

The Effects of Surgical Interventions Compared to Conservative Treatment in Active Individuals with First Time Patellar Dislocation and Recurrent Instability: A Critically Appraised Topic

LIBERTY
UNIVERSITY

Jacob Heeringa, Dr. Robert Bonser, Dr. John Coots

Abstract and/or Background

Clinical Scenario: Recurrent Patellofemoral Instability (RPI) resulting from acute Lateral Patellofemoral Dislocation (LPD) is a common and serious occurrence in athletic individuals who traditionally treat their injury through conservative, non-operative, methods. However, surgical interventions such as Medial Patellofemoral Ligament Reconstruction (MPFL-R) have shown promising results regarding patient LPD recurrence rates, knee function, and overall quality of life (QOL). Currently there is much debate on which treatment is significantly better at treating RPI and more research is required to assist healthcare providers in selecting high quality treatment for their patients with RPI and first time LPD. **Focused Clinical Question:** Within an active population, what are the effects of performing surgical intervention compared to conservative management of RPI following first time acute LPD? **Summary of Key Findings:** All the authors in the included studies agreed that MPFL-R or similar procedures show significant reduction in re-dislocation of patients with RPI. However, not all the authors agreed that MPFL-R had any significant effect on patient reported knee function, quality of life, or pain.¹⁻³ Overall, surgical, or conservative treatment of RPI is shown to improve patient knee function and quality of life over time; However, re-dislocation is much more common among patients who conservatively treat their RPI.¹⁻³ **Clinical Bottom Line:** Evidence suggests MPFL-R and conservative treatment of RPI resulting from acute LPD is appropriate for restoring knee function and quality of life over time.¹⁻³ Treatment utilizing MPFL-R has been shown to reduce the incidence of recurrent LPD compared to conservative treatment.¹⁻³ **Strength of Recommendation:** Grade B evidence⁴ shows moderate statistical support for the use of MPFL-R over conservative treatment of RPI to decrease recurrent LPD and improve knee function.^{1,2}

Keywords: Patellofemoral dislocation, patellofemoral subluxation, recurrent patellofemoral instability, conservative management, non-operative management, surgical intervention, adolescents, pediatrics, knee function, quality of life, pain, re-dislocation

Clinical Scenario And Focused Research Question

Clinical Scenario: Lateral patellar dislocation (LPD) is a common and serious knee injury that can considerably reduce knee function, quality of life, and cause chronic knee pain in patients long after primary injury.³ LPD affects 5.8 per 100,000 active individuals on a yearly basis with 40% individuals who treat non-operatively likely to recurrent patellofemoral instability (RPI).⁵ Furthermore, 17-42% of patients who undergo conservative treatment will experience recurrent patellofemoral dislocations which puts them at greater risk for RPI.⁶ Current literature shows that females are on average at higher risk of RPI (104 in 100,000 yearly) and that 55% of patients who experience patellar dislocation do not return to sport.^{1,5} Current literature also shows that LPD causes signs and symptoms, loss in knee function, and reduction in quality of life similar to that of an ACL rupture; However, patients with LPD often wait 25 months longer to undergo surgical procedure compared to patients with ACL ruptures.⁶ The treatment of first time LPD is currently debated with multiple authors suggesting medial patellofemoral ligament reconstruction (MPFL-R) is significantly superior or similar to conservative treatment.⁷ Therefore, the purpose of this paper is to determine the effects of surgical intervention (via MPFL-R) on RPI as a result of acute LPD in active individuals.

Focused Clinical Question: Within an active population, what are the effects of performing surgical intervention compared to the conservative management of RPI following first time acute LPD?

Search Strategy/Summary

A computerized search was completed in November 2023 (Figure 1)

Terms used to guide search strategy:

- Patient/Client Group: Recurrent patellar instability, lateral patellar dislocation
- Intervention: Operative treatment, surgical treatment
- Comparison: Non-operative, conservative management, conservative treatment
- Outcome: Re-dislocation rate, knee function, quality of life, PROMs

Sources of Evidence Searched

- Medline Ultimate
- ProQuest
- Cochrane Library
- PubMed Central

Inclusion and Exclusion Criteria

- Inclusion**
- Compared MPFL-R or similar procedures to conservative treatment of RPI
 - Written within the last 15 years
 - Adolescent aged subjects who have prior history of being active
 - Outcome measures assessing patellar re-dislocation rate and PROM's regarding participant knee function
- Exclusion**
- Systematic reviews
 - Meta analysis
 - Outcome measures that fall outside of measures listed in inclusion criteria
 - Patients who are not active or advanced in age

Results of Search

- The literature search identified 89 studies. Of the 89 studies, 4 records were excluded as duplicate studies, 81 studies were excluded based on title or abstract, 1 study was excluded based on being an ongoing clinical trial.
- Overall, three relevant studies were located using these search terms (Table 1). The validity of the selected studies was determined using the PEDro scale (Tables 2 and 3).

Table 1 Summary of Study Designs of Articles Retrieved

Level of Evidence	Study Design	Number Located	Reference
I b	Prospective Randomized Control Trial (> 85% Follow-up)	2	Straume-Naesheim et. al. ³ Bitar et. al. ²
II b	Prospective Randomized Control Trial (< 85% Follow-up)	1	Regaldo et. al. ¹

	Regaldo et. al.	Straume-Naesheim et. al.	Bitar et. al.
Study Design	Prospective Randomized Control Trial	Randomized Control Trial	Prospective Randomized Control Trial
Participants	36 Participants, ages 8-16 years, w/acute primary patellar dislocation. Conservative treatment group n = 20. Operative treatment group n = 16. 30/36 (83%) total patients evaluated at 6 years, 6 lost to follow up. 15/20 conservative reached. 15/16 operative reached.	61 patients, ages 12-30 years, w/ recurrent lateral patellar dislocation. Conservative treatment group n = 31. MPFL-R group n = 30. Patients were without underlying conditions that cause further RLDP. 2 patients lost at follow up. 30/30 operative were reached for follow up, 29/31 for non-operative were reached for follow up. 59/61 (96%) total patients assessed at 12 months.	39 patients, mean age = 23.8 years, 41 knees, with first time primary acute patellar dislocation. Conservative treatment group (18 patients, 20 knees). MPFL-R group (21 patients, 21 knees). No patients lost to follow up at 2 years.
Interventions Investigated	<i>I.CON* group:</i> 1-2 visits to physiotherapy every month focusing on restoring full ROM and strengthening the quadriceps muscles. Physiotherapy took place at least 3 weeks and patients would receive written take home exercises. Patients utilized a lateral patellar support brace for at least 6 weeks. Follow up occurred at 3, 6, 12, and 24 months. At 36 months and 72 months a functional assessment and questionnaire was completed over a telephone interview. <i>2. Operative group:</i> Participants with type I, II, and III Fulkerson classifications received a LRR procedure (n = 3). Participants with type II, III, and IV Fulkerson classifications underwent a modified RG procedure (n = 16). Operative participants underwent the same physiotherapy schedule, bracing, and evaluation schedule as the non-operative group.	<i>I.CON* Group:</i> Conservative treatment of lateral patellar dislocation. Participants received physiotherapy from a physiotherapist and were given home exercise programs and further referral to an external physiotherapist for follow up. Training programs focused on strengthening of the VMO, hamstring stretching exercises, and restoration of NMC of the knee. A patellar brace or Mc Connell tape was used for the 1 st year during participant high risk situations. <i>2. MPFL Reconstruction Group:</i> The participants in this group were able to bear their weight on the same day as their procedure. Participants were to practice passive range of motion up to 90 degrees of flexion and perform straight leg raises with quadriceps contraction. After 8 weeks, the participants were instructed to perform the same activities as the control group.	<i>I.CON* group:</i> (n = 18) Conservative treatment of primary acute patellar dislocation. Patients used an extension brace for 3 weeks and then underwent physiotherapy to restore range of motion and increase quadriceps strength. Modalities such as cryotherapy, electrostimulation, and analgesia were used during the patient's initial 3 weeks. Patients would periodically visit the orthopedist to receive passive mobilization of the knee. After 3 weeks, the patients were allowed to weight bear and their range of motion exercises increased. Patients were also allowed to exercise on a stationary bike without load. The patients progressed from proprioceptive and closed chain kinetic exercises to open kinetic exercises to return patients to sport level activity in a 16-24-week timeframe. <i>2. MPFL Reconstruction Group:</i> (n = 21) The MPFL-R group had an arthroscopy performed to diagnose and treat any possible cartilage injuries. After the MPFL-R was completed, the patients were able to begin rehabilitation after their first follow up. Patients in this group were to wear a knee immobilizer for 3 weeks but were allowed to bear weight immediately after surgery. Patients in this group performed exercises and progressed similarly to the control but were expected to return to sport level activity within 10-12 weeks.
Outcome Measures	1. Patellar Re-dislocation Rate 2. Knee Functionality Recorded Through PROM's	1. Patellar instability at 1 year 2. Knee function, pain, quality of life, and dislocation recurrence.	1. Persistent patellar instability 2. Knee function, pain, patient quality of life, and dislocation recurrences via Kujala Questionnaire
Main Findings	At 3 and 6 years, patellar re-dislocation was significantly higher for the non-operative group than the operative group. 3-year re-dislocation rates (35% non-operative, 7/20); (0%, 0/16 operative). 6-year re-dislocation rates (73%, 11/15 non-operative); (33%, 5/15 operative). p = 0.02. There was no significant difference between the operative and non-operative groups in terms of reported knee function at 6 years. There were only a few individuals who reported poor knee function and procedure dissatisfaction at 6 years. Non-operative (27%, 4/15). Operative (13%, 2/15).	41.9% (13/31) participants of the control group reported persistent patellar instability compared to the 6.7% (2/30) in the MPFL-R group. The authors found no statistical difference between the groups regarding physical activity or participants at base line or during follow up. The authors also found no statistical difference when assessing participant quality of life and knee function at 12 months.	The mean Kujala score between the MPFL-R group (88.9/100) were significantly higher than the conservative group (70.8/100) (p=.001). 71.43% of the surgical group scored as "good or excellent" on the Kujala survey. 25% of the conservative group scored as "good or excellent" on their Kujala survey. The authors found that the conservative group had a patellofemoral re-dislocation of 35% at 2 years. The surgical group reported a 0% re-dislocation rate over 2 years.
Level of Evidence	II b	I b	I b
Validity Score	PEDro 5/10	PEDro 7/10	PEDro 6/10
Conclusion	Overall, the authors concluded that both operative and non-operative treatments for acute primary patellar dislocation are reasonable for improving patient knee function over a 6-year period. Clinically significant findings of this study show that re-dislocation rate for patients who undergo surgery are less likely to experience patellar re-dislocation at 3 and 6 years than their non-operative counterparts.	Overall, the authors concluded that recurrent patellar instability is 6 times more likely to occur in individuals who undergo conservative treatment only. Though recurrent instability was more likely with conservative treatment, the authors found that knee function improvement was like that of the operative group.	The authors concluded that treatment of 1 st time traumatic patellar dislocation w/MPFL-R produced better results regarding dislocation recurrence and PROMs compared to the conservative treatment group.

Table 2 Characteristics of Included Studies

Abbreviations: CON, control; LRR, lateral retinacular release; RG, Roux-Gold-Waithe procedure; Vastus Medialis Oblique muscle, VMO; MPFL, Medial Patellofemoral Ligament; Medial Patellofemoral Ligament Reconstruction, MPFL-R; Patient reported outcome measure, PROMs; Physiotherapy Evidence Database.

	Regaldo et. al.	Straume-Naesheim et. al.	Bitar et. al.
1. Eligibility criteria specified (yes/no)	Yes	Yes	Yes
2. Subjects randomly allocated to groups (yes/no)	Yes	Yes	Yes
3. Allocation was concealed (yes/no)	No	Yes	No
4. Groups similar at baseline (yes/no)	Yes	Yes	Yes
5. Subjects were blinded to group (yes/no)	No	No	No
6. Therapists who administered therapy were blinded (yes/no)	No	No	No
7. Assessors were blinded (yes/no)	No	No	No
8. Minimum 85% follow-up (yes/no)	No	Yes	Yes
9. Intent to treat analysis for at least 1 key variable (yes/no)	Yes	Yes	Yes
10. Results of statistical analysis between groups reported (yes/no)	Yes	Yes	Yes
11. Point measurements and variability reported (yes/no)	Yes	Yes	Yes
Overall Score (out of 10)	5/10	7/10	6/10

Table 3 Results of PEDro Scale for Each Article

Note: Item 1 was not included in overall score

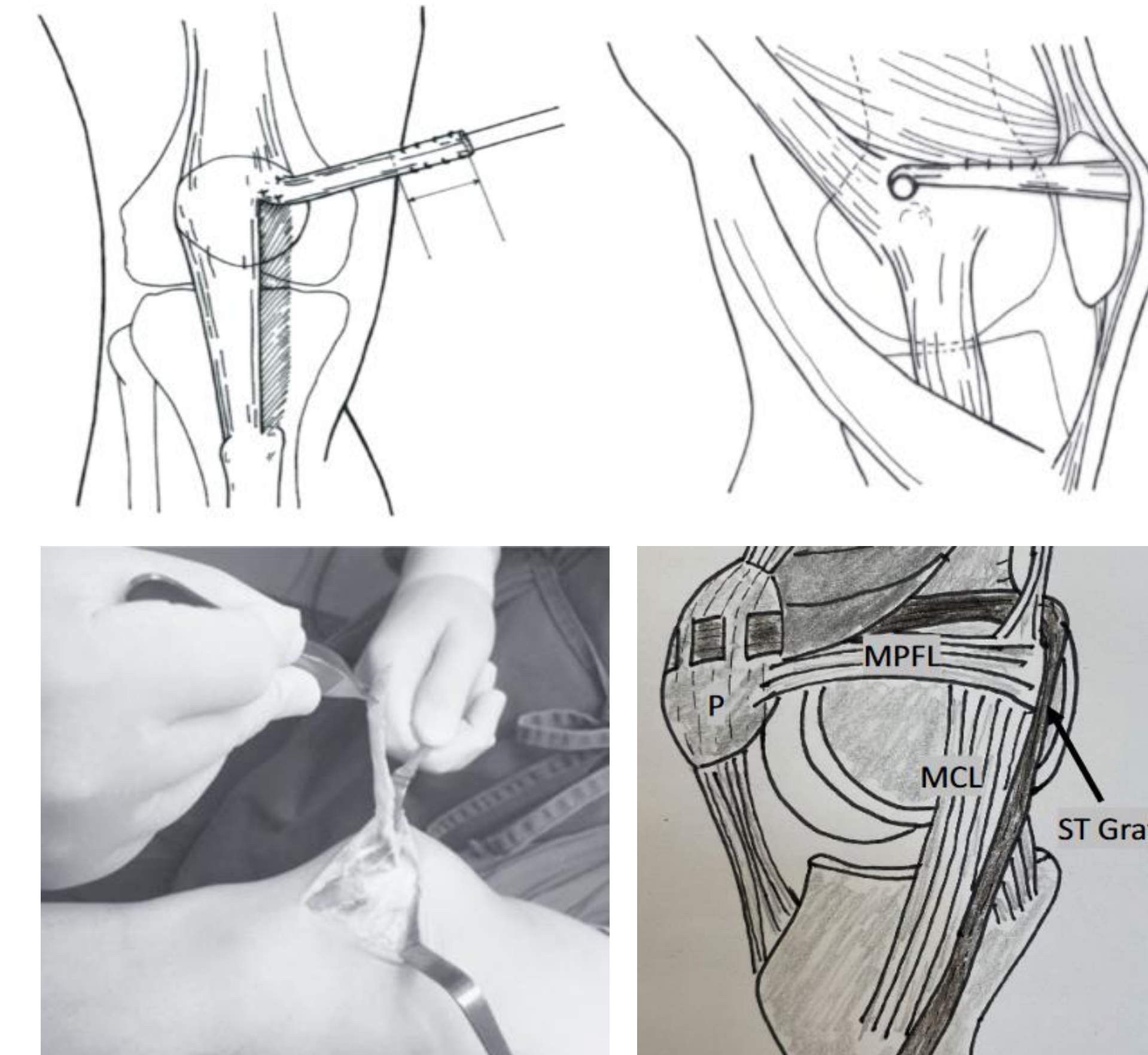


Image 1: Depiction of MPFL-R utilizing the patellar tendon (top row and bottom left) and the semitendinosus tendon (bottom right).^{2,3}

ANTERIOR KNEE PAIN (Sheet code: _____)

Name: _____ Date: _____

Age: _____

Knee: L/R

Duration of symptoms: _____ years _____ months

For each question, circle the latest choice (letter), which corresponds to your knee symptoms.

1. Limp (a) None (5) (b) Slight or periodical (3) (c) Constant (0)	8. Prolonged sitting with the knees flexed (a) No difficulty (10) (b) Pain after exercise (8) (c) Constant pain (6) (d) Pain forces to extend knees temporarily (4) (e) Unable (0)
2. Support (a) Full support without pain (5) (b) Painful (3) (c) Weight bearing impossible (0)	9. Pain (a) None (10) (b) Slight and occasional (8) (c) Interferes with sleep (6) (d) Occasionally severe (3) (e) Constant and severe (0)
3. Walking (a) Unlimited (5) (b) More than 2 km (3) (c) 1-2 km (2) (d) Unable (0)	10. Swelling (a) None (10) (b) After severe exertion (8) (c) After daily activities (6) (d) Every evening (4) (e) Constant (0)
4. Stairs (a) No difficulty (10) (b) Slight pain when descending (8) (c) Pain both when descending and ascending (5) (d) Unable (0)	11. Abnormal painful kneecap (patellar) movements (subluxations) (a) None (10) (b) Occasionally in sports activities (6) (c) Occasionally in daily activities (4) (d) At least one documented dislocation (2) (e) More than two dislocations (0)
5. Squatting (a) No difficulty (5) (b) Repeated squatting painful (4) (c) Painful each time (3) (d) Possible with partial weight bearing (2) (e) Unable (0)	12. Atrophy of thigh (a) None (5) (b) Slight (3) (c) Severe (0)
6. Running (a) No difficulty (10) (b) Pain after more than 2 km (8) (c) Slight pain from start (6) (d) Severe pain (3) (e) Unable (0)	13. Flexion deficiency (a) None (5) (b) Slight (3) (c) Severe (0)
7. Jumping (a) No difficulty (10) (b) Slight difficulty (7) (c) Constant pain (2) (d) Unable (0)	

Image 2: The Kujala Questionnaire¹¹

Results and Discussion

Results: The included randomized control trials (RCT) met the inclusion and exclusion criteria (Table 1). All of the studies compared surgical intervention, specifically medial patellofemoral ligament reconstruction (MPFL-R), with conservative management and physiotherapy of RPI. All of the studies measured patellar re-dislocation and patient knee function, quality of life, and pain utilizing patient reported outcome measures (PROM). Regaldo et. al. found that patellar re-dislocation was significantly higher for non-operative treatment at 3 (35% conservative, 0% operative) and 6 years (73% conservative, 33% operative) with no significant difference in patient reported knee function and quality of life.¹ Straume-Naesheim et. al. found that patellar instability (recurrence of dislocation or subluxation) continued in 41.9% of the conservative treatment group and 6.7% of the surgical group at a 1-year follow-up with no significant difference in patient reported knee function and quality of life.² Bitar et. al. found that patellar instability continued significantly within the conservative treatment group compared to the surgical group. Bitar et. al. also found significant difference in PROMs regarding knee function and quality of life between conservative and surgical treatment groups at 2 years (conservative 70.8/100 avg. Kujala score, 25% reported good or excellent knee function; surgical 88.9/100 Kujala score, 71.43% reported good or excellent knee function).³ Overall, the authors agreed that surgical intervention, such as MPFL-R, may significantly reduce chances of LPD and regardless of treatment, knee function will improve.¹⁻³

Discussion: The differences in findings that are observed between our included studies could be the result of variations among the material and methods of the study. For example, Bitar et. al. and Regaldo et. al. both performed MPFL-R with the patient's patellar tendon while Straume-Naesheim et. al. utilized part of the patient's semitendinosus tendon when performing MPFL-R.¹⁻³ Even between Bitar et. al. and Regaldo et. al., Bitar et. al. performed a lateral retinacular release on patients in conjunction with MPFL-R while Regaldo et. al. only performed MPFL-R.^{1,2} There were also differences in the conservative treatment given to the control and surgical groups among all of the studies. The most apparent difference in conservative treatment could be seen in Bitar et. al.'s study as patients were allowed to use modalities and received passive knee mobilization regularly while the other studies did not prescribe these treatments to their patients.¹⁻³ More research should be conducted regarding the efficacy between the differing treatment methods as comparison alone between our studies cannot sufficiently explain the differences in outcomes between the studies.

Compared to LPD and RPI: Anterior Cruciate Ligament (ACL) ruptures, within youth athletic populations, have historically been managed through non-operative means as surgical reconstruction carries the risk of transphyseal damage.¹⁰ However, 50% of active youth who treat their ACL rupture non-operatively dropout of sports due to persistent knee instability with around 94% unable to return to pre-injury activity levels.¹⁰ Several studies have shown that return to sports among athletes who underwent ACL reconstruction improved from 50% to 74-100% of patients.¹⁰ Patients experiencing RPI as a result of LPD experience pain and decreases in QOL and knee function equal to or more severe than patients with ACL ruptures.⁶ Furthermore, LPD causes 55% of patients to retire from sport with a 40% chance of developing RPI when choosing to treat their injury conservatively.⁶ It has been evident throughout this critically appraised topic that MPFL-R has been shown to improve patient RPI by diminishing LPD recurrence and improving perceived patient knee function and quality life.¹⁻³ Current literature outside of the studies included found that 84% of youth patients who undergo MPFL-R return to sports with low incidence of RPI and LPD which is similar to the return rate for youth patients who undergo ACL reconstruction.^{6,10}

Future Research

1. Research if there is a significant difference between the graft selection for MPFL-R and rates of LPD and patient reported knee function and quality of life
2. Research if use of modalities significantly influence patient reported knee function and quality of life

References

1. Regaldo G, Lintula H, Kokki H, Kröger H, Väättäinen U, Eskelinen M. Six-year outcome after non-surgical versus surgical treatment of acute primary patellar dislocation in adolescents: a prospective randomized trial. *Knee Surg Sports Traumatol Arthrosc.* 2016;24(1):6-11. doi:10.1007/s00167-014-3271-3
2. Bitar AC, D'Elia CO, Demange MK, Viegas AC, Camanho GL. RANDOMIZED PROSPECTIVE STUDY ON TRAUMATIC PATELLAR DISLOCATION: CONSERVATIVE TREATMENT VERSUS RECONSTRUCTION OF THE MEDIAL PATELLOFEMORAL LIGAMENT USING THE PATELLAR TENDON, WITH A MINIMUM OF TWO YEARS OF FOLLOW-UP. *Rev Bras Ortop.* 2015;46(6):675-683. doi:10.1016/S2255-4971(15)30324-4
3. Straume-Naesheim TM, Randsborg PH, Mikaelson JR, Årøen A. Medial patellofemoral ligament reconstruction is superior to active rehabilitation in protecting against further patella dislocations. *Knee Surg Sports Traumatol Arthrosc.* 2022;30(10):3428-3437. doi:10.1007/s00167-022-06934-3
4. Ebell MH, Siwek J, Weiss BD, et al. Strength of Recommendation Taxonomy (SORT): A Patient-Centered Approach to Grading Evidence in the Medical Literature. *J Am Board Fam Pract.* 2004;17(1):59-67. doi:10.3122/jabfm.17.1.59
5. Garrett BR. Patella dislocations and patellofemoral instability: a current concepts review. *South Afr Orthop J.* 2021;20(3):167-177.
6. Straume-Naesheim TM, Randsborg PH, Mikaelson JR, et al. Recurrent lateral patella dislocation affects knee function as much as ACL deficiency - however patients wait five times longer for treatment. *BMC Musculoskelet Disord.* 2019;20(1):318. doi:10.1186/s12891-019-2689-7
7. Liebensteiner M, Keiler A, El Attar R, et al. Conservative versus tailored surgical treatment in patients with first time lateral patella dislocation: a randomized-controlled trial. *J Orthop Surg.* 2021;16:378. doi:10.1186/s13018-021-02513-3
8. PEDro scale - PEDro. Published June 5, 2016. Accessed November 8, 2023. <https://pedro.org.au/english/resources/pedro-sc>
9. McCarthy MA, Bollier MJ. Medial Patella Subluxation: Diagnosis and Treatment. *Iowa Orthop J.* 2015;35:26-33.
10. Fabricant PD, Lakomkin N, Cruz AI, Spitzer E, Marx RG. ACL reconstruction in youth athletes results in an improved rate of return to athletic activity when compared with non-operative treatment: a systematic review of the literature. *J ISAKOS.* 2016;1(2):62-69. doi:10.1136/jisakos-2015-000013
11. Kujala UM, Jaakkola LH, Koskinen SK, Taimela S, Hurme M, Nelimarkka O. Scoring of patellofemoral disorders. *Arthroscopy* 1993, 9:159-163.