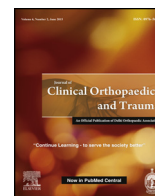




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Full length article

# Functional outcome of an early anterior cruciate ligament reconstruction in comparison to delayed: Are we waiting in vain?☆

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### ABSTRACT

**Background:** Surgical techniques of ACL reconstruction (ACLR) have evolved over the past three decades along with debate regarding timing of reconstruction. It was a widespread belief that the timing of surgery was an important factor in determining the resulting stiffness after ACLR. Delayed rather than early reconstruction of the ACL is the current recommended treatment since it is thought to give a better functional outcome. However, there is no consensus in the literature regarding the optimal time of surgical intervention. The purpose of this study was to compare the range of motion and functional outcome in patients who underwent ACLR early with those that were delayed.

**Materials and Methods:** The patients were randomized into two groups; patients who underwent the procedure within three weeks were kept in Group I (Early) and those patients who were reconstructed after six weeks were categorized as Group II (Delayed). Hamstring grafts were used and a standard protocol of surgery and physiotherapy was followed. The range of motion, IKDC and Tegner scores were compared.

**Results:** A hundred and four patients underwent ACLR; fifty-three patients were grouped as Group I (Early) and fifty one as Group II (Delayed). The range of motion of both groups was comparable. The IKDC and Tegner scores were also comparable for early (Group I) ACLR and the patients who had their ACL reconstructed after a delay of at least 6 weeks (Group II).

**Conclusion:** There are no clinical differences in terms of range of motion and functional results between early and delayed ACLR.

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## 1. Introduction

The anterior cruciate ligament (ACL) is the most commonly injured ligament of the knee.<sup>1,2</sup> Arthroscopic reconstruction is the usual treatment for younger athletes or those with occupational or sporting pursuits since it restores stability and limits the prospective for progressive degeneration and long-term instability of the knee.<sup>3,4</sup> Surgical techniques of ACL reconstruction (ACLR)

have evolved over the past three decades along with debate regarding timing of reconstruction.<sup>5</sup>

It was a widespread belief that the timing of surgery was an important factor in determining the resulting stiffness after ACLR.<sup>6,7</sup> In a landmark publication, Shelbourne et al. recommended delaying surgery for at least 3 weeks would result in considerable decrease of arthrofibrosis.<sup>5</sup>

Delaying surgical intervention was thought to allow optimization of pre-operative knee range of motion and recovery of surrounding soft tissues from the initial injury potentially reducing the incidence of post-operative arthrofibrosis and wound complications.<sup>5,8</sup> The knee would have recovered from the first injury. However, the ensuing surgery is then perceived by the body as a “second hit” from which healing must again commence. On the contrary, if the surgery is performed early, there is just one

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trauma.<sup>9</sup> Early surgery also hastens return to sporting and work with considerable economic consequences.

Francis et al.,<sup>10</sup> conducted a national survey in the UK. 81% reported that they considered the ideal time span from injury to operation to be between 1 and 6 months, although it was acknowledged that only 35% of ACL reconstructions are performed within this time-frame.<sup>11</sup>

Delayed reconstruction is the current recommended treatment since it is thought to give a better functional outcome.<sup>12</sup> Recent random controlled trials suggest that early surgery does not affect post-op range of motion. Meta-analysis of 6 studies found no difference in clinical outcome between patients who underwent early and delayed ACL reconstruction.<sup>13</sup> Hence, there is no consensus in the current literature regarding the optimal time of surgical intervention.

## 2. Objectives

The purpose of this study was to compare the range of motion and functional outcome in patients undergoing arthroscopic assisted ACL reconstruction early within 3 weeks and delayed after 6 weeks.

## 3. Materials and methods

A randomized prospective study was performed on adult patients who underwent arthroscopic assisted ACL reconstruction from January 2014 to January 2015 for a period of one year. Patients with ACL insufficiency with or without associated chondral (Outerbridge I & II) injuries, meniscal injuries, which required partial meniscectomy or debridement, were included. The patients were randomized into two groups; patients who underwent the procedure within three weeks were kept in Group I (Early) and those patients who were reconstructed after six weeks were categorized as Group II (Delayed). The patients were randomized into two groups on the basis of odd and even hospital numbers. The odd numbers were placed in Group I (Early) and the even in Group II (Delayed). The prerequisite for surgery was knee flexion of at least 120°. Ethical clearance for the study was obtained and informed consent was taken from all patients.

All patients underwent physiotherapy, and surgery in the early group was performed as soon as flexion of 120° was achieved. The patients in the delayed group were placed on a physiotherapy program where the quadriceps was strengthened and the range of motion restored to 120° of flexion and they were operated after 6 weeks. Those patients who had undergone previous knee surgery, multi ligament injuries, associated chondral injuries > Grade III, IV (Outerbridge classification), associated meniscal injuries requiring repair and patients in whom BPTB and Quadriceps grafts were used were excluded.

### 3.1. Operative technique

An examination under anaesthesia was performed to confirm the findings and an anterolateral parapatellar viewing portal and accessory anteromedial parapatellar working portals were made. Diagnostic arthroscopy was done. The hamstring graft was then harvested making a vertical incision below and medial to the tibial tuberosity in between the tibial tuberosity and the medial tibial flare. After the hamstring tendons were palpated the skin was incised, the fat was pushed away using a gauze piece and the sartorius fascia was visualized. A transverse incision was made in the fascia in between the gracilis and semitendinosus tendons and the semitendinosus was isolated initially using a 90° right angled artery forceps. The tendon was removed from its insertion on the tibia and held by a luggage tag suture.<sup>14</sup> A closed end tendon

stripper was used to strip the tendon. Then the gracilis was removed. Ethibond no 2 whipstitches were applied at the ends and a quadrupled graft construct was made.

The femoral tunnel was made using the transportal technique. The knee was placed in about 130° of flexion. The transportal guide wire was placed 30–45° in the sagittal plane and horizontal to the floor via the accessory anteromedial portal.<sup>15</sup> Then a 4.5 mm cannulated drill was used to drill a tunnel and the length was measured. Then the femoral tunnel was made larger as needed according to the width of the graft with flower head tipped drills. The entrance to the femoral tunnel was widened and smoothed to help graft passage with a curette and rasp.

The tibial tunnel was made using the ACL jig. The graft was passed and fixed proximally with CL loop endobutton. Impingement was checked and cyclical loading done and then distal fixation was done with a bioscrew. Placement of the screw was confirmed under arthroscopic guidance, the tension in the reconstructed ligament was checked using a probe and Lachman test.

The knee was placed in a knee brace. Mobilization and partial weight bearing with a pair of crutches as tolerated was started the next day, but their range of motion was restricted to 0–90° of flexion for the first three weeks. The patients were discharged on the second post-operative day. Partial weight bearing with a pair of crutches was advised for two weeks. After two weeks, the operated side crutch was removed. Recumbent cycling was started at three weeks and the second crutch was discontinued to be used in crowded places if necessary. Half squats were started. Slow walking and jogging was allowed and speed and duration was increased.

After three months, swimming and side running progressing to zig zag running was advised. Single leg presses and single half squats were also taught. The balance training was started at the end of the fourth month, using wobble board. Plyometrics and skill exercises were taught at the fifth month. The patient was encouraged to start playing gradually after six months. The patients were followed up at intervals of three, six and twelve weeks postoperatively, then at six months and thereafter at six-monthly intervals.

Passive range of motion was measured and compared with the opposite knee. A physiotherapist performed the range of motion assessments using a goniometer. The heel was elevated on a support to assess the total amount of extension. The final assessment was carried out on patients who had completed six months of their rehabilitation. Their pre-operative and present IKDC (International Knee Documentation Committee) and Tegner scores and range of motion were compared.

Statistical analysis was done using SPSS version 20. The mean pre-operative and post-operative IKDC and Tegner scores were compared using paired samples *t*-test. The mean scores in the two groups at the final assessment at 6 months were compared using independent samples *t*-test. A *p* value of less than 0.05 was considered to be statistically significant.

## 4. Results

A total of one hundred and ten patients underwent ACLR from January 2014 to January 2015. Six patients were lost to follow up and could not be contacted and were excluded from the study. Of the remaining hundred and four patients, fifty-three patients were grouped as Group I (Early) and fifty-one as Group II (Delayed). The time period from injury to surgery was 11.20 days (Range: 4–21 days) in Group I and 48 days (Range: 42–60 days) in Group II. The mean age was 30 years (Range: 18–55 years).

There were 21 female and 83 male patients. The right side was involved in 64 and left in 40 patients. The commonest mode of

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