

Late results after anterior cruciate ligament rupture reconstruction

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Abstract

ACL injuries are very frequent in sports medicine. This research set out to comprehensively evaluate the existing research on late outcomes in the wake of ACL repair. From the beginning until April 2020, all Medline searches have been conducted using PubMed, SCOPUS, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL), and Google Scholar. 2089 distinct records were found during the search. We were left with 57 possibly suitable records, of which we did full-text searching on all of them. The final count was twelve studies. After ACLR, the long-term rate of Lachman Grade 0-1 was estimated to be 97.8 percent (95 percent confidence interval: 196-99.5 percent). This figure shows that, although on the one hand, the long-term average of Pivot Grade 0-1 after ACLR was 97.8 percent (95 percent CI 96– 99.5 percent), the effect estimates indicate that the long-term average rate of Pivot Grade 0-1 after ACLR was only 95.3 percent (95 percent CI 95.2– 95.5 percent). IKDC score A rate was 55.4% (95% CI 42.7–68.2%). The Lysholm mean score was 84.4 (95% CI: 84.4 to 84.4). The failure rate in the current research varied between 0 and 10%, whereas the complication rate ranged between 8 and 11%. Meniscal operations, notchplasty, irrigation, and debridement were most frequent complications. A total of 12 investigations revealed that Lachman Grade 0-1 (most severe) after ACLR results in a 97.8 percent success rate, and Pivot Grade 0-1 (most severe) after ACLR results in a 97.8 percent success rate. Prior to surgery, the Lysholm score had been at an insufficient level.

Keyword: ACL, Rupture, Reconstruction.

1. Introduction

Osteoarthritis accelerates as a result of an ACL rupture, one of the most frequent knee injuries. The good news is that ACLR is effective in helping patients return to high-level sports and hard work. The bad news is that ACLR does not help to maintain and improve movement.

The ACL's intricate structure illustrates its major role in knee joint mobility. Originally referred to as a cruciate ligament, because the anterior and posterior ligaments are organised into two criss-cross patterns on the anterior and posterior portions of the knee. In reference to the ACL femoral attachment, the lateral portion of the ACL is positioned on the posterior side of the medial surface of the lateral femoral condyle, and is directed along the longitudinal axis of the femur when the knee is extended.

The ACL is crucial for proper knee flexion, rotation, and stability. Anterior translation of the tibia on the femur is heavily restrained by the ACL, and internal rotation, varus, valgus, and hyperextension are also restrained. Posterior drawer will still be applied once the ACL has been deployed. There is a substantial increase in anterior knee instability after sectioning the ACL. Approximately 15° to 45° of anterior translation is seen when solo ACL reconstruction is completed.

ACL injuries are a common injury for this knee ligament. While less common, ACL injuries often afflict younger, more active people, and females are believed to be around two to ten times more likely to be injured than men.

In the treatment of ACL ruptures, many clinical tests may be utilised. According to pooled studies, the Lachman test has a sensitivity of 85% and a specificity of 94%. Sensitivity and specificity for chronic ACL ruptures (anterior drawer test, 92 percent) are excellent, while accuracy for acute ruptures is lower (91 percent). The pivot shift test is unequivocal evidence of an ACL

rupture when positive (98 percent specificity). A negative test does not exclude the possibility of harm (24% sensitivity).

To make a diagnosis of an ACL rupture, the combination of patient history and physical examination is typically enough. However, it may be difficult to notice the damage during clinical examination if there is severe pain and effusion. Misdiagnosis is very frequent; of the patients who were evaluated for an ACL tear in an orthopaedic emergency room, 50% were given a non-ACL injury diagnosis. MRI has an excellent ability to diagnose ACL tears, with sensitivity, specificity, and accuracy all above 90%. In the vast majority of cases, MRI scans reveal an ACL rupture, which is obvious based on clinical findings. fibre discontinuity is the main indicator of an ACL rupture.

Young energetic people and skeletally immature individuals find nonoperative treatment of ACL tears unappealing. Recurrent instability and the development of chondral and meniscal injuries often arise as a result of this.

Re-approximating the torn ends of the native ACL was the first documented surgical therapy for ACL tears, as described by Robson in the early 1900s, and it is done by using suture or suture anchors. Aversion to making little adjustments. Autograft or cadaver tissue may be obtained from the patient (allograft). [8].

Early ACLR may contribute to delay in quadriceps healing and may lead to a loss of range of motion. Several studies show that quadriceps strength is significantly decreased after ACLR (first seven days post-injury) when it is performed early in the recovery process as opposed to later, and also show a substantial reduction in knee extension towards the end of the recovery process. This shows that the increasing usage of preoperative rehabilitation is on the rise. Exercise before the operation is crucial because it helps preserve

quadriceps strength and knee range of motion, both of which are important for functional results.

This research set out to comprehensively evaluate the existing research on late outcomes in the wake of ACL repair.

2. Material and methods

2.1. Search strategy

An electronic search was conducted from the inception till April 2020 in the following bibliographic databases: Medline via PubMed, SCOPUS, Cochrane Central Register of Controlled Trials (CENTRAL), and Web of Science to identify relevant articles. We used different combinations of the following queries: ((Reconstructive) OR Reconstruction)) AND ((Transplant) OR graft)) OR (Autograft) OR Autologous) OR Autotransplant)) OR ((Allograft) OR Allogeneic) OR Homograft) OR Homologous)) OR hybrid) OR ((Hamstring) OR Semitendinosus) OR Gracilis) OR Tibialis) OR Achilles) OR Calcaneal)) OR Artificial Ligament) AND (RCT[MeSH Terms]) OR RCT[Title/Abstract]) OR randomized controlled trial[Title/Abstract])) OR randomized controlled trial[MeSH Terms]).”..

2.2. Inclusion criteria

Studies included should meet the following criteria:

- ✓ Studies that included adult patients with anterior cruciate ligament (ACL) injury.
- ✓ Studies that assessed the long-term results of different techniques of ACL reconstruction.
- ✓ Studies that reported any of the following outcomes:
 - Clinical outcome assessments (range of motion, anterior drawer test, pivot-shift test, Lachman

test, and knee laxity measurements with KT-1000/KT-2000 arthrometer)

- Objective functional testing (1-leg hop, stair hop, and agility tests)
- Isokinetic muscle strength testing, patient-reported quantitative outcome measures (International Documentation Knee Documentation Committee [IKDC] grade, Lysholm score, Tegner activity scale)
- Radiographic evidence of OA
- Graft failures and associated complications.
- ✓ Studies that were randomized controlled trials (RCTs), comparative studies, or prospective cohort studies.
- ✓ Human subjects and in the English language.

2.3. Exclusion criteria

The Studies that were excluded had any of the following features:

- ✓ Reviews, conference presentations, editorials or expert opinions.
- ✓ Case reports & case control studies.
- ✓ No abstract.
- ✓ Other knee injury (e.g. PCL or Meniscal injury).

3. Results

• Study selection

In the present study, we searched Medline via PubMed, SCOPUS, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL), and Google Scholar from their inception till April 2020. The search retrieved 2089 unique records. We then retained 57 potentially eligible records for full-texts screening. Finally, fifteen studies were included Figure (1).

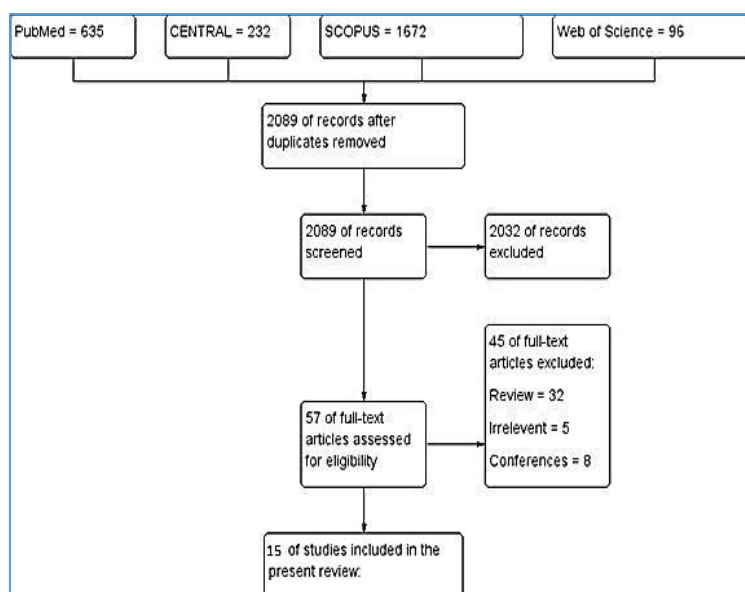


Fig. (1) Prisma flow diagram for selection included studies.

Characteristics of the Included Studies:

Table (1) Summary Characteristics of the included studies.

No.	Authors	Year	Country	Procedure Date Range	Study De sign	Single or Multice nter	No. of Patient
1	O'Neill	2001	USA	1989-1994	Randomized Controlled Trial	Single	225
2	Ibrahim et al	2005	Kuwait	1994-1996	Randomized Controlled Trial	Single	85
3	Zaffagnini et al	2006	Italy	1998	Retrospective Study	Single	75
4	Keays et al	2007	Australia		Prospective study	Single	56
5	Lidén et al	2007	Sweden	1995-1997	Randomized Controlled Trial	Single	68
6	Ahldén et al	2009	Sweden	1995-1998	Retrospective Study	Single	47
7	Holm et al	2010	Norway		Randomized Controlled Trial	Single	57
8	Sajovic et al	2011	Slovenia	1999-2000	Randomized Controlled Trial	Single	52
9	Wipfler et al	2011	Germany	1998-1999	Randomized Controlled Trial	Single	54
10	Leys et al	2012	Australia	1993-1994	Prospective study	Single	94
11	Gifstad et al	2013	Norway	2001-2004	Randomized Controlled Trial	Multicenter	93
12	Webster et al	2016	Australia	1996-1998	Randomized Controlled Trial	Single	47
13	Beyaz et al	2017	Turkey	2007-2008	Randomized Controlled Trial	Single	31
14	Jarvela et al	2017	Finland	2003- 2005	Randomized Controlled Trial	Single	60
15	Elveos et al	2018	Norway	1991 - 1993	Randomized Controlled Trial	Multicenter	100

Complications Rate of the included studies:

Table (2) Complications Rate of the included studies.

Authors	No.of Patients	Complications, %(n)	Description of Complications
Gifstad et al	45	17.8 (8)	6 meniscus surgeries, 1 notchplasty, 1 irrigation and debridement
Holm et al	29	55.2 (16)	16 meniscal surgeries
Ibrahim et al	40	15 (6)	3 meniscal injuries, 1 PCL rupture, 2
Keays et al	29	20.7 (6)	1 ipsilateral PCL rupture, 2 meniscal injuries, 1 asymptomatic calcification in PT, 1 loose body, 1 hemangioma in vastus medialis
Lidén et al	32	25 (8)	1 culture negative effusion, 3 meniscus injuries, 3 symptomatic
O'Neill	150		NR
Leys et al	43	25.6 (11)	5 meniscectomies, 2 excisions of tibial screw, 1 excision of patellar tendon cyst,
Sajovic et al	25	0 (0)	NR
Webster et al	22		NR
Wipfler et al	28		NR
Zaffagnini et al	25	0 (0)	NR
Beyaz et al	NR	NR	NR
Jarvela et al	32	53%	Osteoarthritis
Elveos et al	NR	NR	NR

Failure Rate of the included studies:

Table (3) Failure Rate of the included studies.

Authors	No. of Patients at	No. of Failure s, % (n)	Cause of Failure
Gifstad et al	45	4 (2)	NR
Holm et al	29	10 (3)	Traumatic
Ibrahim et al	40	0 (0)	NR
Keays et al	29	0 (0)	NR
Lidén et al	32	3 (1)	NR
O'Neill	150	5 (4) (group II) 7 (5) (group III)	NR
Leys et al	43	8 (7)	NR
Sajovic et al	25	12 (4)	NR
Webster et al	22	5 (1)	Traumatic
Wipfler et al	28	11 (3)	NR
Zaffagnini et al	25	0 (0)	NR
Beyaz et al	31	0 (0)	NR
Jarvela et al	47	11 (0)	Traumatic
Elveos et al	100	19 (0)	Traumatic

Radiographic Outcomes:

Table (4) Radiographic Outcomes.

Authors	No. of Patients	IKDC	K-L	Objective
Ibrahim et al	40	NR		Moderate OA in 35% (14)
Keays et al	29	NR		Mild-moderate OA in 62% (18) Moderate PF OA in 41% (12)
Leys et al	58			Grade A: 41% (24) Grade B: 48% (28) Grade C: 10% (6)
Sajovic et al	25			Grade A: 16% (4) Grade B: 40% (10) Grade C: 44% (11)
Webster et al	19			Grade 0-1: 74% (14) Grade 2-3: 26% (5)
Beyaz et al	NR	71.29	NR	
Jarvela et al	32	NR		OA in the medial compartment of the operated knee was present in 38% of the patients, in the lateral compartment in 38%, and in the patellofemoral compartment in 34%.
Elveos et al	65	NR		15 patients (27%) had severe OA: 9 of 28 (32%) in the BPTB group and 6 of 28 (21%) in the LAD group

4. Discussion

ACL injuries are very frequent in sports medicine. An injury of this type is often seen in sportsmen or the general public who do the incorrect exercises or fitness routines. To assist in ACL recovery, patients who have been diagnosed with ACL damage are often given the option of anterior cruciate ligament repair (ACLR). The reconstructive methods were utilised during ACL repair operations.

In the short- and intermediate-term, ACLR provides impressive outcomes independent of the graft utilised. Surveys and long-term research have shown generally positive outcomes for at least 10 years following surgery. It has been observed that seven years following surgery, degenerative alterations of the cartilage may be seen. Follow-up time increases the risk.

Thus, in order to thoroughly evaluate previously published research on late ACL repair outcomes, we performed the current study.

In the current research, we looked for citations from the beginning of Medline until April 2020 in databases including PubMed, SCOPUS, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL), and Google Scholar. 2089 distinct records were found during the search. We were left with 57 possibly suitable records, of which we did full-text searching on all of them. The final count was twelve studies.

Automatic and controlled laxity

As a general rule, the mean ROM of the general population is lower than the ROM seen in patients with generalised joint laxity (GJL). It has been shown that

GJL and hyperextension of the knee have been linked to an increased risk of ACL damage, and it is generally recognised that this may include both non-contact and contact injuries. This past research has shown that females had higher laxity in the knee joint and increased GJL.

The Lachman test is a physical examination technique used to determine the health of the anterior cruciate ligament. The degree of laxity of the ACL is graded as mild, moderate, and severe, which corresponds to Grade 1, 2, and 3 ACL injuries. Grade I anterior tibial translation is 0 to 5 mm, Grade II is 6 to 10 mm, and Grade III is 11 to 15 mm relative to the undamaged side.

Although, theoretically, the pivot shift is the ideal test to detect and measure the health of the ACL, which is especially relevant in diagnosing ACL deficiency, evaluating treatment strategies for ACL injuries, and constructing treatment algorithms for patients with ACL injuries, there are a few complications that have to be taken into consideration. a grading system for pathologic motion seen in a pivot shift test was established by the International Knee Documentation Committee (IKDC): 0 is normal, 1 is glide, 2 is clunk, and 3 is stone-walled (locked subluxation).

The results indicate that the long-term Lachman Grade 0-1 post-ACLR rate is about 97.8 percent (95 percent confidence interval, 96–99.5 percent). Pivot Grade 0-1 following ACLR's long-term rate was estimated to be 97.8 percent (95 percent CI: 96–99.5 percent).

Our findings concur with those of Sundemo and et al.; thus, in concurrence with these results, we examined whether postoperative knee laxity is linked with worse long-term prognosis after ACL reconstruction. Of the 193 patients who had ACL repair, 117 (61.3%) were evaluated again after 2 years, while the other 82 (38.7%) were checked again at 16 years. The Lachman Grade 0-1 Lachman Grade 0-1 rate was 95% while the Pivot Grade 0-1 Pivot Grade 0-1 rate was 96%.

In contrast to a group of non-operatively treated individuals, clinical and radiological outcomes for patients who had had ACL reconstruction were evaluated by Mihelic and et al. After 15–20 years, individuals who had ACL repair demonstrated that 94% of them remained stable in their knees.

The clinical and scientific communities have both used instrumented knee laxity testing equipment to assess individuals with knee injury. Knee motion quantification may improve clinical practise and research, since it would make knee-ligament damage more precisely and reproducibly measurable.

In our meta-analysis, the overall impact estimates were 1.2 (95% confidence interval [CI] 0.89 to 1.6).

Just as we found, Mouarbes and colleagues conducted a comprehensive literature search on clinical trials related to ACL repair. In all, there were 2856 individuals having ACL repair in 27 clinical trials that

fulfilled the inclusion criteria. The side-to-side mean difference of instrumented means was 0.9 [6].

Patients' experience

In addition to clinical examination, patient-reported measures of knee function are essential for complete evaluation of ACL status. The International Knee Documentation Committee (IKDC) subjective self-evaluation of functional level and symptom-related impairment is responsive, trustworthy, and valid. This questionnaire tests how well the patient describes their level of function and symptoms when engaged in everyday activities, and how active they are in sports.

While on the other hand, research has shown the Lysholm knee score's usefulness in functional assessment for different knee ailments, including patellofemoral pain syndrome, meniscal injuries, and other chondral diseases.

The impact estimates we obtained indicated that the IKDC score A rate was 55.4% (95% CI 42.7–68.2%). IKDC rate B is estimated to be 37.3% (95% CI: 24–50.6%). Based on Lysholm knee data, the mean Lysholm score was estimated to be 87.085 (95% confidence interval [CI] 84.4–89.7).

In agreement with our results, Jia and et al. found that the Ligament Advanced Reinforcement System (LARS) artificial ligament provided long-term clinical benefits after ACL repair. We have 168 patients in our practise who had arthroscopic ACL repair done with the LARS artificial ligament. The pre- and postoperative Lysholm scores increased from 54.6 ± 14.3 to 85.4 ± 12.1 [10].

For this study, Al-Khalifa & et al. analysed data from 36 patients with an ACL repair to determine their functional results two years after surgery, who received hamstring autografts. Approximately 97.2% (35/36) of the subjects had a normal or very normal clinical assessment. Severe passive motion deficit was found to be mild to practically normal in 97.2% (35/36). Nearly all patients (94.4 percent) showed normal or near normal compartmental results, and nearly all patients (34/36) had normal or near normal clinical manual knee ligament findings.

The failure rate and complications of treatment

There are both short-term and long-term problems with this surgery.

Failure rate was found to vary from 0-10%, while complication rate was found to range from 8-11%. Meniscus operations, notchplasty, irrigation, and debridement were the most often performed procedures.

5. Conclusion

A total of 12 investigations revealed that Lachman Grade 0-1 (most severe) after ACLR results in a 97.8 percent success rate, and Pivot Grade 0-1 (most severe) after ACLR results in a 97.8 percent success rate. Prior to surgery, the Lysholm score had been at an insufficient level.

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