The Knee 19 (2012) 769–772

Contents lists available at SciVerse ScienceDirect

The Knee

Evaluation of outcomes in conservatively managed concomitant Type A and B posterolateral corner injuries in ACL deficient patients undergoing ACL reconstruction

Mandeep Dhillon, Narendranadh Akkina, Sharad Prabhakar, Kamal Bali *,1,2

Dept of Orthopaedics, Postgraduate Institute of Medical Education and Research (PGIMER), Sector 12, Chandigarh- 160 012, India

ARTICLE INFO

Article history:
Received 14 September 2011
Received in revised form 15 February 2012
Accepted 17 February 2012

Keywords:
ACL injury
PLC injury
Posterolateral corner
ACL reconstruction
Knee

ABSTRACT

Introduction: There is paucity of literature regarding the outcomes of ACL reconstruction in ACL deficient knees with concomitant Type A and Type B PLC injuries.
Materials and methods: A total of 102 patients undergoing isolated ACL reconstruction for an ACL injury were evaluated prospectively in this study. The patients with divided into three groups: group A with isolated ACL injury, group B1 with concomitant Type A PLC injury and group B2 with concomitant Type B PLC injury. The associated PLC injury in all these patients was managed conservatively. Outcome assessment was based on IKDC scores measured preoperatively and at last follow up visits.
Results: The mean age of the patients was 25.33 years (16–38 years) with 95 males and seven females. The average follow up was almost 2.5 years (13–46 months). Group A had 88 patients while groups B1 and B2 had six and eight patients respectively. The preoperative IKDC scores were comparable for all the groups. The follow up IKDC scores were similar (statistically insignificant, p value: 0.421) for group A and group B1. Group B2 had poorer follow up IKDC scores as compared to group A and this result was found to be statistically significant (p value: 0.0001).
Conclusion: Conservative management of a concomitant Type B PLC injury adversely affects the outcomes of ACL reconstruction in these patients. Type A PLC injuries, on the other, do well without surgery and can be left as such even when associated with a concomitant ACL tear.
Level of evidence: Level 2

1. Introduction

Rupture of the Anterior Cruciate Ligament (ACL) is a common injury seen in young adults involved in “pivoting” and “contact” sports [1]. A literature review shows that even in the best centers worldwide, the outcome of ACL reconstruction with regard to good functional stability and return to pre-injury levels of activity never exceeds 85–90% of the operated cases [2–5]. This implies that a substantial group of patients have an unsatisfactory result from the procedure due to various causes. Better understanding of the anatomic aspects of graft placement with better instrumentation has substantially decreased errors in surgical technique as a cause of graft failure [2,4,5]. It is now being suggested that one of the principal causes of graft failure could be an unrecognized (and therefore untreated) posterolateral corner (PLC) instability, which may have been associated with the initial knee injury [6–8].

The PLC, with its complicated and varying anatomy of static and dynamic stabilizers, is probably the least understood region of the knee and was once considered the “dark side” of the knee [9]. A biomechanical study by LaPrade et al. [8] confirmed that varus loading in the absence of posterolateral structures significantly increases the load on the ACL graft, which places it at an increased risk for failure.

Hughston et al. [10] have classified the knee instability due to collateral ligament injury into three grades. Studies evaluating nonoperative management of lateral collateral ligament (LCL) injuries [11–14] have uniformly shown poorer outcomes as compared to operative treatment in Grade III injuries. Although the results of nonoperative treatment of grade I injuries have been good, the results of conservative management of grade II injuries have been inconclusive [12,13]. It was Fanelli et al. [15] who gave comprehensive clinical classification of PLC instability dividing them into 3 types (Types A, B and C). On reviewing the literature there is sufficient evidence to show that Type C PLC injuries have a negative effect on ACL reconstruction, and in this scenario the PLC should also be reconstructed [7–9,16–18]. However there is not enough data regarding the outcome of ACL reconstruction along with Type A or Type B PLC injuries.

* Corresponding author at: 10/78-80, Alexander Street, Crows Nest, NSW 2065, Australia.
E-mail address: kamalpgi@gmail.com (K. Bali).
[1] Previously: Senior Resident, Dept of Orthopaedics, PGIMER, Chandigarh, India.
[2] Currently: Fellow in Knee Surgery, North Sydney Orthopaedic and Sports Medicine Center, Sydney, NSW, Australia.

0968-0160/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
doi:10.1016/j.knee.2012.02.004

In light of the paucity of literature focusing on management of different types of PLC injuries associated with ACL deficiency, we prospectively evaluated the outcome of a consecutive series of patients undergoing ACL reconstruction. Special clinical tests were employed to diagnose additional posterolateral or lateral instability. The PLC injuries were graded according to the Fanelli classification [15,16] and the effect of Type A and Type B PLC injury on the reconstructed ACL was determined by comparing and evaluating the post operative patient outcome scores in both the groups (isolated ACL tears and combined PLC with ACL injury). To the best of our knowledge, no similarly designed prospective study exists in the literature.

2. Material and methods

After obtaining institutional approval for the study, we prospectively evaluated a total of 217 patients with ACL deficient knees who failed an initial trial of conservative management and underwent arthroscopic ACL reconstruction during a period of 3 years ranging from January 2007 to December 2009. Patients with multi-ligament injury, Type C PLC injury (seven patients), associated bony/chondral/meniscal injury or those undergoing revision ACL surgery were excluded from the study. Thus, a total of 102 patients who completed a minimum follow up of at least 1 year were ultimately included in the study. A written consent for participation in this prospective study was obtained from all the patients enrolled.

The patients were admitted one day prior to surgery and were explained about the reconstruction procedure and the postoperative rehabilitation protocol. A detailed clinical examination was independently performed by any two of the authors and if any discrepancy in the findings existed, the tests were repeated and a consensus achieved. Arthroscopic ACL reconstruction surgery using bone patellar tendon bone (BTB) graft was then performed. All surgeries were conducted by the senior author. The patients were discharged after 48 h and attached to the physiotherapy department to follow a specific physiotherapy schedule. Postoperatively, the patients were followed up weekly for the first 2 months, 3 weekly until 6 months, 6 weekly until 1 year and once in three months thereafter.

The clinical diagnosis of ACL tear was confirmed using the Lachman test, the anterior drawer test, and the pivot shift test. These were graded according to the amount of laxity as grade 1, grade 2 and grade 3. Special tests conducted for the diagnosis of PLC injury included dial test at 30° and 90° of knee flexion, reverse pivot shift test, posterolateral drawer test, and varus stress test at 0° and 30° of knee flexion. If any two of the tests for PLC injury were positive it was presumed that a significant PLC injury existed.

PLC injuries were classified according to the system proposed by Fanelli et al. [15,16] incorporating both external rotation and varus instability. Type A PLC injury was clinically assessed as $\geq 10°$ of increased tibial external rotation compared to the normal knee at 30° of knee flexion. Type B injury was defined as a rotational injury with a mild varus component and was clinically assessed as $>10°$ of increased tibial external rotation with varus opening of 5–10 mm and a firm endpoint at 30° of knee flexion. Type C injury was clinically assessed as $>10°$ of increased tibial external rotation with varus opening of >10 mm and no firm endpoint at 30° of knee flexion.

The patients were divided into three groups (Table 1). Group A included patients with isolated ACL injury while Group B1 and Group B2 included ACL deficient patients with a concomitant Type A and Type B PLC injury respectively. Subjective symptoms were assessed by International Knee Documentation Committee [IKDC] questionnaire preoperatively and at the last follow up visit. The data was analysed to determine (a) the incidence of posterolateral instability in chronic ACL deficient knees and (b) the functional outcome of arthroscopic ACL reconstruction in patients with isolated ACL tear compared to those with concomitant Type A and Type B PLC injury.

Table 1
Patient profile.

	Group A	Group B1	Group B2	Total
Injury	Isolated ACL	ACL + Type A PLC	ACL + Type B PLC	
Number of patients	88	6	8	102
Males/females	82/6	5/1	8/0	95/7
Side (Rt/Lt)	51/37	3/3	3/5	57/45
Average age in years	25.23 (16–38)	26.83 (21–36)	25.25 (20–35)	25.33 (16–38)
Mean follow up (months)	29.62 (13–46)	28.33 (14–40)	30.37 (16–44)	29.6 (13–46)

The statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 13.0 for Windows). All quantitative variables were estimated using measures of central location (mean and median) and measures of dispersion (standard deviation). Normality of data was checked by measures of Kolmogorov Smirnov tests of normality. For skewed data Mann–Whitney test was applied for two groups. Time related variables were analysed using Wilcoxon signed rank. Qualitative or categorical variables were described as frequencies and proportions. Proportions were compared using Chi square or Fisher's exact test whichever was applicable. All statistical tests were two-sided and p values less than 0.05 taken as statistically significant.

3. Results

The mean age of the patients was 25.33 years (16–38 years) with 95 males and seven females. The average follow up was almost 2.5 years (13–46 months). The mechanisms of injury varied with the two most common causes being sports injuries (68 cases) and roadside accidents (26 cases). The patient profile has been summarized in Table 1.

Preoperative evaluation revealed positivity of the Lachman and the anterior drawer tests in all the patients; being 1+ in four patients, 2+ in 86 patients, and 3+ in 12 patients. Of 12 patients with 3+ Lachman and anterior drawer tests, six patients belonged to the group B2. Pivot shift test was demonstrated to be positive in 98 patients; being grade 1 in 40 patients, grade 2 in 56 and grade 3 in two patients. All the cases with a frank Type C PLC injury were excluded from the study. Testing for PLC injury in the remaining patients revealed positivity of the dial test in 14, all of who also had a positive posterolateral drawer test. These 14 patients were thus diagnosed to be having a Type A or Type B PLC injury in addition to ACL injury. However, the reverse pivot test could be demonstrable in only 12 of these patients while eight of these had a grade 1 varus stress laxity. On the basis of Fanelli classification, six patients were found to have Type A PLC injury while eight patients had Type B PLC injury. One of the patients in Group B2 was found to have bilateral varus alignment of the knees.

Table 2 highlights the mean preoperative and follow up IKDC scores of both the patient groups. For Group A, the mean preoperative IKDC score was 57.60 (38 to 71); for Group B the mean preoperative IKDC score was 57.36 (47–70). Using the non-parametric Mann–Whitney test, there was no statistically significant difference in preoperative IKDC scores between Group A and Group B (p value: 0.358). At the last follow up visit the mean IKDC score for Group A patients improved to 93.96 (79–99) while for Group B patients the mean score improved to only 80.5 (60 to 94). There was statistically a significant difference in the change in IKDC scores between Group A and Group B post ACL reconstruction surgery with patients with isolated ACL injury faring better than patients with concomitant Type A or Type B PLC injury (p value: 0.002). This difference was primarily attributable to poorer scores of Group B2 patients as a statistically significant difference in the follow up IKDC scores existed between Group A and

Table 2
IKDC scores in different patient groups.

	Group A	Group B	p-value
Preoperative IKDC score	57.60 (38–71)	57.36 (47–70)	0.358
		B1 = 58.33 (48–70)	0.342
		B2 = 56.62 (47–68)	0.364
Last follow up IKDC score	93.96 (79–99)	80.5 (60–94)	0.002*
		B1 = 87.83 (80–94)	0.421
		B2 = 75.00 (60–84)	0.0001*

*Statistically significant.