

Effect of Surgical Timing on Outcome of ACL Reconstruction

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ABSTRACT

ACL deficient knees are currently being treated with reconstruction. The objective in this study is to find out if the functional outcome is different in patients who undergo early vs delayed operation after injury.

A retrospective study was conducted on 59 patients who underwent ACL reconstruction in SGH. All 25 patients in the early reconstruction group and 34 patients in the late reconstruction group showed significant improvements in functional outcomes. When the 2 groups were matched, there were no significant differences found in both the pre-op and post-op scores. There was statistically significant improvement in post-op scores in both groups.

In conclusion, there may not be a significant difference in the functional outcome between patients who undergo early or late reconstruction. ACL reconstruction does significantly improve the functional outcome and may thus benefit the patient with ACL deficient knees.

INTRODUCTION

The increasing emphasis on sports has resulted in a high incidence of anterior cruciate ligament (ACL) injuries. With the evolution of knee surgery, ACL deficient knees are currently being treated with reconstruction procedures using biologic tissue grafts¹.

Although much has been written regarding the refinement and evaluation of new surgical techniques, the debate on whether the timing of surgery affects the functional outcome of the knee has not been solved.

If the results of surgical reconstruction are compromised as a result of delaying the operation, then the optimal timing after injury for operation is of utmost importance to both the surgeon and the patient.

In this study, the objective is to find out if there was a difference in the functional outcome between patients who underwent early surgery as compared to those whose reconstruction was delayed.

METHOD

A retrospective study was conducted of 90 consecutive patients who underwent ACL reconstruction between the period of 1996-1998 in Singapore General Hospital.

This allowed a 2-year minimal follow-up period which was taken as a measure of functional outcome.

The surgical techniques used in these patients involved an arthroscopic approach, using either the hamstring graft^{1,2,3,4} or the patellar tendon graft^{1,6,7}. Operative records were reviewed and associated meniscal injury was also noted in each case.

The patients were interviewed either by phone or by mail. Fifty-nine patients were included in the study. Thirty-one patients were excluded from the study as they could not be contacted.

The Lysholm scoring system⁸ was used to evaluate the functional outcome of the knee before and after the operation (Table 1). This contemporary scale allows a more standard method of evaluating the symptoms with activity. This uses a numeric system to assign points to each variable, namely instability, pain and swelling, correlating to activity level and frequency. Instability (giving way is the hallmark of ACL injury) and pain account for half of the total score.

The remaining components of limping, support, locking, stair climbing and squatting were assigned a numeric score on 4 gradient levels.

The patients were categorised into 2 groups, the early and the delayed operation. Early operation was taken to be less than 6 months and delayed operation was taken to be more than 6 months.

All data were recorded and subjected to computerised statistical analysis. Parametric variables were analysed using the student's t-test and statistical significance was taken to be $p < 0.05$.

RESULTS

Out of the 59 patients studied, there was a majority of male patients (53) (89.8%) as compared to female patients (6) (10.2%).

The racial distribution of patients with ACL tears corresponds to that of the composition of our population. There were 36 Chinese (61%), 16 Malays (27.1%), 6 Indians (10.2%), and 1 Others (1.7%).

The age distribution was similar for both groups of patients. There were 9 patients more than 30 years old, 10 patients under 20 years of age and 40 patients in the 20-30 year old age group.

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There were more patients with injured left-sided ACL. There were 35 (59.3%) in the early group and 24 (40.7%) in the delayed group.

Associated meniscal injuries were present in 7/25 (28%) in the early group and 13/35 (38.2%) in the delayed group. Results of the early reconstruction (Fig 1) showed that of the 25 patients studied, all showed improvements when the 8 variables of the Lysholm score were analysed. There was significant improvement seen ($p < 0.05$) after Bonferroni's correction in decrease in swelling, stair climbing, less symptoms of locking, instability and pain.

Results of the late reconstruction group (Fig 2) included 34 patients. Similarly, significant improvements were seen in stair climbing, decrease in swelling, reduced symptoms of locking, instability and pain ($p < 0.05$).

When the early and delayed pre-operative scores were matched in both groups, no significant differences were

found. All parameters were better in the late group except for instability, squatting and pain symptoms (Fig 3). Similarly, no significant difference was found between both groups in the post-operative scores. All variables were practically similar except for swelling (Fig 4).

Comparison of the total scores revealed significant improvements in the post-operative scores in both groups. However, there was no difference in the matched pre-operative and post-operative scores in both groups (Fig 5).

DISCUSSION

Non-operative treatment of the ruptured ACL has led to functionally unacceptable outcomes such as persistent joint instability, knee pain and higher risk of injury to the other structures within the joint^{9,10}. The poor healing capacity of the ACL observed clinically and confirmed in multiple *in vitro* and *in vivo* experiments has led orthopaedic surgeons to perform ACL reconstruction rather than repairs. The most popular and successful replacement for ACL has been biological tissue graft because of the potential for graft remodelling and integration into the joint¹.

Until recently, some patients were often anxious to proceed with surgery as soon as possible as they believe that reconstruction would allow a faster return of muscle strength and return to sporting activity. Several studies on the other hand have demonstrated the benefits of a delayed reconstruction for acute ACL tears by reducing post-operative morbidity^{11,12}.

In our study, we took 6 months as a reference point for early and delayed surgery¹². This study demonstrated that with either patellar or hamstring graft, significant improvements were seen after reconstruction, corresponding to that seen in other studies^{1,5,6,7}. However, in contrast to the results shown by Shelborne¹¹, we found no difference whether the surgery took place before or after 6 months after the injury.

Limitations in our study are due to its retrospective nature. There was difficulty in data acquisition, affecting the cohort size. The confounding variables were period and intensity of rehabilitation.

Shelborne¹¹ found in a prospective study that a statistically significant higher proportion of patients in the delayed group achieved earlier progression to sport-specific rehabilitation compared to the early group. He suggested that early surgery predisposed the patient to developing arthrodesis, become weaker from disuse and lack the emphasis to regain strength before surgery. With a delayed operation, patients could obtain a better range of motion, avoid arthrodesis and still obtain equally good stability and return to activities quickly. He found that there was a correlation between decreased swelling, regaining full range of motion, mentally accepting the injury and preoperative treatment and a more rapid return of strength postoperatively.

Wasilweski¹² found in a retrospective study that patients with early operation often had more patello-femoral pain and incidence of arthrodesis as compared to the delayed group, with slower return of quadriceps strength although stability was similar in all groups.

Table 1. Lysholm Scoring Scale

Symptoms	Score
Limp (5 points)	
None	5
Slight or periodical	3
Severe and constant	0
Swelling (10 points)	
None	10
On severe exertion	6
On ordinary exertion	2
Constant	0
Support (5 points)	
None	5
Stitch or crutch	2
Weight bearing impossible	0
Stair Climbing (10 points)	
No problems	10
Slightly impaired	6
One step at a time	2
Impossible	0
Locking (15 points)	
No locking and no catching sensations	15
Catching sensation but no locking	10
Locking occasionally	6
Frequently	2
Locked joint on examination	0
Squatting (5 points)	
No problems	5
Slightly impaired	4
Not beyond 90 degrees	2
Impossible	0
Instability (25 points)	
Never giving way	25
Rarely during athletics or other severe exertion	15
Occasionally in daily activities	10
Often in daily activities	5
Every step	0
Pain (25 points)	
None	25
Inconstant and slight during severe exertion	30
Marked on or after walking more than 2 km	5
Constant	0
Score Chart:-	
Excellent	95 – 100
Good	84 – 94
Fair	65 – 83
Poor	< 64

CONCLUSION

There may not be a significant difference in functional outcome between patients who underwent early or late reconstruction. Even if surgery is delayed by more than 6 months, ACL reconstruction does significantly improve the functional outcome and thus may benefit the patient with ACL deficient knees.

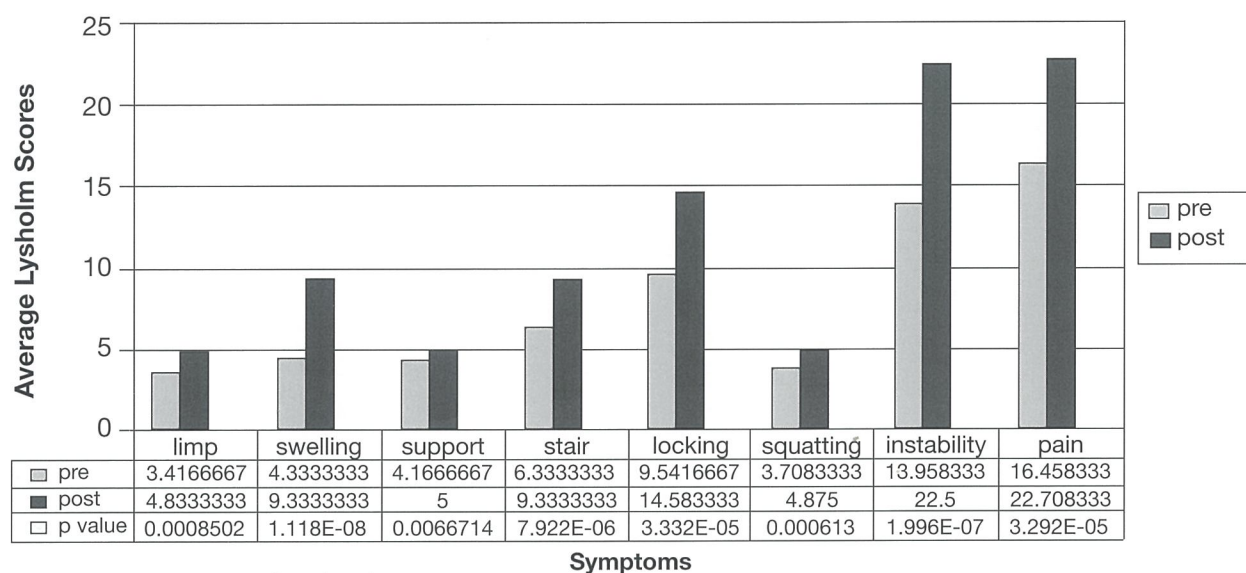


Fig. 1. Results of early reconstruction.

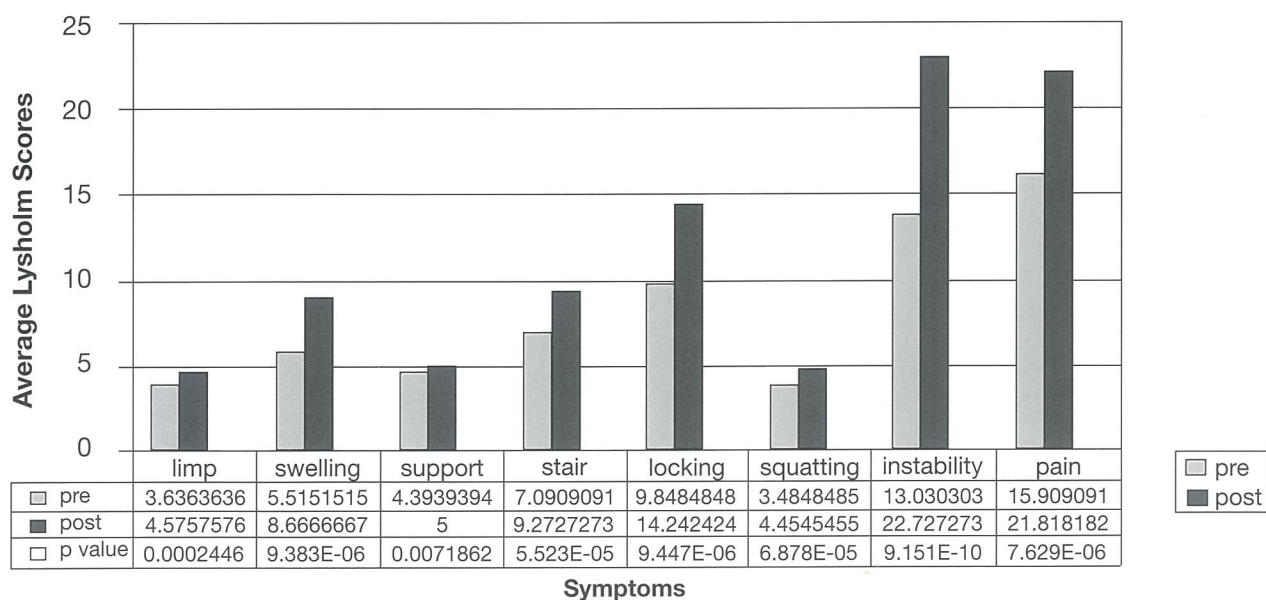


Fig. 2. Results of late reconstruction.

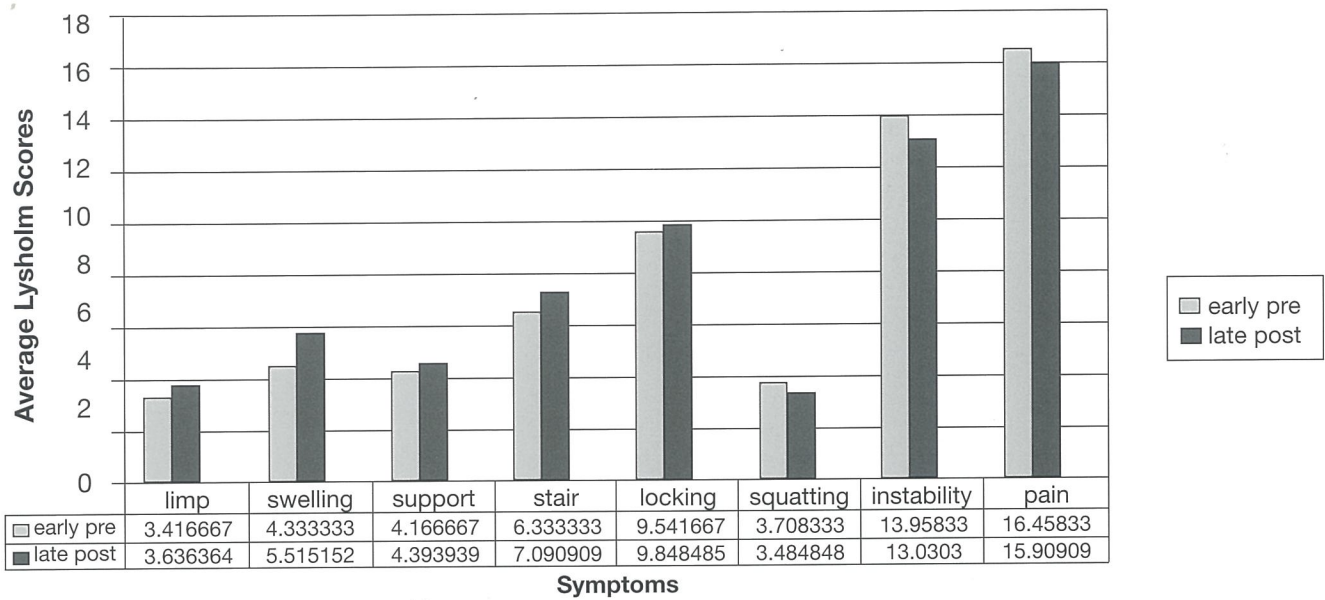


Fig. 3. Matched early and late preop scores.

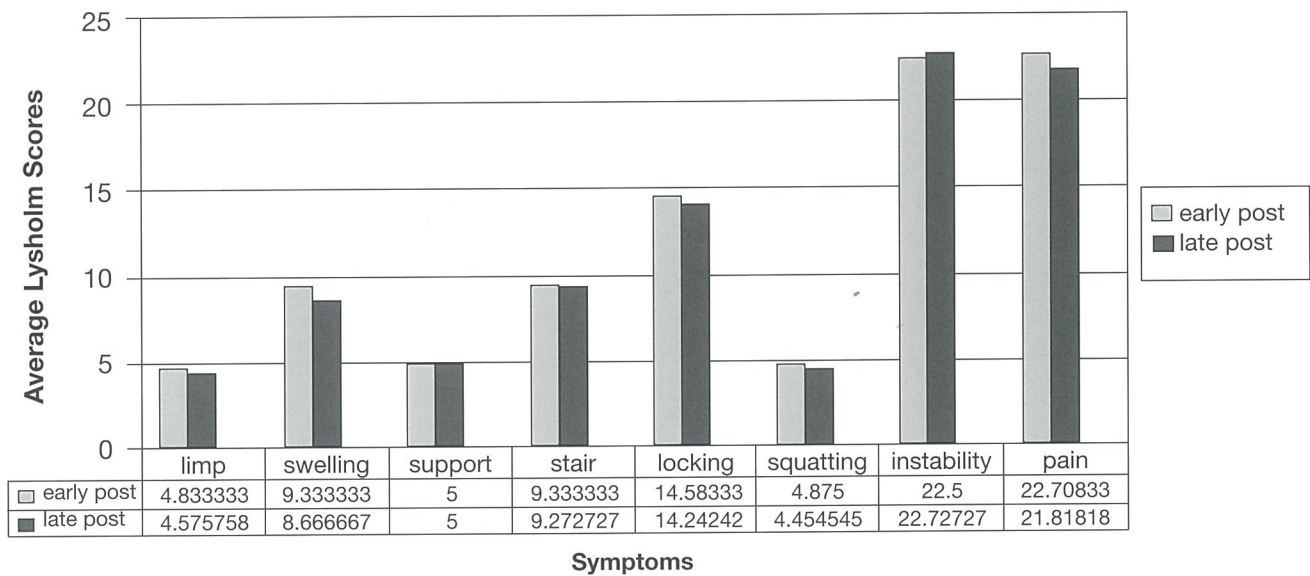


Fig. 4. Matched early and late postop scores.

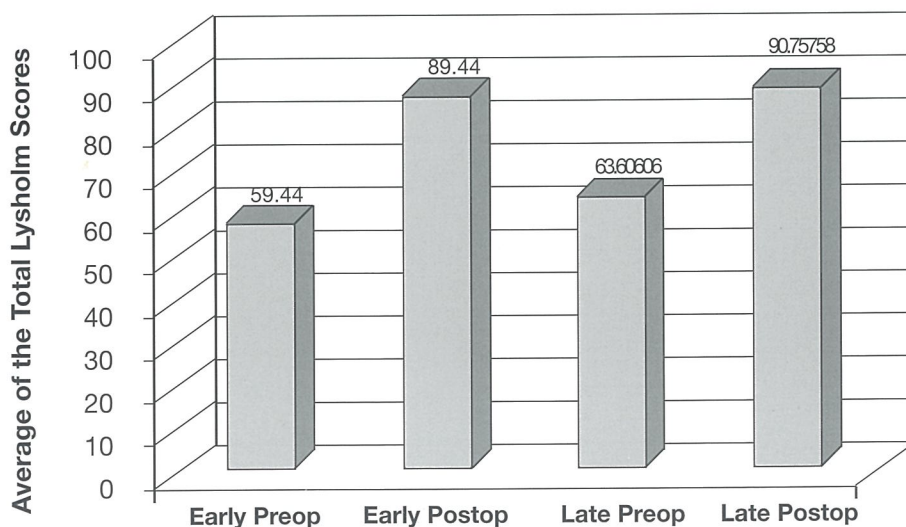


Fig. 5. Comparison of total scores.

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