not yet decided to generally employ primary augmentation for proximally reinserted ACLs, but we have begun on a prospective study comparing this technique to reinsertion plus augmentation using a ligament augmentation device.

References

1. Anderson C, Odensten M, Gillquist J (1989) Early arthroscopic evaluation of acute repair of the anterior cruciate ligament. Arthroscopy 5:331–335
2. Balkfords B (1982) The course of knee ligament injuries. Acta Orthop Scand [Suppl] 198
3. Cabaud HE, Feagin JA, Rodkey WG (1980) Acute anterior cruciate ligament injury and augmented repair. Experimental studies. Am J Sports Med 8:395–401
4. Feagin JA, Curl WW (1976) Isolated tear of the anterior cruciate ligament. Five-year-follow up study. Am J Sports Med 4: 95–100
5. Lysholm J, Gillquist J (1982) Evaluation of knee ligament surgery results with special emphasis of use of a scoring scale. Am J Sports Med 10:105–114

6. Müller W (1982) Das Knie. Springer, Berlin Heidelberg New York
7. Müller W, Biedert R, Hefti F, Jakob RP, Munzinger U, Stäubli HU (1988) OAK knee evaluation. A new way to assess knee ligament injuries. Clin Orthop Relat Res 232:37–50
8. Noyes FR, Mooar PA, Matthews DS, Butler DL (1983) The symptomatic anterior cruciate-deficient knee. Part I. The longterm functional disability in athletically active individuals. J Bone Joint Surg [Am] 65:154–162
9. Noyes F, Matthews DS, Mooar PA, Grood ES (1983) The symptomatic anterior cruciate-deficient knee. Part II. The results of rehabilitation, activity modification, and counselling on functional disability. J Bone Joint Sug [Am] 65:163–174
10. Noyes FR, Butler DL, Paulos LE, Grood ES (1983) Intra-articular cruciate reconstruction. Part I. Perspectives on graft strength, vascularization and immediate motion after replacement. Clin Orthop 173:71–77
11. Noyes FR, Butler DL, Paulos LE, Grood ES (1983) Intra-articular cruciate reconstructions. Part II. Replacement with vascularized patella tendon. Clin Orthop 172:78–84
12. Odensten M, Hamberg P, Nordin M, Lysholm Y, Gillquist J (1985) Surgical or conservative treatment of the acutely torn anterior cruciate ligament. A randomized study with short-term follow-up observations. Clin Orthop 198:87–93
13. Palmer I (1938) On the injuries to the ligaments of the knee joint. A clinical study. Acta Chir Scand 81 [Suppl 53]:9–282
14. Tegner Y, Lysholm J (1985) Rating systems in the evaluation of knee ligament injuries. Clin Orthop 198:43–49
15. Trillat A, Dejour H, Bousquet G (1978) Chirurgie du genou. 3 ièmes Journèes Lyon, September 1977. Simep-Editions, Villeurbanne, France, Simep