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Surgical treatment of habitual lateral patellar instability by proximal realignment procedure (Campbell technique)

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Abstract

Background: Patellar instability may manifest as acute patellar dislocation, recurrent patellar dislocation or subluxation, habitual patellar dislocation or chronic patellar dislocation. Habitual patellar dislocation is a condition where the patella dislocates whenever the knee is flexed and spontaneously relocates with extension of the knee. The purpose of this study is to know the functional and radiological outcome following proximal realignment procedure (Campbell technique) for habitual patellar dislocation.

Methods: The study was conducted from June 2017 to January 2019 with a minimum follow up of 6 months and a maximum follow up of 2 years. Inclusion Criteria: All patients with habitual patellar dislocation, age between 5 to 40 years. Exclusion Criteria: Patient age less than 5 years and aged above > 40 years, past history of knee surgery, acute patellar dislocation and knee effusions. Radiological assessment was done by measuring sulcus angle and congruence angle. Functional outcome was assessed by Kujala score.

Conclusion: Campbell technique (lateral release of tight structures and medial plication of patellar retinaculum) is a safe and effective procedure for treating habitual patellar dislocation. Functional outcome evaluated by Kujala score was good for most of our patient's. Radiological parameters (sulcus angle and congruence angle) were brought back to normal. There were no significant changes in sulcus angle. Congruence angle was brought back to normal, which was statistically significant ($p < 0.001$).

Keywords: habitual dislocation of patella, campbell technique, congruence angle, Kujala score

Introduction

The incidence of patella dislocation ranges from 6 per 100,000 in the adult population to 43 per 100,000 in the pediatric population. Habitual dislocation of patella is a condition where the patella dislocates whenever the knee is flexed and spontaneously relocates with extension of the knee. The causes of habitual patellar dislocation include contracture and fibrosis of the quadriceps femoris, vastus lateralis, and lateral retinaculum, abnormal iliotibial band attachment, repeated intramuscular injections into the thigh, genu valgum, patella alta due to the abnormal position of an elongated patellar tendon, systemic ligament laxity and dysplastic lateral femoral condyle^[4]. Campbell developed the Campbell's technique as a method of proximal realignment for habitual patellar dislocation. We conducted the present study to evaluate the results following Campbell's technique.

Materials & Methods

This is a prospective study conducted on 15 patients with habitual patellar dislocation, who presented to BIRRD Hospital between June 2017 to January 2019. In all cases patellar dislocation was treated by Campbell's procedure. Inclusion Criteria: All patients with habitual patellar dislocation, age between 5 to 40 years. Exclusion Criteria: Patient age less than 5 years and aged above > 40 years, past history of knee surgery, acute patellar dislocation and knee effusions. All patients were clinically evaluated for medial joint line tenderness, ROM at knee, Q angle, apprehension test, Positive J sign (lateral Subluxation) and ligamentous laxity. Radiological assessment was done by measuring Sulcus angle, Congruence angle, Insall-Salvati ratio. Following radiographs are taken for all the patients - Knee- antero posterior view with full weight bearing, Knee-lateral view with full weight bearing in 30 degree flexion,

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Merchant view (45 degree skyline view), Laurin view (30 degree skyline view). Post-operative radiographic evaluation was done periodically at 6 weeks, 3months, 6 months and yearly. Functional outcome was assessed by Kujala score.

Sulcus Angle: Sulcus angle defined as the angle formed between lines joining the highest points of the bony medial (B) and lateral condyles (C) and the lowest bony point of the intercondylar sulcus (A). The mean sulcus angle ($138^{\circ} \pm 6^{\circ}$).

Congruence Angle: Identify the highest point of the medial (B) and lateral (C) condyles and the lowest point of the intercondylar sulcus (A). Bisect the sulcus angle (BAC) to establish the zero reference line (AX). Identify the lowest

point on the articular ridge of the patella (D) and draw a line from A to D. The angle DAX is the congruence angle. All values medial to the zero reference line AX are designated as negative and those lateral as positive. All values medial to the zero reference line AX are designated as minus and those lateral as plus. Normal angle is defined as < -16 degrees.

Surgical technique: A midline skin incision was made from the quadriceps tendon to the tibial tubercle. Deep tissue dissection was extended from quadriceps tendon to tibial tubercle. A lateral retinacular release was then performed. The exposure was deepened to the level of the medial capsule and the retinaculum. A proximally based strip of medial capsule, 10 x 2cm wide, was then developed. This is followed by closure of the medial arthrotomy. The proximally based strip of medial capsule is then passed over the quadriceps tendon at the superior pole of the patella from a medial to lateral direction. The flap then passed medially under the quadriceps tendon and sutured to the fascia in the region of the adductor magnus tendon. The wound was then closed in a routine fashion over hemovac drain. Postoperatively, the knee was immobilized for four weeks in the cast with knee in 30 degree flexion and then rehabilitated.

Intra-operative photographs

Lateral patellar dislocation on knee flexion

Midline skin incision

Release of lateral tight structures

Medial retinacular flap

Medial flap passed from medial to lateral **Plication of medial retinaculum** **Wound closure over hemovac drain**

Post op protocol: Cast was opened on 12th day and suture removal was done. Cast was reapplied with knee in 30 flexion, with good padding at the pressure points. [48] Patients were asked to review after 1 month when they were evaluated clinically for wound status, range of motion, patellar tracking, deformity correction, ligament laxity and neurological status.

Radiological assessment was done by measuring sulcus angle and congruence angle. Subjective evaluation was done by Kujala index scoring.

Radiographs

CASE: 1

Pre-operative radiographs **Post-operative radiographs**

CASE: 2

Pre-operative radiographs **Post-operative radiographs**

CASE: 3 **Pre-operative radiographs** **Post-operative radiographs****Results**

Our study included 15 patients who underwent Campbell technique (lateral release of tight structures and plication of medial retinaculum) for habitual patellar dislocation from June 2017 to January 2019. For final end result evaluation, all patients were reviewed and analyzed at the end of 6 months postoperatively. Results include preoperative and postoperative subjective assessment by Kujala scoring scale, clinical findings and radiographic assessment. The results are tabulated below

Conclusion

Our prospective study consisted of 15 cases, (9 male, 6 female). No patient missed the follow up during this study series. The minimum follow up period was 6 months. All cases were treated with Campbell's technique for habitual dislocation of patella. Of all the 15 knees operated with lateral release and medial plication, 12 knees had significant improvement in functional scores and congruence angle on radiographs. There were no statistically significant changes in sulcus angle as trochleoplasty procedure was not done and there was inadequate study time to notice bony changes in growing patients. In our study preoperative and postoperative range of motion was unchanged. Radiological assessment showed statistically significant changes in congruence angle. No improvement of sulcus angle on X-rays doesn't always correlate with poor functional outcome. Of three cases that had recurrence, one was revised with modified Galeazzi's technique^[38] and one patient underwent modified Roux Goldthwait procedure^[31] and last one was revised with trochleoplasty and modified Roux Goldthwait procedure. Thus we conclude that Campbell procedure is a safe and effective procedure for treating habitual patellar dislocation. Future study to quantify medial laxity (amount of medial soft tissue to be imbricated and/or additional dynamic stabilization procedure) is desirable. Further no single procedure is fully effective in the surgical treatment of all cases of lateral patella dislocation. Long term follow-up is desirable to evaluate distal femur remodeling.

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