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Clinical Outcome of Arthroscopic Lateral Release for Lateral Patellar Compression Syndrome

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Abstract
Objective In this study, we have evaluated the effects of isolated arthroscopic lateral retinacular release in lateral patellar compression syndrome according to Lysholm Knee Scoring Scale.
Methods A prospective case series study of 48 patients who suffered Lateral patellar compression syndrome who were diagnosed by clinical examination and confirmed by M.R.I. and failed conservative management and underwent isolated arthroscopic lateral patellar retinaculum.
Results There was significant improvement in Lysholm score, in particular for pain, using stairs and squatting. The procedure had a high mean satisfaction score of 83.15 post operatively which is significant compared to preoperative score which was 51.17 ($P < 0.001$).
Conclusion Isolated patella retinaculum release can be effective for relieving anterior knee pain in isolated lateral patellar compression syndrome without significant instability or mal-alignment.
Keywords Lateral patellar compression syndrome; arthroscopic lateral release; Lysholm score

Introduction

Among the causes of patellofemoral pain; the "lateral patellar compression syndrome", "excessive lateral pressure syndrome", or "lateral patellar hyperpressure syndrome" (same condition with different nomenclatures suggested by different authors) is a condition associated with overload and increased contact pressure on the lateral facet results from pathologic thickening and contracture of lateral soft-tissue restraints.[1] Kneeling plays a major role in increasing the ultimate contact pressure between the patella and femoral condyles.[2] There is wide variation in the reported prevalence of anterior knee pain and lateral patellar compression syndrome. A prevalence of 12~13% in the general population of adolescents was reported.[3] Benjamin E. Smith stated a prevalence of 22.7% in the general population, and increased in adolescent athletes to reach 28.9%.[4] Great attention should be paid for the evaluation of patellar tilt, patellar glide and peripatellar structures. Patellar tilt is the angle between the axis of patella and floor a neutral or negative (angle opens medially) angle is consistent with extensively tight lateral retinacular ligament.[5] The patellar glide test measures passive patellar mobility. The examiner pushes the patella first medially, then laterally, each time estimating the excursion of the patella with respect to the distal femur. In lateral patellar compression syndrome lateral glide is extremely limited with less than 1 quadrant medially and/or less than 3 quadrants laterally.[6] Before moving towards radiographic assessment, completion of the physical examination is advised for associated or aggravating conditions. Measuring the Q-angle (more than 17° is considered abnormal), tubercle sulcus angle (more than 8° is considered abnormal), checking for femoral anteversion (more than 15° is abnormal), valgus knee, flat feet and pronated feet which all aid in the diagnosis of mal-alignment that may need correction.[7,8] Various modalities are available to approach lateral compression syndrome, starting with plain radiograph; axial views of the patella are available, namely Skyline (Merchant) view which may show lateralization of trabeculae and lateral facet sclerosis.[9] Multiple information can be obtained from this view to show the Wiberg type of patella, whether there is any bony abnormality like trochlear dysplasia (sulcus angle of more than 142°) or incongruity of the patellofemoral articulation (congruence angle measuring more than 16°),[10] The lateral patellofemoral angle measured between a line parallel to patellar lateral facet and a line connecting the most prominent tips of medial and lateral femoral condyles is a representation of patellar tilt, and patellar subluxation may be more precisely assessed by Merchant congruence angle.[11] The objective of this study is to determine the functional outcome of isolated arthroscopic release of lateral patellar retinaculum in cases of lateral patellar compression syndrome who failed conservative treatment including 3 months of physiotherapy. The patients will be followed up for reassessment using the Lysholm Knee Scoring Scale for comparison with preoperative score.

Method

Prospective study, designed to follow up patients with lateral patellar compression syndrome according to Lysholm Knee Scoring Scale who undergo arthroscopic lateral retinacular release. The study conducted in Erbil province in Erbil Teaching Hospital, PAR private hospital and Hawler Private Hospital. The study carried out between December 2016 and August 2019. 48 patients were involved in this study; 32 females and 16 males with age interval ranged from 19~45 years.

Inclusion Criteria

All the patients were examined by our term either in outpatient clinic at Erbil Teaching Hospital or in clinic for restricted patellar glide test and patellar tilt test, then the diagnosis was confirmed by knee MRI including axial sections, and failed conservative

treatment with physiotherapy for at least 3 months, we did arthroscopic intervention to each case for dynamic tracking as a final confirmation of the diagnosis. The study included all patients of both sexes who are skeletally mature and after failure of 3-month trial of conservative treatment with quadriceps strengthening.

Exclusion Criteria

Dislocated or history of dislocation, Patellar instability, Bony abnormality (trochlear groove hypoplasia or flat), Osteoarthritis of the knee 3rd and 4th grades, Infected knee, Varus and valgus knee, Rotational deformity of the lower extremity, Miserable malalignment triad, Anterior cruciate ligament, posterior cruciate ligament and medial collateral ligament rupture, History of fracture around knee, Focal Osteoarthritis of the lateral facet joint, Chondral lesion (Outerbridge 3 and 4).

The arthroscopic technique is done under general or spinal anesthesia, patients were positioned in supine position with leg holder placed for the operative side, stander sterilization method by povidone iodine and disposable draping was used, prophylaxis antibiotic (ceftriaxone 1 gm) was given about 30 ± 15 minutes prior to incision, using tourniquet inflated to 300 mmHg, the thigh is held by a leg holder, through anterolateral and anteromedial portals, with a 30° viewing arthroscopy, proper systematic check scope is conducted looking for patellar tilt especially at 30°—40° of flexion, dynamic patellotrochlear engagement, chondral lesions, meniscal tears, synovitis, Hoffa status and cruciate ligaments integrity. Using an 18-gauge needle, the junction between the inferior edge of vastus lateralis and the patella is marked. While viewing from anteromedial portal, introducing electrocautery, through the anterolateral portal and cutting the synovium and lateral retinaculum from the marked edge then proceed cutting to the inferior edge of patellar tendon. Alternatively; a hook knife, can be used to perform the retinacular release. If a sufficient release could not be established, a superolateral portal may be needed to complete the release. The dynamic tracking is rechecked now at 30°—40° of flexion and this should show balanced engagement. Deflation of tourniquet is done and secured haemostasis is carried out and a drain may be inserted. The portals are closed by 2-0 Nylon suture Allgower manner. Padding over the suprapatellar pouch is applied to minimize bleeding from geniculate vessels.[12] Patients were mobilized soon after the surgery and encouraged to walk as soon as they could, and move around, with restriction of stairs climbing, sitting cross-legged or squatting for the first month. Closed-chain strengthening exercise was started on the early post-operative period focusing on vastus medialis obliqus, and patients were followed up after 2 weeks for stich removal and exclusion of infection, and three months after surgery to reassess the Lysholm Score. The patients were instructed to contact the researcher in case of any adverse events like leg pain or discharge from the wound. Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 22). Numerical variables were presented and summarized as means and standard deviations. Categorical variables were summarized by calculating the frequencies and percentages. McNemar test was used to compare the proportions before and after the operation for the same sample. The McNemar-Bowker test was also used when the number of rows or columns exceeds two. Paired t test was used to compare the total Lysholm score before and after the operation. A P value of ≤ 0.05 was considered statistically significant.

Results

The total number of patients undergoing arthroscopic lateral retinacular release was 48. Their mean age ± SD was 32 ± 6.30 years as presented in Table 1. The age ranges from 19 to 46 years. The median was 32 years. The table shows that more than one third (37.5%) of the patients aged ≥35 years, and two thirds of the sample were females. The right knee affected in 50% of the patients and the left knee was affected in the rest of the studied sample.

Table 2 shows that 25 patients (52.1%) had limping before the operation, while only 1 patient (2.1%) had limping after the operation ($P < 0.001$). Results showed also that all the patients were not using canes, whether before or after the operation.

It is evident in Table 3, that 4 patients had occasional locking before the operation, 2 of them (50%) didn't improve and the rest (50%) had catching sensation, but no locking after the operation. The table shows that 36 patients had catching sensation but no locking before the operation, only 6 (16.7%) improved after the operation where there was no locking or catching sensation ($P = 0.018$).

Table 4 shows that 5 patients (10.4%) had frequent giving way during athletics or other severe exertion, and 2 patients (4.2%) had frequent giving way after the operation, but the difference was not significant ($P = 0.082$).

It is evident in Table 5 that 11 patients (22.9%) had constant pain before the operation, while no patient had constant pain after the operation. The rest of the patients (37 patients) had marked pain after walking before the operation, 7 of them (18.9%) had no pain after the operation, and the rest (81.1%) had inconstant and slight pain during severe exertion.

Table 6 shows that 3 patients had constant swelling before the operation; after the operation, 2 of them improved. The table shows that 18 patients had swelling on ordinary exertion, but after the operation 6 of them (33.3%) had swelling on severe exertion (improved). The table shows also that only two patients (13.3%) of the 15 patients with severe exertion improved after the operation (had no swelling). The differences between the readings before and after the operation were significant ($P = 0.040$).

Table 7 showed that climbing the stairs was impossible for 15 patients before the operation. After the operation, 10 (66.7%) of them had no problem, and 5 (33.3%) had slight impairment. So all the patients had been improved regarding climbing the stairs (so the P value could not be calculated).

Table 8 shows that there was upgrading in the squatting ability after the operation compared with the status before the operation (P value can't be calculated because of the difference in the categories before and after the operation). It is evident that the squatting was impossible for 25 patients (52.1%) before the operation. All of those patients improved after the operation (80% had slight impairment, 16% had no problem, and 4% had no problem if the squatting is less than 90 degrees).

Discussion

Anterior knee pain related to lateral patellar compression syndrome is a common and challenging problem to treat, particularly in patients who have persistent pain despite non operative treatment. Our results demonstrate that a lateral retinacular release with highly selected patient has potential to provide significant improvement in overall function of the affected knee and result in a high level patient satisfaction. Also Shea;[13]

Table 1. **Basic characteristics of the studied sample**

Age (years)	No.	(%)
< 25	5	(10.4)
25–29	11	(22.9)
30–34	14	(29.2)
≥35	18	(37.5)
Mean (± SD)	32	(± 6.30)
Gender		
Male	16	(33.3)
Female	32	(66.7)
Side		
Right	24	(50.0)
Left	24	(50.0)
Total	48	(100.0)

Table 2. **Limping before and after the operation**

	Limp after			
Limp before	**Slight or periodic**	**None**	**Total**	***P*†† **
Slight or periodic	1	24	25	
	(4.0%)*	(96.0%)*	(100.0%)*	
	(100.0%)†	(51.1%)†	(52.1%)†	
None	0	23	23	
	(0.0%)*	(100.0%)*	(100.0%)*	
	(0.0%)†	(48.9%)†	(47.9%)†	< 0.001
Total	1	47	48	
	(2.1%)*	(97.9%)*	(100.0%)*	
	(100.0%)†	(100.0%)†	(100.0%)†	

*Row %. †Column %. ††By McNemar test.

Table 3. **Locking before and after the operation**

	Locking after the operation				
Locking before the operation	**Locking: occasionally**	**Catching sensation but no locking**	**No locking/catching sensations**	**Total**	***P*†† **
Locking: occasionally	2	2	0	4	
	(50.0%)*	(50.0%)*	(0.0%)*	(100.0%)*	
	(100.0%)†	(6.3%)†	(0.0%)†	(8.3%)†	
Catching sensation but no locking	0	30	6	36	
	(0.0%)*	(83.3%)*	(16.7%)*	(100.0%)*	
	(0.0%)†	(93.8%)†	(42.9%)†	(75.0%)†	
No locking/catching sensations	0	0	8	8	
	(0.0%)*	(0.0%)*	(100.0%)*	100.0%)*	
	(0.0%)†	(0.0%)†	(57.1%)†	(16.7%)†	0.018
Total	2	32	14	48	
	(4.2%)*	(66.7%)*	(29.2%)*	(100.0%)*	
	(100.0%)†	(100.0%)†	(100.0%)†	(100.0%)†	

*Row %. †Column %. ††By McNemar-Bowker Test.

Table 4. **Giving way before and after the operation**

	Giving way after the operation				
Giving way before the operation	**Frequently during athletics or other severe exertion**	**Rarely during athletics or other severe exertion**	**Never giving-way**	**Total**	***P*†††**
Frequently during athletics or other severe exertion	2 (40.0%)* (100.0%)†	3 (60.0%)* (11.5%)†	0 (0.0%)* (0.0%)†	5 (100.0%)* (10.4%)†	
Rarely during athletics or other severe exertion	0 (0.0%)* (0.0%)†	23 (92.0%)* (88.5%)†	2 (8.0%)* (10.0%)†	25 (100.0%)* (52.1%)†	
Never giving-way	0 (0.0%)* (0.0%)†	0 (0.0%)* (0.0%)†	18 (100.0%)* (90.0%)†	18 (100.0%)* (37.5%)†	0.082
Total	2 (4.2%)* (100.0%)†	26 (54.2%)* (100.0%)†	20 ((41.7%)* (100.0%)†	48 (100.0%)* (100.0%)†	

*Row %. †Column %. ††By McNemar-Bowker Test.

Table 5. **Pain before and after the operation**

	Pain after the operation			
Pain before the operation	**Inconstant and slight during severe exertion**	**None**	**Total**	***P***
Constant	11 (100.0%)* (26.8%)†	0 (0.0%)* (0.0%)†	11 (100.0%)* (22.9%)†	
Marked on or after walking for 2 km	30 (81.1%)* (73.2%)†	7 (18.9%)* (100.0%)†	37 (100.0%)* (77.1%)†	NA
Total	41 (85.4%)* (100.0%)†	7 (14.6%)* (100.0%)†	48 (100.0%)* (100.0%)†	

*Row %. †Column %. NA = Not applicable.

Table 6. **Swelling before and after the operation**

	Swelling after the operation				
Swelling before the operation	**Constant**	**On ordinary exertion**	**On severe exertion**	**None**	**Total**	
Constant	1 (33.3%)* (100.0%)†	1 (33.3%)* (7.7%)†	1 (33.3%)* (5.0%)†	0 (0.0%)* (0.0%)†	3 (100.0%)* (6.3%)†	
On ordinary exertion	0 (0.0%)* (0.0%)†	12 (66.7%)* (92.3%)†	6 (33.3%)* (30.0%)†	0 (0.0%)* (0.0%)†	18 (100.0%)* (37.5%)†	
On severe exertion	0 (0.0%)* (0.0%)†	0 (0.0%)* (0.0%)†	13 (86.7%)* (65.0%)†	2 (13.3%)* (14.3%)†	15 (100.0%)* (31.3%)†	
None	0 (0.0%)* (0.0%)†	0 (0.0%)* (0.0%)†	0 (0.0%)* (0.0%)†	12 (100.0%)* (85.7%)†	12 (100.0%)* (25.0%)†	0.040
Total	1 (2.1%)* (100.0%)†	13 (27.1%)* (100.0%)†	20 (41.7%)* (100.0%)†	14 (29.2%)* (100.0%)†	48 (100.0%)* (100.0%)†	

*Row %. †Column %. ††By McNemar-Bowker Test.

Table 7. **Climbing stair before and after the operation**

	Climbing stairs after the operation		
Climbing stairs before	**Slightly impaired**	**No problem**	**Total**
Impossible	5	10	15
	(33.3%)*	(66.7%)*	(100.0%)*
	(45.5%)†	(27.0%)†	(31.3%)†
One step at a time	6	27	33
	(18.2%)*	(81.8%)*	(100.0%)*
	(54.5%)†	(73.0%)†	(68.8%)†
Total	11	37	48
	(22.9%)*	(77.1%)*	(100.0%)*
	(100.0%)†	(100.0%)†	(100.0%)†

Note: The *P* value was not calculated because of the difference between the before and after operation categories.

Table 8. **Squatting before and after the operation**

	Squatting after the operation				
Squatting before	**Not beyond 90 degrees**	**Slightly impaired**	**No problems**	**Total**	
Impossible	1	20	4	25	
	(4.0%)*	(80.0%)*	(16.0%)*	(100.0%)*	
	(100.0%)†	(62.5%)†	(26.7%)†	(52.1%)†	
Not beyond 90 degrees	0	12	10	22	
	(0.0%)*	(54.5%)*	(45.5%)*	(100.0%)*	
	(0.0%)†	(37.5%)†	(66.7%)†	(45.8%)†	
Slightly impaired	0	0	1	1	
	(0.0%)*	(0.0%)*	(100.0%)*	(100.0%)*	
	(0.0%)†	(0.0%)†	(6.7%)†	(2.1%)†	NA
Total	1	32	15	48	
	(2.1%)*	(66.7%)*	(31.3%)*	(100.0%)*	
	(100.0%)†	(100.0%)†	(100.0%)†	(100.0%)†	

NA: Not applicable. *Note*: All the differences were significant ($P < 0.05$) except for the cane use.

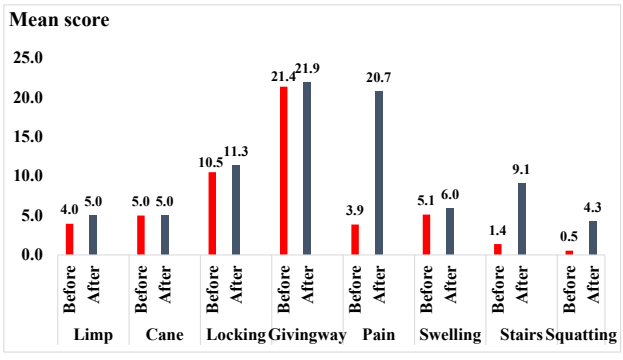

Fig. 1 **Mean score of each section, before and after the operation.**

reported 90% good and excellent results as long as the preoperative examination revealed a tight lateral retinaculum in the absence of medial facet wears. Osman et al.[14] showed a significant improvement in the Lysholm score of 29~31 points between pre- and post-operative values Fithian[15] demonstrated the strong consensus among experts that the reduction of the lateral tension, which leads to a relief of the surface pressure together with the denervation, Is the mechanism by which the lateral release relieves pain. It particularly improves patients' ability to kneel and climb stairs giving a high satisfaction rate, the grade of wear of patellofemoral cartilage being the most important predictor. In our study, a total of 48 patients of lateral patellar compression syndrome were undergoing arthroscopic release of patellar retinaculum through standard ports and showed significant improvement in the functional outcomes of the knee according to the Lysholm knee scoring scale and classified accordingly into 6.3% (3 patients) excellent, 39.6% (19 patients) good, 54.2% (26 patients) fair and no cases recorded with poor result, the mean Lysholm score pre-operatively was 51.17 (+7.2), while post-operatively the mean became 83.15 (+7.28). Panni[16] showed comparable results with pre-operative Lysholm score of 51.1(+9.3) and post-operative Lysholm score of 81.9 (+11.2) by looking at 5- to 12-year follow-up after lateral release. They wanted to know if good early results deteriorated over time and if patients with patellar tilt fared differently than patients with patellar instability. They found that the good results in patients with

patellar tilt held up over time, but those in patients with instability deteriorated. We also noticed in our study that the greatest improvement was in three main categories: Pain, Squatting and Stairs climbing. Apart from cane use; all other categories improved significantly but to a much lesser extent Gerbino[17] founds that in the 5- to 22-year follow-up range, adolescents and young adults who have had lateral retinacular release continue to do well. O'Neil[18] provides us with strong evidence that a well-defined patient population that has isolated anterior knee pain with documented lateral retinacular tightness without a history of patellar dislocation or subluxation can successfully be treated with open or arthroscopic lateral release. His study showed that the overall outcome of these procedures is very good with over 90% of patients in either group reporting return to their respective athletic activities. Lattermann and Zakariyah[19,20] observed that the isolated procedure yielded 76% good results when studies were compiled.

Conclusion

Arthroscopic lateral retinacular release for highly selected patients with lateral patellar compression syndrome who failed to respond to proper physiotherapy and have no associated malalignment or instability is very effective technique in eliminating symptoms and disabilities especially for pain during using stair, squatting and prolong flexion sitting with flexed knee.

Abbreviations

TT–TG: tibial tuberosity–trochlear groove distance.
VLO: vastus lateralis obliqus.
VMO: vastus medialis obliqus.
SD: standard deviation.
SPSS: statistical package for social science.

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