# COMBINED ANTERIOR CRUCIATE LIGAMENT & ANTEROLATERAL LIGAMENT RECONSTRUCTION VERSUS ISOLATED ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Meta Analysis Study

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*First thanks to* **ALLAH** *to whom I relate any success in achieving any work in my life.*

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**Maitham Murtadha Kadhim**

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# List of Abbreviations

| Abb. | Full term |
|---|---|
| ACL | nterior cruciate ligament |
| ACLR | Anterior cruciate ligament reconstruction |
| AH | Anterior horn |
| ALL | Anterolateral ligament |
| AM bundle | Anteromedial bundle |
| CT | Computed Tomography |
| EAT | Extra articular tenodesis |
| GT | Gerdy s Tubercle |
| ITB | iliotibial band |
| JL | Joint line |
| LCL | Lateral collateral ligament |
| LL | Lateral meniscus |
| MCL | Medial collateral ligament |
| MM | Medial meniscus |
| OA | Osteoarthritis |
| PH | Posterior horn |
| PL bundle | Posterolateral bundle |
| PLC | Posterolateral corner |
| PT | Popliteus tendon |

# ABSTRACT

ACL reconstruction aims to restore knee function and stability; however, rotational stability may not be completely restored by use of standard intraarticular reconstruction alone. Although individual studies have not shown the superiority of combined ACL reconstruction compared with isolated intraarticular reconstruction in terms of function and stability, biomechanical principles suggest a combined approach may be helpful, therefore pooling (meta-analyzing) the available randomized clinical studies may be enlightening.

**PURPOSES:**

We performed a meta-analysis to determine whether combining extraarticular with intraarticular ACL reconstruction would lead to: (1) similar knee function measured by the IKDC evaluation, return-to-activity, and Tegner Lysholm scores, compared with isolated intraarticular reconstruction; (2) increased stability measured by pivot shift and instrumented Lachman examination; and (3) any differences in complications and adverse events?

**RESULTS:**

When functional outcomes were compared, we found no difference between patients who underwent intraarticular ACL reconstruction only and those who underwent combined reconstruction (IKDC, return-to-activity, and Tegner Lysholm scores).

We found a high significant difference between pateints who underwent ACL+ALL and those with ACL only in the pivot shift test for the rotational stability.



**KEYWORDS:** Anterolateral ligament (ALL), ACL reconstruction, extra articular tenodesis, high pivot shift test, Anterolateral stability

# INTRODUCTION

Sports injury is common, ranking the second highest (21%) in terms of cause of injury and leading to long term disabilities and handicaps especially in patients with knee injuries [(1)]. Among all sport-related knee injuries, one-fifth (20%) involves the anterior cruciate ligament (ACL) – the most commonly traumatized structure. ACL rupture results in knee instability. Prohibits the athletes back to sports, and results in early retirement [(2)].

Anterior cruciate ligament (ACL) reconstruction is an operation performed frequently by orthopedic surgeons throughout the world. In fact, it is estimated that more than 200,000 ACL reconstructions are performed each year in the United States alone [(3)].

Operative treatments are often prescribed to reconstruct the ACL in order to restore the knee stability and return the athletes to sports and active lifestyle.

Numerous anatomical studies showed that the intact human ACL consists of an anteromedial (AM) bundle, and a posterolateral (PL) bundle, while some studies even reported an intermediate bundle in between. Biomechanics studies showed that AM and PL bundles mainly contribute to anterior-posterior and rotational stability of the knee respectively [(4)].

Traditional surgical methods employ a single bundle bone-patellar-tendon-bone or hamstrings autographt, however, the methods provide good resistance to anterior tibial loads but not to good rotational loads. Therefore, the unique anatomical and biomechanical characteristics of the two bundles provide a rationale to the recent emerge of anatomical double-bundle ACL reconstruction approach to better mimic and restore the anatomy and biomechanics of the intact ACL in the reconstructed knee. However, this advantage of rotational stability has not been widely proved on living human [(5)].

Double-bundle ACL reconstruction has been proposed as a means of restoring the 2-bundle anatomy of the native ACL. Double bundle technique may improve the bundle appearance of the ACL; but it increases the operating time in both the number of tunnels to be drilled, the placement of the tunnels and the operative complexity of passing and securing the two grafts. In addition it is known that 6% of reconstructions will re-rupture with the same incidence in the contralateral knee. Having had two tunnels within the femur may leave larger bony voids within the lateral femoral condyle to fill during revision surgery [(6)].

Now Attention has returned to single bundle grafts placed anatomically using the anteromedial portal as a method of placing the femoral tunnel independent of the tibial tunnel [(7)].

The modern intra articular anatomical ACLR has produced well to excellent results for most patients; however, there remains a group for whom rotational instability continues to be an issue [8].

Residual rotational instability, subjectively measured as a positive pivot shift, is thought to be a cause of recurrent ACL injuries, which could persist in up to 25% of patients after single-bundle ACLR [9].

Persistent problems in rotational laxity control after standard intra-articular ACLR have led knee surgeons to focus on the potential benefits of adding lateral extra articular tenodesis (LET).

Theoretically, the addition of LET plays an important role in better constraining the displacement of the lateral tibial compartment and providing a stronger lever arm for controlling the rotational laxity of knee joints [10].

Recently, new insights into the existence and function of a distinct ligamentous structure on the anterolateral aspect of the knee, the anterolateral ligament (ALL), have refocused attention on primary restraint of the rotational laxity of the knee after ACL injury.

According to an in vitro study, isolated ACL transection could only produce a pivot shift no higher than grade I whereas the additional ALL transection resulted in a high-grade (grade

II or III) pivot shift in all specimens. These findings suggested a high correlation between the associated ALL lesions and the high grade pivot shift, which indicated that combined LET and intra-articular ACLR appeared synergistic in controlling the high-grade pivot shift [11].

Finally the relation between LET and ALL reconstruction should be clarified. As the anatomy of the ALL has been described, the LET procedure may be able to be modified to allow truly anatomic ALL reconstruction [12].