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## The Knee



# Medial patellofemoral ligament repair restores stability in pediatric patients when compared to reconstruction ☆☆☆☆

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## ABSTRACT

**Background:** Pediatric patellar instability has a high recurrence rate with non-operative care, and medial patellofemoral ligament (MPFL) reconstruction has known complications. MPFL repair offers an alternative method to restore patellar stability. This study's purpose was to assess the outcomes of MPFL repair in a pediatric cohort, and to compare these outcomes to a cohort of pediatric patients who underwent MPFL reconstruction.

**Methods:** One surgeon performed 16 MPFL repairs on pediatric patients for traumatic patellar instability, with an average follow-up of 1.5 years. Age, sex, skeletal maturity, trochlear dysplasia, additional procedures, final range of motion, and complications were recorded. A sub-cohort with >1 dislocation (10 patients) was compared to a historical group (22 patients) with >1 dislocation who underwent allograft MPFL reconstructions by the same surgeon.

**Results:** Ten out of 16 (63%) patients had >1 dislocation event at time of presentation. Thirteen out of 16 (81%) patients had trochlear dysplasia. There were no complications and no recurrent instability in the repair group at last follow-up. Patients in the reconstruction group were older than the repair group (15.6 years vs. 13.0 years,  $p < 0.05$ ), had lower Caton–Deschamps ratio (1.2 vs. 1.4,  $p < 0.05$ ), and had lower percentage of additional procedures (59% vs. 100%,  $p < 0.05$ ). There were three complications in the reconstruction group: two patients with recurrent instability and one patient with patella fracture requiring revision surgery.

**Conclusions:** MPFL repair in pediatric patients resulted in a low risk of recurrent instability with rates comparable or better than that of allograft reconstruction.

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## 1. Introduction

Patellar instability is a common and challenging condition to treat in the pediatric population [1]. Traumatic patella dislocations are among the most frequent knee injuries in children and adolescents [2], and recurrent instability is high in this population [3]. The medial patellofemoral ligament (MPFL) is the primary restraint to lateral patellar translation in the first 30° of flexion [4]. This ligament is almost always torn during traumatic patellar dislocations [5,6] and is a frequent target of surgical intervention.

The treatment of patellar instability in pediatric and adolescent patients continues to evolve and remains controversial. Numerous surgical techniques have been described, including MPFL reconstruction, MPFL repair, medial retinacular reefing/advance-

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ment, and other associated bony and soft tissue procedures [7]. Ligament reconstruction has become a popular surgical technique for this condition and has demonstrated good outcomes with a low risk of recurrent instability [8–11]. Despite these overall favorable results, MPFL reconstruction has known complications, reported as high as 26% [12]. This high complication rate has also been demonstrated in a young population under 21 years of age [13]. Such complications include patella fracture, femoral tunnel enlargement, loss of motion, clinical instability, and wound problems [14–16].

MPFL repair offers an alternative method to restore patellar stability and has shown promising results [17]. The success rate of MPFL repair in preventing recurrent dislocations in a pediatric and young adult population has been shown to be as high as 72% [18]. Repair has previously been described using arthroscopic or open techniques [19–22]. A primary repair technique to bring the MPFL back to the patella avoids the use of large drill holes and does not compromise future surgical intervention if required. There is a paucity of data on outcomes after such repair procedures in the pediatric population. The purpose of this study was to assess the outcomes of MPFL repair in a pediatric cohort, and compare these outcomes to a historic cohort of pediatric patients who underwent MPFL reconstruction with allograft tissue by the same surgeon.

## 2. Materials and methods

One surgeon (NKP) at a single institution performed 16 MPFL repairs on pediatric and adolescent patients for traumatic patellar instability from December 2014 to September 2016. During this time, the surgeon recommended repair to patients who had recurrent dislocation or subluxation after six weeks of physical therapy, activity modification and bracing if they had a torn or attenuated MPFL on magnetic resonance imaging (MRI) scan. During this period, MPFL repair was the primary surgical technique used by the surgeon to treat traumatic patellar instability, unless the family specifically requested that an MPFL reconstruction be performed or they had a fixed patellar dislocation. Patients were excluded from study inclusion if they had neuromuscular or connective tissue disease, or if they did not have a preoperative MRI. Institutional review board approval was obtained for this retrospective study.

Sixteen patients met the initial inclusion criteria for the study. Patients who did not return for their scheduled final post-operative visits were contacted by phone or email. Demographic data and presenting clinical features were collected including age at time of surgery, sex, laterality, mechanism of injury, and number of dislocations. Preoperative radiographs were analyzed for presence of open physes and Caton–Deschamps ratio. Preoperative MRI scans were analyzed for associated chondral or meniscus injuries, trochlear dysplasia, patellar tilt, and presence of loose bodies. Operative report was analyzed for presence of additional procedures performed during time of initial repair.

The mean age of patients was 13.4 (standard deviation (SD) = 1.2) years with seven males and nine females. One patient had a history and clinical exam consistent with generalized ligamentous laxity but did not have an underlying connective tissue disorder. Six (38%) patients had closed physes at the time of surgery. Ten patients (63%) had experienced >1 dislocation at time of presentation. All patients had patella based tears. Thirteen patients (81%) had trochlear dysplasia on MRI scan. The average Caton–Deschamps ratio (CD) was 1.4 (SD = 0.2). All patients required additional arthroscopic procedures at the time of MPFL reconstruction including chondroplasty of femoral condyle or patella (eight patients), patellar microfracture (two patients), loose body removal (seven patients), lateral release (nine patients), partial meniscectomy (one patient), and osteochondritis dissecans (OCD) fixation (one patient).

### 2.1. Surgical technique

All patients underwent a standard diagnostic arthroscopy to evaluate intra-articular pathology and patellar tracking. This was followed by MPFL repair which is done via an open incision after removal of arthroscopic instruments. All patients had patellar



**Figure 1.** Intra-operative photograph of the five centimeter skin incision for the MPFL repair with the leg at 30° of flexion after arthroscopy has been completed.

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