Medial and Lateral Retinaculum Plasty for Congenital Patellar Dislocation due to Small Patella Syndrome

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**abstract**

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The objective of this study was to explore the clinical effect of medial and lateral retinaculum plasty for congenital patellar dislocation due to small patella syndrome. Twelve patients with congenital patellar dislocation due to small patella syndrome treated at the authors’ hospital between January 2005 and February 2010 were enrolled in the study. The study group comprised 4 men (4 knees) and 8 women (8 knees) with an average age of 10.58±6.91 years. All patients underwent medial and lateral retinaculum plasty. Clinical evaluation included the number of patellar redislocations, patellar apprehension sign, Kujala score, subjective questionnaire score, and patella lateral shift and patellar tilt angle measured using a cross-sectional computed tomography scan. All patients were followed up, and the shortest follow-up time was 2 years. Kujala scores improved from 49.20±6.20 preoperatively to 80.10±5.80 postoperatively. Subjective questionnaire scores indicated that the excellent and good rate was 75%. In addition, a significant difference existed in the patellar tilt angle and patella lateral shift between pre- and postoperative results ($P<.05$). Medial and lateral retinaculum plasty for patients with congenital patellar dislocation due to small patella syndrome can be effective to correct the tracking of the patellofemoral joint and improve knee function.

**Figure:** Computed tomography scan showing patella dysplasia and femoral trochlear dysplasia associated with patellar dislocation in a 31-year-old woman who reported the inability to completely extend her left knee joint and occasionally experienced knee pain since childhood but had not received any treatment since birth (A). Computed tomography scan 2.5 years postoperatively (B).

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Drs Wang (Cheng-hai) and Shu contributed equally to this study.

The authors have no relevant financial relationships to disclose.

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Congenital dislocation of the patella is a relatively rare clinical disease. Congenital dislocation of the patella is identified by an irreducible, permanent lateral dislocation. In 1968, Green et al. described congenital dislocation of the patella for the first time. Previous literature reported that congenital dislocation of the patella is often bilateral and familial. In 1979, Scott and Taor first described “small patella syndrome,” which is characterized by patellar aplasia or hypoplasia and pelvic abnormalities.

Between January 2005 to February 2010, twelve patients with congenital patellar dislocation due to small patella syndrome were treated in the author's hospital using a new surgical technique, which was termed medial and lateral retinaculum plasty. The purpose of this study was to review and evaluate the authors’ experiences with surgery for congenital patellar dislocation due to small patella syndrome.

**Materials and Methods**

Twelve patients with congenital patellar dislocation due to small patella syndrome treated at the authors’ hospital between January 2005 and February 2010 were enrolled in the study. The study group comprised 4 men (4 knees) and 8 women (8 knees) with an average age of 10.58±6.91 years. All patients underwent medial and lateral retinaculum plasty. Patients’ demographic data are shown in Table 1. All patients reported pain around the knee. Patellar crepitus was positive in all patients. Knee radiography and computed tomography (CT) scan verified the occurrence of patellar dislocation. Knee CT images indicating dislocation of the patella in the family for 3 generations were obtained (Figures 1-3).

### Table 1

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*Abbreviation: preop, preoperative.*

**Surgical Technique**

The same senior surgeon conducted the surgery in all patients. Patients were placed in the supine position and spinal anesthesia was administered. Anteromedial, anterolateral, and superolateral portals were routinely adopted. Diagnostic arthroscopy was performed to evaluate the patellar trajectory, cartilage degeneration of the patellofemoral joint, and associated concomitant injuries and to deal with intra-articular lesions (such as meniscectomy, repair, cartilage trimming, and removal of loose bodies).

For the withdrawal of the arthroscope, a 3-cm longitudinal incision in the medial edge of the patella was made, cutting the skin, subcutaneous tissue, and deep fascia and exposing the vastus medialis and medial patellar retinaculum. A transverse dissection was made along the junction of the vastus medialis and medial retinaculum. A section of the lateral patellar retinaculum along the line from the lateral upper margin of the patella to the lateral femoral condyle was grafted to the junction of the lateral patellar retinaculum and the tensor fasciae latae. The free end of the lateral patellar retinaculum was pulled to the center of the patellar lateral edge and temporarily fixed on the lateral edge of the patella. Assessment of patellar activity by hand, static observation of the patellofemoral joint, and dynamic observation of the patella trajectory in flexion and extension activities through the arthroscope were performed. Finally, the vastus medialis and the medial patellar retinaculum were sutured and fixed on the prepatellar and patellar medial margin with #1 PDS sutures (Ethicon, Inc,
Somerville, New Jersey), and the free end of the lateral patellar retinaculum was re-sutured on the patellar lateral border with #1 PDS sutures (Figures 4, 5).

**Postoperative Rehabilitation**

This surgery does not require that patients wear a brace for external fixation. Two days postoperatively, patients began to perform exercises such as isometric contraction of the quadriceps femoris muscle, straight-leg raising, patella traction, and mild knee flexion. Two weeks postoperatively, patients began continuous passive motion exercises and active and assisted knee range of motion exercises and could perform knee flexion to 60°. Four weeks postoperatively, patients could flex the knee to 90° and were able to achieve partial weight bearing on the affected limb. Six weeks postoperatively, patients could flex the knee to 120°, achieve full weight bearing on the affected limb, and perform jogging exercises. Six months postoperatively, patients were able to return to their normal physical activities.

**Follow-up**

Knee range of motion was recorded. The patella lateral shift and patellar tilt angle were measured using a cross-sectional CT scan with 20° of knee flexion. The Kujala score and a subjective questionnaire score were used to assess knee function.

**Statistical Analysis**

Statistical analysis was performed using the paired *t* test, and *P* values less than .05 were defined as significantly different.

**RESULTS**

One case was treated with medial and lateral retinaculum plasty combined with medial translocation of the tibial tuberos-
The wound healed in time and had no effect on the recovery of joint function. The shortest follow-up time was 2 years. Kujala scores improved from $49.20 \pm 6.20$ preoperatively to $80.10 \pm 5.80$ postoperatively. Six patients had excellent results, 3 had good results, and 3 had fair results; the excellent and good rate was 75%. Postoperatively, the patellar tilt angle and patella lateral shift were restored to the normal range with statistical significance ($P < .05$) compared with preoperative values. Follow-up data are presented in Table 2.

**DISCUSSION**

The etiology of congenital patellar dislocation due to small patella syndrome is still unknown but may be related to genetic issues or trochlear dysplasia and patellar retinaculum. Congenital permanent dislocation of the patella is a disorder of the knee joint in which the patella is permanently displaced. Even in the process of knee extension, the patella is fixed on the lateral aspect of the femoral condyle. Early diagnosis and definitive treatment are generally recommended to prevent subsequent degenerative changes of the knee joint and to attempt to restore partial knee function.

The pathological changes of patellar congenital dislocation consisted of patellar dysplasia, patellar dislocation in the superior and lateral aspect of the trochlea, trochlear dysplasia, lateral insertion of the patellar tendon, iliobial tubular hypertrophy, short and deformed quadriceps, vastus lateralis adherent to the iliobial band and tensor fasciae latae, thin and stretched vastus medialis, knee valgus, and tibial external rotation.$^5,^8$ Abnormal anatomic and biomechanical characteristics of the patellofemoral joint may result in abnormal contact of the patellofemoral joint and increased or reduced local stress of the articular surface, resulting in damage to the articular cartilage.

This study found that the medial and lateral patellar retinacula of the knee were closely associated with patellofemoral joint stability. The medial patellar retinac-
The lateral patellar retinaculum consisted of the lateral patellofemoral ligament, lateral patellotibial ligament, and lateral epicondylar patellar ligament.12-15 The medial and lateral patellofemoral ligament may influence the patellar lateral shift. Patellar instability often occurred on the basis of knee dysplasia, medial soft tissue relaxation, medial muscle weakness, and tensive lateral retinaculum. Because of the long-term bad coacethosis of the patellofemoral joint, patellar medial retinacular relaxation and the development of lesions will be further accelerated.16 Ghanem et al8 found that the patella was underdeveloped because it was not placed in the normal femoral trochlea and was dislocated superiorly and posteriorly with reference to the trochlea; it was fixed laterally at the level of the lateral condyle.

Stanisavljevic et al17 described a comprehensive surgery technique to treat congenital, irreducible permanent lateral dislocation of the patella, and the results at 2-year follow-up indicated that the clinical effect was good. The same procedure was used by McCall and Lessenberry18 in 2 cases of congenital dislocation of the patella; they also achieved good clinical results. Other authors adopted the Conn procedure for congenital dislocation of the patella and also obtained satisfactory results.19,20 Storen21 used medial transfer of the tibial tubercle with release of the lateral capsule of the knee to treat 2 children with congenital permanent irreducible lateral patellar dislocations, and clinical results were good. However, the current authors believe that tibial tubercle transfer surgery should be avoided in younger patients because of the high risks associated with this procedure.

Most of the patients with congenital dislocation of the patella were adolescents with immature bone structure. Tibial tuberosity transfer or medial patellofemoral ligament reconstruction may damage the epiphyseal plate, leading to knee dysplasia. Therefore, the soft tissue surgery was the best choice for these patients. In the current study, all 12 patients had patellar medial soft tissue laxity and lateral soft tissue contracture. Medial and lateral retinaculum plasty were necessary for them. In 1 of the 12 patients, a limited procedure was performed by medial translocation of the tibial tuberosity combined with medial and lateral retinaculum plasty; a good outcome was obtained with this procedure.

Medial patellofemoral ligament reconstruction for these patients may increase the risk of patellar fracture. In this study, the authors adopted medial and lateral retinaculum plasty for 12 patients with congenital dislocation of the small patella in the clinic. No recurrent dislocation occurred postoperatively. Kujala score increased from 49.20 ± 6.20 preoperatively to 80.10 ± 5.80 postoperatively. Medial and lateral retinaculum plasty could markedly improve knee function and quality of life.

Patellar tracking was guided by the patellar tendon, patellar lateral retinaculum, and patellar medial retinaculum in the process of knee flexion and extension. The authors adopted medial and lateral retinaculum plasty for the patients with congenital dislocation of the small patella to change the tension and attachment point of the patellar retinaculum. This operation may change the patella trochlear from the abnormal position to the center of the femoral trochlea. Abnormal patellar tracking was modified to the normal position. Mean patellar tilt angle decreased from 13.80° ± 3.65° preoperatively to 7.60° ± 1.71° postoperatively. Mean patellar lateral shift decreased from 22.70 ± 0.65 mm preoperatively to 8.20 ± 0.42 mm postoperatively. The difference was statistically significant between the pre- and postoperative results.

Medial and lateral soft tissue structure reconstruction could adjust the position of the patella and reduce lateral patellofemoral joint pressure. Lateral release and medial tightening of the retinaculum at the same time could move the patella to the normal position and prevent the tilting of the patella to the medial position.

### Conclusion

Medial and lateral retinaculum plasty surgery could improve knee function and quality of life for patients with congenital patellar dislocation due to small patella syndrome. Early surgical treatment could prevent subsequent degenerative changes of the knee and patient disability. This technique needs further clinical study and application.

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**Table 2** Paired t Test Preoperatively and 24 Months Postoperatively

<table>
<thead>
<tr>
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<th>24 mo Postop</th>
<th>t</th>
<th>P</th>
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<tr>
<td>Kujala score</td>
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<td>80.10 ± 5.80</td>
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<tr>
<td>Patellar tilt angle, deg</td>
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<td>7.60 ± 1.71</td>
<td>11.431</td>
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<tr>
<td>Patella lateral shift, mm</td>
<td>22.70 ± 0.65</td>
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<td>Knee flexion, deg</td>
<td>126.33 ± 6.33</td>
<td>125.92 ± 6.57</td>
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</tr>
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</table>

**Subjective questionnaire, No. (%)**

| Excellent | 6 (50) |
| Good      | 3 (25) |
| Fair      | 3 (25) |

**Abbreviations:** deg, degrees; post, postoperatively; pre, preoperatively.
REFERENCES


