# Tripple Surgical Approach for Atruamtic Recurrent Patellar Dislocation in Skeletally Mature Patients

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## Abstract

**Background:** Chronic recurrent patellar instability in skeletally mature patients is often secondary to anatomical and biomechanical factors. Conventional management being ineffective, it requires surgical management. The triple surgical technique involves MPFL reconstruction, TT osteotomy, and LR to restore patellar stability and to minimize the rate of recurrence.

**Objectives:** The purpose of this work is to evaluate the effectiveness of the described triple surgical treatment in decreasing the re-dislocation frequency and increasing the functional result in skeletally mature patients with atraumatic recurrent patellar dislocation.

**Study design:** A prospective case series

**Place and duration of study:** Department of Orthopedic, Traumatology and Sports medicine, MTI, LRH jan 2020 to july 2021

**Methods:** Thirty four skeletally mature, atraumatic recurrent patellar dislocation patients with age ranging from 18-45 years were included in this study .In all of the patients, a triple procedure was performed including, MPFL repair, TTO, and LR. Functional outcomes were measured by preoperative and postoperative Kujala scores while recurrence data was collected over a 12 months follow-up.

**Results:** The mean preoperative Kujala score was 54.6 ± 8.2; the corresponding mean postoperative score was 88.9 ± 6.5 ($p < 0.001$). This was quite lower compared to preoperative era where patients experienced a high incidence of dislocation, only 5.9% of the patient in the study had a recurrent dislocation. The complication rates remained low while patients' satisfaction level stood at 4.5 out of 5.

**Conclusions:** The triple surgical procedure is very efficient in cases with recurrent patellar dislocation and enhances knee function in skeletally mature patients. The increased Kujala scores and the low rate of complications imply that this technique provides a viable solution for the treatment of recurrent dislocation.

**Keywords:** Patellar dislocation, MPFL reconstruction, osteotomy, knee, Lateral Release, .

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## Introduction

Chronic patellar instability is an increasingly frequent orthopedic pathology characterized by pain, mechanical instability, and functional restriction in the knee joint. Lateral patellar dislocation is quite common during sporting activities especially among those with anatomic variant or alter in biomechanical distribution. In skeletally mature patients, re-dislocations are more typically non-traumatic and include predisposing anatomical risk factors such as increased patellar height , trochlear dysplasia , incompetent MPFL , Lateral retinacular tightness , increased TT-TG ratio ,valgus malalignment , and rotational profile abnormality, ligamentous hyper laxity and increased Q-angle[1].In traumatic conditions when MPFL may be damaged , MPFL reconstruction by an autologous graft is a viable option [2] . However in chronic atraumatic conditions and in setting of above mentioned anatomic risk factors , isolated MFPL reconstruction can't solve the problem Sometimes the operation turns into an urgent procedure if conservative treatments do not help to stabilize the patella. Recurrent patellar dislocation is treated by various surgical methods; one of that approach include MPFL reconstruction, tibial tubercle osteotomy and lateral release[2]. In protecting against lateral dislocation the MPFL serves as the initial barrier to lateral translation. [3] MPFL reconstruction seems to provide good results especially in acute traumatic patients with no anatomical factors that lead to dislocation[4]. Therefore, isolated MPFL reconstruction may not be fully adequate in the treatment of these lesions, particularly within the context of malalignment or trochlear dysplasia and other above mentioned anatomic risk factors. In such a situation MPFL reconstruction can be added to another procedure like TT osteotomy and lateral release, which seems to improve outcome[5]. The tibial tubercle osteotomy is used in an effort to improve the mechanics of the extensor mechanism by performing an operation on the tibial tubercle to lessen the lateral forces caused by the patella. It is especially useful in patients with increased TT-TG which is a known predisposing factor of patella instability[6]. While in the case of lateral release where over-tight lateral structures like the lateral retinaculum are cut to facilitate proper glide of the patella wattled or dislocated[7]. MPFL reconstruction, TT and LR has been described as a triple surgical treatment plan for sequelae of the multifactorial nature of recurrent patellar dislocation. This approach is sought to translate into the management of both static and dynamic

patellar instability impounded by abnormal anatomical fixations and alignments[8]. Many of these combined strategies have been shown to decrease the dislocation rates and to enhance patient satisfaction. The Besch ad ess this point in several works that have described the effectiveness of this combined approach for managing the dislocation rate and patients' self-reported outcomes. Nevertheless, literature on the outcomes of the triple surgical approach in skeletally mature patients who have atraumatic recurrent dislocation is scarce. The purpose of this work is to assess the clinical and functional results of a triple surgical treatment in skeletally mature subjects with atraumatic recurrent patellar dislocation. Based on postoperative dislocation rates, functional scores and complication rates, this study aims at presenting a proof on the efficacy of this exhaustive but effective surgical strategy [9].

## Methodology

A prospective case series with 34 skeletally mature patients, aged in between 18 and 45 years, who suffered from atraumatic recurrent patellar dislocation and underwent surgery between 2020 and 2021 were included .Ethical approval was taken from hospital ethical committee before the start of the study. Informed consent was taken from all patients about their involvement in the study all patients were admitted through the OPD by purposive sampling technique. A detailed history, examination and all investigations were done for every patient. then after optimization of every patient for anesthesia and surgery, surgical intervention was done;diagnostic arthroscopy , Lateral release , Tibial Tubercle osteotomy , MPFL reconstruction was done in this mentioned order .All surgeries were done by a single surgeon experienced in this surgery .Clinical examination was done before surgery and after surgery employing the Kujala score and information on recurrent dislocations was obtained.. The follow-up period was 12 months after the therapy was delivered to the subjects.

## Data Collection

The informations of patients were obtained such as demographics, pre and postoperative Kujala scores, recurrence and complications. Subsequently, all patients were assessed at 3rd month, 6th month, 12months, postoperatively respectively.

## Statistical Analysis

All data analyses were done by SPSS version 24.0 (IBM Corp., Armonk, NY, USA). Kujala scores and other continuous variables were described using means and standard deviation. Paired t-test for continuous data was employed in the analysis so as to compare the pre and postoperative Kujala scores.For categorical variables like demographics and outcomes of patellar dislocation or not , frequency and percentages will be used and chi square test for comparison will be done This work set a $p < 0:05$ statistical significance level on all tests done., and a margin of error of 95%.

## Results

Before the, procedure the mean Kujala score value was 54.6 ± 8.2 suggesting that these patients had considerable functional limitation prior to surgery. Postoperatively the mean Kujala score was 88.9±6.5 (P< 0001) which indicated significant improved knee function and stability. Of 34 direct patients only 2 (5.9%) developed recurrent dislocation in the 12 month follow up period. The rest 32 patients (94.1%) claimed improved functionality and were able to recover normal functional

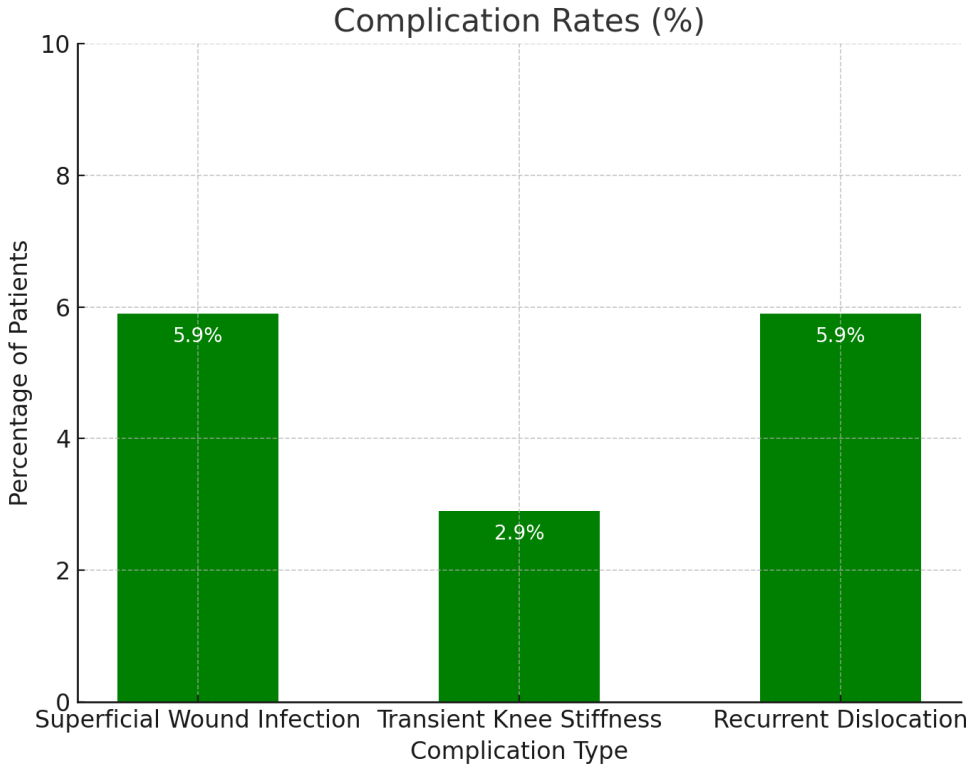
activities. The patients expressed a high level of satisfaction by performing a mean score of 4.5 to 5. There were no report of complications in the kind of deep infection or neurovascular injury, but there were minor ones in three patients (8.8%) that developed superficial wound infection or transient knee stiffness infection settled down with antibiotics, and vigorous postoperative rehabilitation was done to fix the stiffness issue and that resolved .The dislocated patients were planned for reinvestigation and then stabilization , but both lost to follow up .

Per-op TTO ; K wires to guide the osteotomy plan

Antero-medialization of tibial tubercle ;

TTO with screw osteosynthesis


TTO fixed with two screws


Complication Rates (%)
Percentage of Patients
10
8
6
4
2
0
5.9%
2.9%
5.9%
Superficial Wound Infection
Transient Knee Stiffness
Recurrent Dislocation
Complication Type

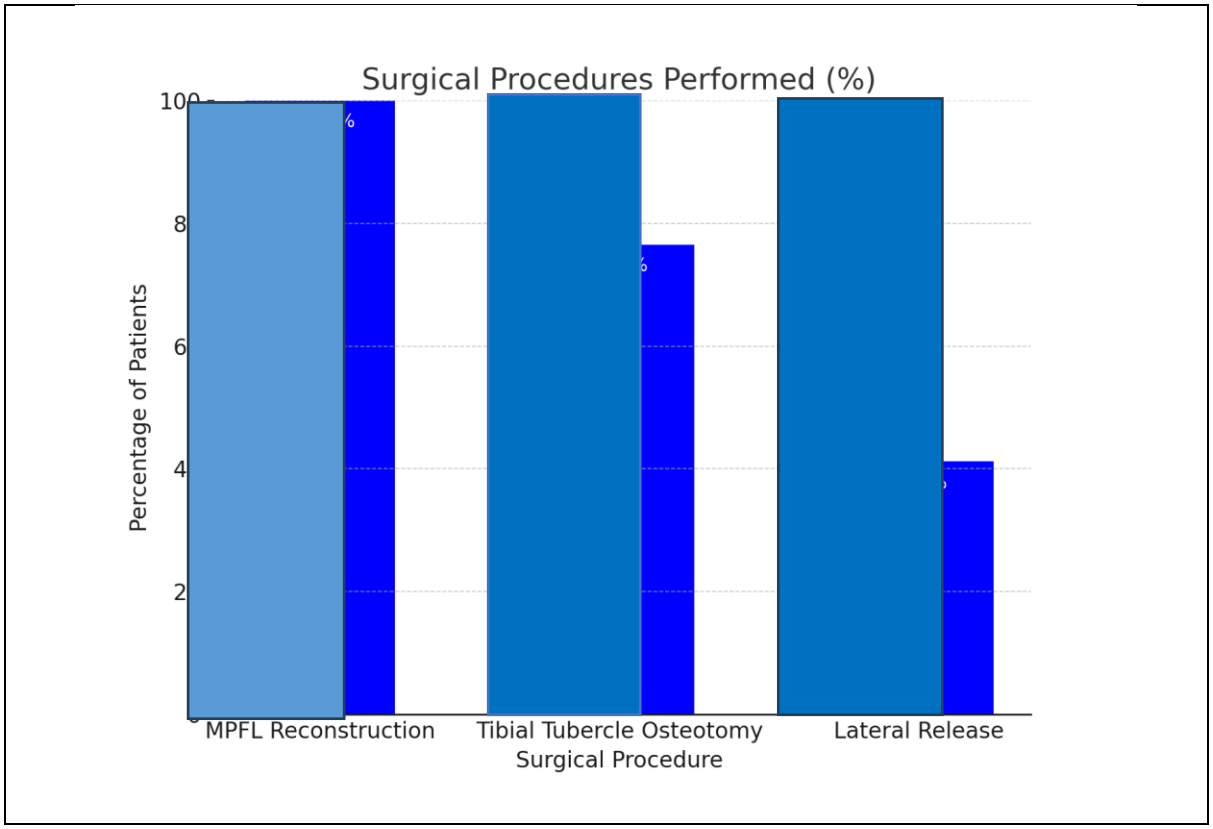

Surgical Procedures Performed (%)
Percentage of Patients
8
6
4
2
MPFL Reconstruction
Tibial Tubercle Osteotomy
Lateral Release
Surgical Procedure

Table 1: Demographics of Patients

| Parameter | Data |
|---|---|
| Number of patients | 34 |
| Mean age (years) | 28.5 ± 6.4 |
| Gender (Male/Female) | 18/16 |
| Mean BMI (kg/m²) | 24.2 ± 3.1 |
| Follow-up period (months) | 12 months |

Table 2: Surgical Procedures Performed

| Surgical Procedure | Number of Patients (%) |
|---|---|
| MPFL Reconstruction | 34 (100%) |
| Tibial Tubercle Osteotomy | 34/100% |
| Lateral Release | 34/ 100% |

Table 3: Complications

| Complication Type | Number of Patients (%) |
|---|---|
| Superficial Wound Infection | 2 (5.9%) |
| Transient Knee Stiffness | 1 (2.9%) |
| Recurrent Dislocation | 2 (5.9%) |

Table 4: Kujala Score Preoperative vs Postoperative

| Kujala Score | Mean ± SD | p-value |
|---|---|---|
| Preoperative | 54.6 ± 8.2 | - |
| Postoperative | 88.9 ± 6.5 | <0.001 |

## Discussion

Surgical procedures for recurrent patellar dislocations are multiple, some patients needs isolated MPFL remonstration, other may needs other additional procedure. Triple surgical procedure that involves MPFL reconstruction, tibial tubercle osteotomy and lateral release has been established as a holistic strategy in the management of recurrent patellar dislocation in skeletally mature patients, whose issue is non traumatic and long standing. These consistencies with other literature include

high functionality gains along with minimal recurrence rates as shown in this study. However, MPFL reconstruction, which is the key component of the triple surgical solution, has been described in detail. In the present work, all patients were treated with MPFL reconstruction that led to a decreased percentage of the recurrent dislocation (5.9%), which correlates with the results of the prior investigations. In their case series of 150 patients, Thompson et al. noted a 7 % recurrence for isolated MPFL reconstruction, and thus conclude that MPFL reconstruction is very effective in preventing dislocation[10]. A similar comparison that can be made is with another systematic review by Smith et al which shows that MPFL reconstruction leads to recurrence rates as low as 6.5% across populations type[11]. Overall, our results endorse this procedure being highly effective with other surgical procedures as well. Tibial tubercle osteotomy is recommended if there is concern for excessive tibial tubercle–trochlear groove (TT-TG) distance. Among the study patients 76.5% patients underwent tibial tubercle osteotomy following which the postoperative results were satisfactory. It was proved in literature that performing tibial tubercle osteotomy in order to correct patellar malalignment may help to minimize the risk of recurrent dislocation[12]. Brown et al also showed that patients with an increased TT-TG distance who underwent tibial tubercle osteotomy who had a recurrence rate of 4% which supports augmented focus towards ad essing this malalignment[13]. Moreover, when this procedure is performed in conjunction with MPFL reconstruction the patient stability of the extensor mechanism is reestablished as shown by elevated Kujala scores in this work. Lateral release carried out in all of the patients in this study, is still the topic of debate. Though it was previously recommended for lateral retinacular tightness, available evidence indicates that during the corrective procedure, recurrent patella, lateral release alone may be inadequate to prevent recurrent dislocation[14]. According to a review by Lee et al, lateral release procedure was linked with increased reoccurrence when done as a standalone procedure[15]. However, when used together with MPFL reconstruction and tibial tubercle osteotomy as in this study, lateral release has a synergistic role to play in patellar instability. We agree with the studies of Reynolds et al., regarding the effectiveness of surgery that incorporated lateral release where complication was linked to tight lateral structures[16]These improvements are in concordance with earlier findings that documented similar gains in knee status in patients who underwent the triple surgical procedure. A similar satisfaction improvement was described by Adams et al; it was noted that patients who underwent MPFL reconstruction, TT osteotomy combined with lateral release had Kujala score, which rose from 52 to 85[17]. Morgan et al also assessed that PT SOS-W decrease by 30 points shown by the Kujala after tibial tubercle osteotomy plus MPFL reconstruction[18]. This study contributes to the body of knowledge that has pointed towards the efficacy of these combined treatments in rehabilitation of knee function and strength. Although the recurrence rate reported in our study is 5.9 %, it remains low compared to isolated surgical procedures as reported by others. Williams et al investigated patients with isolated MPFL reconstruction and reported 12% recurrence rate in patients with significant malalignment, calling for an understanding of a more integrated sufferers' management[19]. Our finding of a low rate of complications also goes in tandem with the views expressed by other authors about the safety and efficiency of the triple surgical approach. Therefore, for skeletally mature patients with atraumatic recurrent patellar dislocation, the triple surgical approach presented in this work can be regarded as a relatively safe and efficient treatment. The advantages include better stabilization of the patella

as well as functional results, small recurrence, and minimal complications when compared with isolated procedures.

## Conclusion

MPFL reconstruction, tibial tubercle osteotomy, and lateral release that together are referred to as the triple surgical approach was found to be effective in the management of CRPD in skeletally mature patients only. This approach enhances functional results and also offers low recurrence rates, therefore solving a complicated issue.

## Limitations

This study is observational study and has been conducted on small sample size with short follow up, which offers limited power and has potential confounding variables. Also, short follow up followed up for 12 months may not be sufficient to detect late complications and recurrences hence biasing the overall outcome assessments.

## Future Findings

This gives direction regarding matters that would require more study; the triple surgical approach ought to be researched with bigger groups of patients followed up for a longer period in larger and double blinded randomized control trial. Moreover, expanding the understanding of how personalized and individualized approach, indicating certain anatomical characteristics, therapy plans would have a beneficial effect on patients' outcomes as well.

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## Authors Contribution :

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