Orthopaedic Journal of MP Chapter
Publisher: Madhya Pradesh Orthopaedic Association www.mpioa.com
E-ISSN:2582-7243, P-ISSN:2320-6993
2024 Volume 30 Number 1 Jan-Jun
Research Article
Anterior cruciate ligament

Lateral Extra articular Tenodesis (L.E.T.) to control Anterolateral instability associated with ACL (Anterior cruciate ligament) deficient knees– A Novel study

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Introduction: Chronic ACL laxity, in particular Rotational laxity associated with an explosive pivot shift test, has being tend to cause combined damage to ACL and Anterolateral structures of knee. We, hereby present a study of adding a LET procedure to such Anterolateral Rotational instability.

Material and methods: We operated 8 cases (All males) with complete ACL tear with Anterolateral instability (7 patients with Grade 2 Pivot shift test,1 with Chronic ACL injury) from May 2020 to October 2021.We did primary ACL reconstruction in all knees, with adding LET procedure (Modified Lemaire's technique).

Results: All patients were followed up for period of 6 months to 1 year (Average 8.6 months). A pre & Postoperative outcome scores were assessed by Lachman test, Pivot shift test (-ve in all, in post-op follow-up), Lysholm score (mean 90.75, %,) and Tegner score (average Gr 4).

Conclusion: After this study we can conclude that adding a LET procedure (Modified Lemaire's technique) to an ACL deficient knee with Anterolateral instability (like explosive Pivot shift test), is beneficial as not only it reduces the Anterolateral instability but also, greatly reduces the risk of Graft Failure.

Keywords: LET procedure, Anterolateral instability, ACL reconstruction

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Ashish Dubey, , , Peetambara hospital 29, Nehru colony, Gwalior, Madhya Pradesh, India. Email: drashish195@gmail.com	Dubey A, Lateral Extra articular Tenodesis (L.E.T.) to control Anterolateral instability associated with ACL (Anterior cruciate ligament) deficient knees– A Novel study. ojmpc. 2024;30(1):29-33. Available From https://ojmpc.com/index.php/ojmpc/article/view/186	

Manuscript Received	Review Round 1	Review Round 2	Review Round 3	Accepted
2024-06-06	2024-06-12	2024-06-18	2024-06-24	2024-06-30

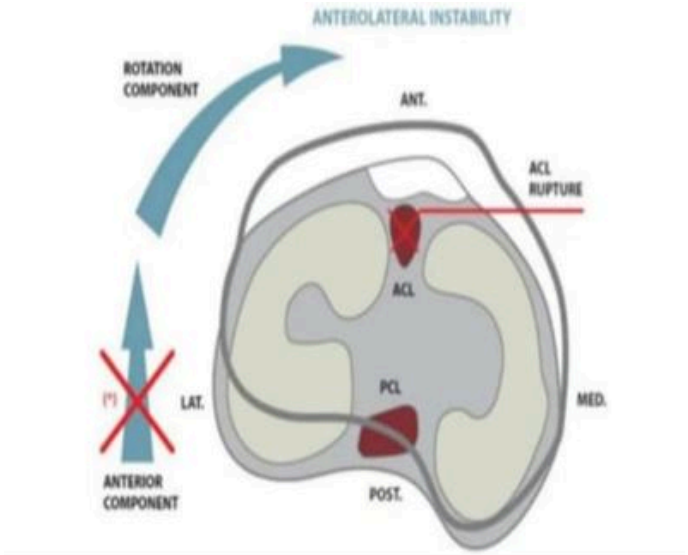
Conflict of Interest	Funding	Ethical Approval	Plagiarism X-checker	Note
Authors state no conflict of interest.	Non Funded.	The conducted research is not related to either human or animals use.	15.36	All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Introduction

Chronic ACL laxity & in particular rotational laxity associated with an explosive positive pivot shift test, has been associated to combined damaged to ACL and Antero or posterolateral structure of the knee. We hereby provide a study of adding a LET procedure to ACL reconstruction associated with anterolateral rotational instability. Long term results are good for ACL reconstruction, however 0.7 to 20% present with recurrent instability due to graft failure. Overall revision rate is as close to 8 to 40%.

Antero Lateral Ligament is the ligament responsible for rotational instability. Diagnosis of ALL tear is done by clinically by Grade 2/3 pivot shift with marked rotational instability. Radiologically by X-ray picture. MRI is best in T2 Coronal image.

LET procedure is also called as lateral plasty. Can be defined as, any lateral – extraarticular procedure which will control anterolateral laxity and contribute to decrease pivot shift after a rupture of ACL.



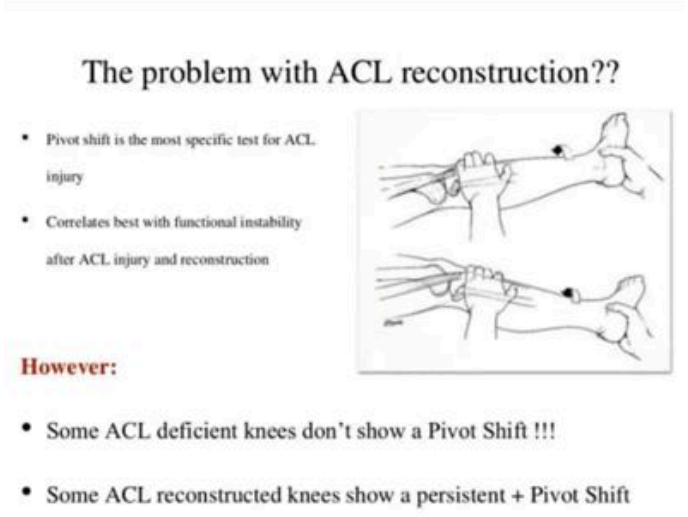


Figure: 1 and 2 Anatomical and clinical presentation of Pivot shift test

Figure: 3 and 4 Anatomy of ALL

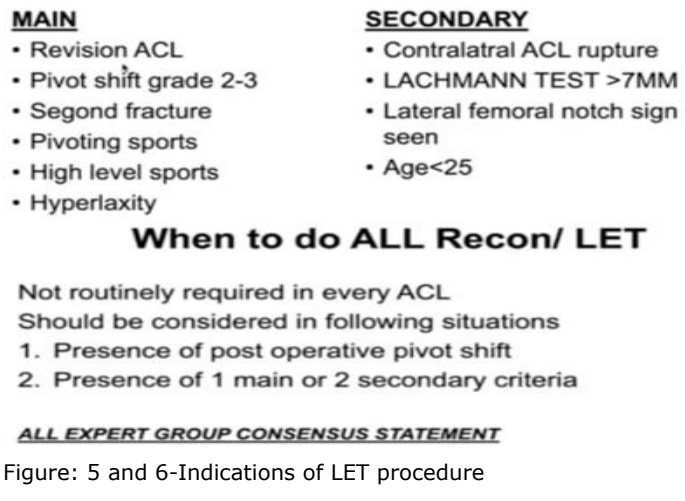


Figure: 5 and 6-Indications of LET procedure

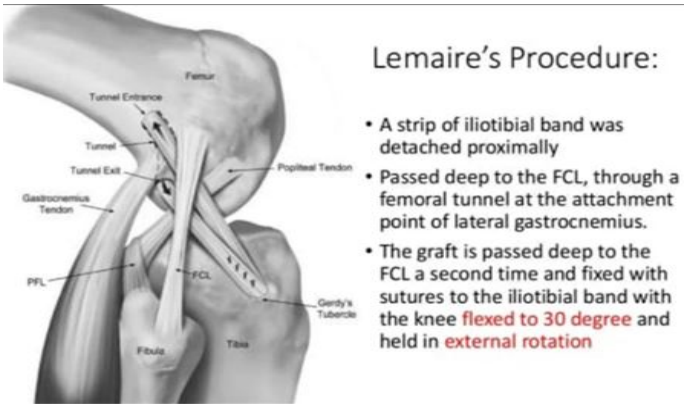


Figure: 7 Lemaire's procedure

Various surgical procedures have been devised since 1967, when Lemaire described it first. They used either ITB, PTB grafts, ST & / or gracilis graft. Other known techniques are Macintosh procedure (3), Losee technique (4), Arnol & coker (5), Wilsen & Scraton (1979)

(They all used IT band), Andrew procedure, Muller Procedure, Benam procedure (They used Lateral ½ of PTB) and Zamns & Rowe technique (They used semitendinosus). Most accepted is modified Lemaire procedure, which is also the present method of choice.

Material and method

We operated 8 patients (All males) with ACL tear associated with anterolateral instability from May 2020 to Oct 2021, with ACL reconstruction with LET procedure (with modified Lemaire's procedure). Mean age of patient was (26.25 Years). 7 patients were chosen for LET because of explosive Pivot shift test. All patient undergone standard AP & Lateral view X-rays and MRI Scans. All patients had undergone ACL reconstructions with LET, by modified Leamire,s procedure. All patients were operated under spinal anesthesia with knees hanging down and, in all patients, tourniquet was used. In all patients, pre-operatively Lachman's & pivot shift tests done to assess instability, after giving spinal anaesthesia.

All patients had undergone routine Arthroscopic ACL reconstruction, all with hamstring graft. In all patients, LET procedure (modified Lemaire's procedure) was added afterwards. After inflating tourniquet, an incision was made at the lateral aspect of knee, from the lateral epicondyle towards Gerdy's tubercle. The iliotibial band was exposed and a 10x1 CM strip was excised from the middle of the iliotibial band, living its distal end attached to Gerdy's tubercle. The free end of the graft was whipstitched with high strength braided suture, then the graft was rerouted by a curved clamp deep to the LCL. Now attention was paid for fixation of graft proximally by clearing the lateral epicondyle so as to attach the graft, just proximal and anterior to lateral epicondyle.

The graft was fixed with knee in 30° flexion and foot in neutral rotation, with giving slight tension on graft so as not to over constrain the joint. The graft was fixed proximally at the above-mentioned point, with the help of a staple. The iliotibial band was sutured in to place. The subcutaneous tissue and skin was closed in layers by absorbable sutures. Post operative management is done as standard protocols as of ACL reconstruction were followed. Isometric exercises for Quadriceps and SLRT were started immediately. Knee immobilized in full extension for three weeks. ROM was limited to 0-90° till 3 weeks and then full flexion was allowed. Patients were mobilized with cruthes and weight bearing was minimal as tolerated, for 3 weeks.

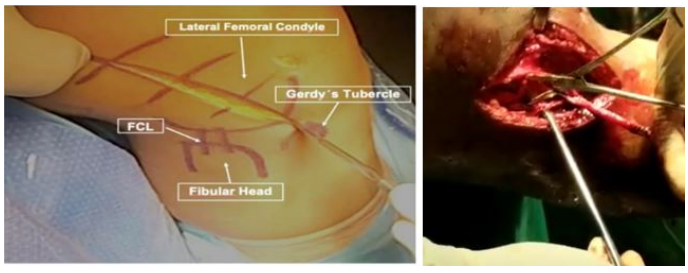


Figure: 8 and 9 Incision and dissection

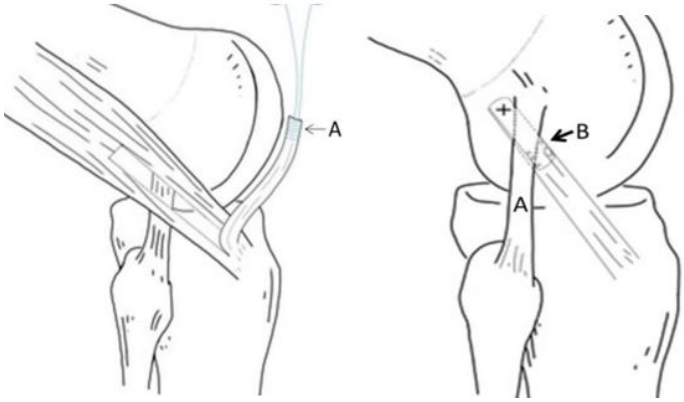


Figure: 10 and 11 Diagrammatic presentation of LET procedure

Table 1- Age, sex and duration of follow up of patient

S. No	Age	Sex	Duration of follow-up
1	30	M	12 Months
2	26	M	6 Months
3	28	M	8 Months
4	22	M	8 Months
5	31	M	7 Months
6	25	M	10 Months
7	26	M	10 Months
8	22	M	8 Months

Table 2- ACL reconstruction technique and graft type

S.No	ACL Reconstruction technique	Graft Type
1	Anatomical (Anteromedial portal)	Hamstring
2	Anatomical (Anteromedial portal)	Peroneus longus
3	Anatomical (Anteromedial portal)	Hamstring
4	Anatomical (Anteromedial portal)	Hamstring
5	Anatomical (Anteromedial portal)	Hamstring
6	Anatomical (Anteromedial portal)	Hamstring
7	Anatomical (Anteromedial portal)	Hamstring
8	Anatomical (Anteromedial portal)	Hamstring

Table 3- Different tests for ACL injury

S. No	Pivot shift Gr 2/3	Segond's fracture	Pivoting sport	Hyperlaxity	Others
1	+Gr2	-	-	-	-
2	-	-	+	-	Chronic ACL Injury
3	+Gr2	-	-	-	Contusion of lateral condyle (MRI)
4	+Gr2	-	-	-	Age <25 years
5	+Gr2	-	-	-	Contusion of lateral condyle (MRI)
6	+Gr2	-	-	-	Contusion of lateral condyle (MRI)
7	+Gr2	-	-	-	Age <25 years
8	+Gr2	-	-	-	-

Table 4- Different scores after surgery

S.No	Lachman Test		Pivot Shift		Lysholm Score	Tagners Socre
	Pre-Op	Post-Op	Pre-Op	Post-Op (6 M - 1Y)	(Post Op)	
1	1+	1	2	-ve	95	5
2	2	1+	2	-ve	85	4
3	1+	1	2	-ve	91	4
4	1+	1	2	-ve	89	4
5	1+	1	2	-ve	94	4
6	1+	1	2	-ve	92	4
7	1+	1	2	-ve	90	4
8	1+	1	2	-ve	90	4
				Average	90.75	


Figure: 12 and 13 Clinical follow up of patient

Results

All patients were followed for 6 months to 1 year (average 8.6 Months). Pre & Post operative outcome score were assessed including Lachman and pivot shift test, Lysholm score and Tegner score. No patients had any signs of infection or neuro vascular injury. No patients had any over constrained joints. Till one year follow-up, there was a significant improvement in Lachman & pivot shift test. The follow-up is still continuing to assess the return to pre injury level.

Discussion

When performed in addition to an ACL reconstruction, LET procedure has been demonstrated to significantly reduce anterior tibial translation and anterolateral instability in addition to reducing the force, experienced by the graft, when an anteriorly directed load applied. Getting an over constraint knee is one disadvantage with this procedure but a limited tension may reduce it. However, with added LET procedure, the risk of graft failure is definitely reduced. To date, there are limited outcome data for patients undergoing combined LET with ACL reconstruction. Marcacei et al (6) reported at 10-to-30-year follow-up with mean lysholm score 97.3, ours were 90.75% with mean follow-up of 8.6 months. In comparison to a study of isolated LET procedure by Romy Deviandri (14) in four patients, post op assessment of all patients was 1+ Lachman, -ve, pivot shift and tegner score of pre injury level (4) with average lysholm score of 82% (almost similar to our observations).

Conclusion

Since we have a smaller number of patients and our follow-up is of shorter duration, still we can conclude, it is always beneficial to combine LET procedure with ACL deficient knee Who present with signs of anterolateral instability (like explosive pivot shit) as it will reduce anterior tibial translation and anterolateral instability and will also reduce the risk of graft failure.

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