RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2024.2023-125
Cyprus J Med Sci 2024;9(4):236-240

Comparison of Primary Repair Techniques for MPFL Ruptures: Is Anchor Use Essential?

Ortaç Güran, Batuhan Gencer, Salih Ender İbaç, Hakan Eşkara, Tayfun Aman

Clinic of Orthopedics and Traumatology, University of Health Sciences Türkiye, Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital, İstanbul, Türkiye

Abstract

BACKGROUND/AIMS: To compare the effects of suture-anchored and unanchored repairs on clinical outcomes in primary medial patellofemoral ligament (MPFL) repair techniques.

MATERIALS AND METHODS: A total of 16 patients who underwent surgery between 2021 and 2023 were retrospectively analyzed. Postoperative assessments included range of motion, apprehension tests, pain with squatting, Tegner-Lysholm Knee Scoring Scale, Kujala Anterior Knee Pain Score, recurrence, Q Angle, Sulcus angle and Insall-Salvati Index.

RESULTS: Among the 16 patients assessed, eight patients (50%) underwent primary repair with a suture anchor, while the remaining eight patients (50%) underwent repair without a suture anchor. The range of motion of the lower extremity was symmetrical to that of the contralateral side at the last follow-up in all patients. No implant-related complications were observed in any patient. Statistical analysis showed no significant differences between the two groups regarding functional scores, physical examination findings, radiological findings, and recurrence ($p>0.05$).

CONCLUSION: Primary repair of the MPFL with or without suturing can effectively prevent the recurrence of patellar dislocation and instability and provide satisfactory clinical and radiological outcomes. Although the successful primary repair results question the necessity of anchor use, anchor use should not be avoided in primary repair cases if necessary.

Keywords: Medial patella-femoral ligament, patellar redislocation, primary repair, suture anchor

INTRODUCTION

Patellar dislocation is a relatively common injury accounting for 3.3% of all knee injuries.[1] It most commonly occurs in 2nd-3rd decades of life, and its incidence rate varies from 7 to 77 per 100,000 person-years in various studies.[2-4] After proper treatment, recurrence rates after primary dislocation can be relatively high, reaching up to 40%.[5]

The injury mechanism is usually a non-contact twisting injury with the knee extended and the foot externally rotated. Risk factors for patellar dislocation include malalignment syndrome, increased Q angle (femoral anteversion, genu valgum and external tibial torsion), patella alta, trochlear, and lateral femoral dysplasia, dysplastic vastus medialis obliquus muscle and iliotibial band, and excessive tension in the vastus lateralis. Osteochondral lesions commonly develop after patellar dislocations.[1-5]

In the treatment of patellar dislocations, conservative management is mostly preferred for initial dislocations, whereas primary repair of the medial patellofemoral ligament (MPFL) is preferred in the presence of bony fractures. On the other hand, Le et al.[6] reported that acute repair of first-time MPFL ruptures had clinical results similar to those of conservative treatment, with a lower redislocation rate.

To cite this article: Güran O, Gencer B, İbaç SE, Eşkara H, Aman T. Comparison of Primary Repair Techniques for MPFL Ruptures: Is Anchor Use Essential?. Cyprus J Med Sci. 2024;9(4):236-240

ORCID IDs of the authors: O.G. 0000-0001-6485-5807; B.G. 0000-0003-0041-7378; S.E.İ. 0000-0002-4771-8293; H.E. 0000-0001-8867-9078; T.A. 0000-0003-3448-1546.

Address for Correspondence: Batuhan Gencer
E-mail: gencer.batuhan@gmail.com
ORCID ID: orcid.org/0000-0003-0041-7378

Received: 11.12.2023
Accepted: 21.03.2024

Two main surgical techniques have been described in MPFL repair; primary suturing with and without the use of a suture anchor. In 2008, Christiansen et al.[7] reported the results of primary MPFL repair using suture anchors. Results showed that primary repair with suture anchors did not change the redislocation rate or functional outcomes compared to conservative treatment.[7] On the other hand, to our knowledge, there is a lack of studies in the literature that compare the efficacy of the use of suture anchors (5.0 mm Excalibur Screw Anchor Titanium, Tulpar Medical Solutions®, Ankara, Türkiye) for primary MPFL repair.[8,9]

Our objective was to determine the effect of suture-anchored and unanchored repair on clinical outcomes in primary MPFL repair for patients with first-time patellar dislocations. Our hypothesis was that unless there is a clear superiority of the use of suture anchors, their use should be avoided to reduce implant burden, implant-related complications, and cost.

MATERIALS AND METHODS

Study Design and Variables

After obtaining approval from the University of Health Sciences Türkiye, Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital Ethics Committee (approval number: 94, date: 14.06.2023), all patients who underwent MPFL rupture surgery with a diagnosis of first-time patellar dislocation between 2021 and 2023 were included in this retrospective study. Patients who received alternative surgical methods, underwent reconstruction, were treated conservatively, failed to adhere to the prescribed physical therapy protocol, missed their final control and functional evaluation, and declined to participate in the study were excluded from the study. A total of 7 patients were excluded based on our criteria, and a total of 16 patients were analyzed while adhering to the specified inclusion and exclusion criteria.

Surgical Technique

Patients were operated according to the techniques described in the literature[6-9] and were grouped and compared accordingly; in group 1, the primary repair without a suture anchor group, the damaged MPFL was sutured with absorbable sutures, while in group 2, the suture anchor group, repair was performed with the help of a suture anchor (5.0 mm Excalibur Screw Anchor Titanium, Tulpar Medical Solutions®, Ankara, Türkiye) placed on the medial aspect of the patella. All surgeries were conducted by the same surgical team with similar incision lengths, and intraoperative examinations performed after primary repair of the patella were not required. Regardless of the surgical technique used, all patients underwent the same postoperative medical and physical therapy protocols.

Functional Outcomes

All patients were called to our clinic in August 2023 using the information registered in the system, and postoperative final control evaluations were completed. Assessments consisted of measurements of range of motion, apprehension tests, and existence of pain with squatting, as well as evaluations of the Tegner-Lysholm Knee Scoring Scale, Kujala Anterior Knee Pain Score, and recurrence. The Tegner-Lysholm Knee Scoring Scale is a numerical patient-reported assessment tool used to assess the outcomes of knee ligament surgery. This scale provides an objective evaluation of a patient's performance in activities of daily living and sport, under the subheadings of pain, instability, locking, swelling, limp, stair climbing, squatting, and the need for support, with scores ranging from 0 (severe disability) to 100 (minimal disability).[10] The Turkish validated version of the Kujala Anterior Knee Pain Score, which consisted of 13 questions, evaluated patients' patellofemoral function and knee stability, with scores ranging from 0 to 100.[11,12]

Radiological Outcomes

Preoperative and final control radiographs were obtained for all patients, and radiological measurements were performed on these radiographs. The Q angle, Sulcus Angle, and Insall-Salvati Index values were measured according to the literature. To determine the Q angle, we drew two lines: One from the center of the patella to the anterior superior iliac spine and another from the tibial tubercle through the center of the patella. We then measured the angle between them. The Insall-Salvati index compares the length of the patellar tendon with that of the patella. We measured the patellar tendon length as the distance between the lower patellar pole and the tuberosita tibia, while the patella length was measured as the distance between the upper and lower patellar poles. Additionally, the sulcus angle was determined by drawing two lines from the highest points of the medial and lateral condyles, which meet at the lowest point of the intercondylar groove.[10,13,14]

Statistical Analysis

Statistical analysis was performed using IBM® SPSS® version 26.0.0.0. 7. Because the number of patients is very limited, the data was assumed to be skewed distributed, and descriptive statistics were expressed using median, interquartile range and minimum-maximum values for all parameters. The percentage frequency values were used to define categorical data. For intergroup comparisons, non-parametric tests were preferred considering the skewed distribution and limited number of patients; and all numerical data were analyzed by Mann-Whitney U test, and categorical data were compared using the chi-square test. Fisher's exact test was used when the chi-square assumption was not met. Statistical significance was considered significant when the "p" value was below 0.05.

RESULTS

A total of 16 patients were analyzed, and of the 16 patients assessed, eight patients (50%) underwent primary repair with a suture anchor, while the remaining eight patients (50%) underwent repair without a suture anchor. The mean follow-up period was 16.7 months (range; 8-25 months). Statistical analysis showed no significant difference between the two groups regarding demographic characteristics ($p>0.05$) (Table 1).

The range of motion of the lower extremity was symmetrical to that of the contralateral side at the last follow-up in all patients. No implant-related complications were observed in any patient. In the primary repair group without suture anchors, only one patient (12.5%) experienced recurrent dislocation, whereas no recurrence was observed in any patient repaired with anchor ($p=0.317$). Functional scores and physical examination findings at the last follow-up did not significantly differ between the groups ($p>0.05$) (Table 2, Figure 1).

DISCUSSION

There is no consensus in the literature regarding the treatment of acute first-time patellar dislocation (APD). Various studies have emphasized the superiority of conservative treatment, MPFL primary repair and

Table 1. Demographic profile of the patients

		Primary repair (n=8)	Anchor repair, (n=8)	Total, (n=16)	p
Age		16.5 (18) (13-37)	14 (5) (9-23)	15 (5) (9-37)	0.234
Gender	Female	2 (25%)	5 (62.5%)	7 (43.8%)	0.315
	Male	6 (75%)	3 (37.5%)	9 (56.3%)	
Side	Right	3 (37.5%)	3 (37.5%)	6 (37.5%)	1,000
	Left	5 (62.5%)	5 (62.5%)	10 (62.5%)	
Follow-up period (month)		18.5 (3) (8-25)	14 (8) (10-22)	18 (8) (8-25)	0.130

N: number of the patients. P: statistical significance.

Table 2. Analyzing functional and radiological outcomes of the patients

		Primary repair, (n=8)	Anchor repair, (n=8)	Total, (n=16)	p
Range of motion	Symmetrical	8 (100%)	8 (100%)	16 (100%)	N/A
	Defective	0	0	0	
Apprehension test	Negative	7 (87.5%)	7 (87.5%)	14 (87.5%)	1,000
	Positive	1 (12.5%)	1 (12.5%)	2 (12.5%)	
Pain with squat	None	4 (50%)	6 (75%)	10 (62.5%)	0.608
	Yes	4 (50%)	2 (25%)	6 (37.5%)	
Recurrence	None	7 (87.5%)	8 (100%)	15 (93.8%)	0.317
	Yes	1 (12.5%)	0	1 (6.3%)	
The Tegner-Lysholm Knee Scoring Scale		70.5 (10) (41-82)	70.5 (56) (10-92)	70.5 (30) (10-92)	0.958
Kujala Anterior Knee Pain Score		85.5 (20) (106-140)	76 (29) (56-99)	80.5 (31) (45-100)	0.574
Q angle		8° (5) (6-14)	11° (3) (7-14)	9.5° (5) (6-14)	0.130
Sulcus angle		120° (20) (106-140)	120° (3) (113-134)	120° (15) (106-140)	0.798
Insall-Salvati Index		1.25 (0.3) (0.9-1.6)	1.25 (0.5) (0.6-1.6)	1.25 (0.4) (0.6-1.6)	0.645

N: Number of the patients. P: Statistical significance value. N/A: Not applicable.

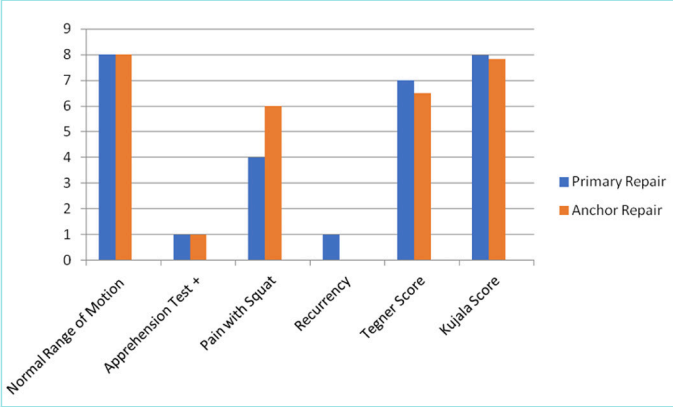

Figure 1. Graphical comparison of the functional and clinical outcomes of two techniques.

reconstruction on each other.[6-9] On the other hand, few studies have investigated the superiority of different primary repair techniques over one another. This is the most important aspect of our study. Our hypothesis was that unless a clear superiority of anchor use is established, avoiding its use will reduce implant burden, implant-related complications, and cost. The main finding of this study was that we confirmed that primary repair of MPFL achieved satisfactory results in terms of clinical, functional, and radiological outcomes, regardless of anchor use (p>0.05 for each).

Available evidence indicates that surgery is more effective than conservative treatment in reducing short-term recurrence. However, surgery is associated with worse functional outcomes in the short term. However, it appears that neither treatment maintained long-term superiority.[8,14] Moreover, previous studies have reported that MPFL reconstruction may result in significantly lower rates of redislocation and reoperation compared with primary repair and medial reefing following APD.[15] On the contrary, there was insufficient evidence to suggest that MPFL reconstruction yielded enhanced functional outcomes compared with MPFL repair and medial reefing.[6-9,14,15] With this study, with an average follow-up period of 18 months, we observed notable ameliorations in the motion range, Tegner-Lysholm Scale score, and Kujala anterior knee pain score after primary MPFL repair, with no difference between groups (p>0.05 for each). Furthermore,

no significant difference was detected in relation to recurrence among the groups (p=0.317). The similar clinical and functional results and recurrence rates in patients with anchors and those without anchors led us to question the necessity of suture anchors. As long as similar clinical and functional results are obtained, avoiding the use of implants as much as possible can prevent unnecessary implant load in patients and prevent future implant-related complications. Moreover, although an economic analysis was not performed in this study, it is obvious that not using implants is more cost effective.

Measurements of the Q angle and sulcus angle are powerful diagnostic tools for evaluating patellofemoral issues, particularly in cases of patellar instability and patellofemoral problems.[10,13,14] Additionally, patellar height plays a crucial role in knee stability, and height-related pathologies have been associated with cartilage defects and instability-related issues.[17] The Insall-Salvati Index is the most reliable method for assessing patellar height.[17] Our study evaluated the radiological stability of patients using these three parameters, and no differences were observed between the groups (p>0.05 for each). These findings indicate that the use of suture anchors for primary MPFL repair does not provide any radiological advantages. The similar radiological results and the absence of clinical and functional superiority of the use of suture anchors in primary MPFL repair, as mentioned before, lead us to question the necessity of suture anchor use in primary MPFL repair once again.

Study Limitations

There are several limitations in our study. First and foremost, the retrospective design and the limited number of patients are important limitations. Second, given the limited number of patients, it was not possible for us to conduct subgroup analysis according to age. Furthermore, the relatively short follow-up period]18 months (minimum of 8 months)] was another important limitation in our study. Finally, the lack of economic analysis is a significant limitation. Prospective studies with long-term follow-up and sufficient numbers of patients, including radiological and economic analyses, may yield different results.

CONCLUSION

This study demonstrated that primary repair of the MPFL with or without suturing anchors can effectively prevent the recurrence of patellar dislocation and instability after first-time APD and provide satisfactory clinical outcomes. Although the successful primary repair results question the necessity of anchor use, anchor use should not be avoided in primary repair cases if necessary.

MAIN POINTS

- Primary repair of MPFL achieves satisfactory clinical and functional outcomes, regardless of the anchor use.
- Primary repair of the MPFL with or without the use of a suture anchor can effectively prevent the recurrence of patellar dislocation and instability during mid-term follow-up.
- Considering that similar clinical, functional, and radiological results can be obtained, avoiding the use of implants as much as possible can both prevent unnecessary implant load in patients and prevent future implant-related complications.

ETHICS

Ethics Committee Approval: This study was approved by the University of Health Sciences Türkiye, Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital Ethics Committee (approval number: 94, date: 14.06.2023).

Informed Consent: Retrospective study.

Authorship Contributions

Surgical and Medical Practices: O.G., H.E., T.A., Concept: O.G., B.G., S.E.İ., H.E., T.A., Design: O.G., B.G., S.E.İ., H.E., T.A., Data Collection and/or Processing: O.G., B.G., S.E.İ., H.E., T.A., Analysis and/or Interpretation: O.G., B.G., S.E.İ., H.E., T.A., Literature Search: B.G., S.E.İ., T.A., Writing: O.G., B.G., S.E.İ., H.E.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study had received no financial support.

REFERENCES

1. Majewski M, Susanne H, Klaus S. Epidemiology of athletic knee injuries: A 10-year study. Knee. 2006; 13(3): 184-8.
2. Atkin DM, Fithian DC, Marangi KS, Stone ML, Dobson BE, Mendelsohn C. Characteristics of patients with primary acute lateral patellar dislocation and their recovery within the first 6 months of injury. Am J Sports Med. 2000; 28(4): 472-9.
3. Hsiao M, Owens BD, Burks R, Sturdivant RX, Cameron KL. Incidence of acute traumatic patellar dislocation among active-duty United States military service members. Am J Sports Med. 2010; 38(10): 1997-2004.
4. Sillanpää P, Mattila VM, Iivonen T, Visuri T, Pihlajamäki H. Incidence and risk factors of acute traumatic primary patellar dislocation. Med Sci Sports Exerc. 2008; 40(4): 606-11.
5. Mäenpää H, Huhtala H, Lehto MU. Recurrence after patellar dislocation. Redislocation in 37/75 patients followed for 6-24 years. Acta Orthop Scand. 1997; 68(5): 424-6.
6. Le N, Blackman B, Zakharia A, Cohen D, de Sa D. MPFL repair after acute first-time patellar dislocation results in lower redislocation rates and less knee pain compared to rehabilitation: a systematic review and meta-analysis. Knee Surg Sports Traumatol Arthrosc. 2023; 31(7): 2772-83.
7. Christiansen SE, Jakobsen BW, Lund B, Lind M. Isolated repair of the medial patellofemoral ligament in primary dislocation of the patella: a prospective randomized study. Arthroscopy. 2008; 24(8): 881-7.
8. Camp CL, Krych AJ, Dahm DL, Levy BA, Stuart MJ. Medial patellofemoral ligament repair for recurrent patellar dislocation. Am J Sports Med. 2010; 38(11): 2248-54.
9. Tian G, Yang G, Zuo L, Li F, Wang F. Conservative versus repair of medial patellofemoral ligament for the treatment of patients with acute primary patellar dislocations: A systematic review and meta-analysis. J Orthop Surg (Hong Kong). 2020; 28(2): 2309499020932375.
10. Dogan O, Gencer B, Suer Dogan I. The effectiveness of anterior cruciate ligament reconstruction on the patellofemoral stability and patellar height. Arch Curr Med Res. 2023; 4(2): 94-101.
11. Tegner Y, Lysholm J. Rating systems in the evaluation of knee ligament injuries. Clin Orthop Relat Res. 1985; (198): 43-9.

12. Ozcan C, Turkmen I, Sokucu S. Comparison of three different approaches for anterior knee pain after tibia intramedullary nailing. Eur J Trauma Emerg Surg. 2020; 46(1): 99-105.

13. Gencer B, Yiğit A, Çamoğlu C, Çulcu A, Dogan O. Can Anterior Knee Pain Be Explained by Patella Position After Infrapatellar Tibia Intramedullary Nailing? Cureus. 2023; 15(10): e47334.

14. Petri M, Ettinger M, Stuebig T, Brand S, Krettek C, Jagodzinski M, et al. Current Concepts for Patellar Dislocation. Arch Trauma Res. 2015; 4(3): e29301.

15. Zhang K, Jiang H, Li J, Fu W. Comparison Between Surgical and Nonsurgical Treatment for Primary Patellar Dislocations in Adolescents: A Systematic Review and Meta-analysis of Comparative Studies. Orthop J Sports Med. 2020; 8(9): 2325967120946446.

16. Jiang J, Yi Z, Li J, Liu Y, Xia Y, Wu M. Medial Patellofemoral Ligament Reconstruction is Preferred to Repair or Reefing for First-Time Patellar Dislocation: A Systematic Review and Meta-analysis. Indian J Orthop. 2022; 57(2): 177-88.

17. Doğan Ö, Çulcu A, Doğan İS. Patellar height changes after treatment of tibia plateau fractures: A radiological analysis. Saudi Med J. 2023; 44(3): 306-13.