e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2024; 16(2); 256-259

Original Research Article

Outcome Assessment of Proximal Realignment Procedure for Habitual Dislocation of Patella: An Observational Study

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Received 03-01-2024 / Revised: 25-01-2024 / Accepted: 10-02-2024
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Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to assess the radiological outcome following proximal realignment procedure (Campbell procedure) for habitual dislocation of patella.

Methods: This was a prospective study conducted on 20 patients with habitual patellar dislocation, who presented to the Department of Orthopaedics, In all cases patellar dislocation was treated by Campbell's procedure.

Results: The sulcus angle pre-operatively and Post-operatively was not statistically significant. The congruence angle pre-operatively and Post-operatively was statistically significant.

Conclusion: We concluded that following proximal realignment procedure (Campbell procedure) for habitual dislocation of patella radiological parameters 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 procedure, Sulcus angle, Congruence angle

Introduction

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, patella alta due to the abnormal position of an elongated patellar tendon, systemic ligament laxity, dysplastic lateral femoral condyle, and genu valgus. [1-3] A variety of surgical techniques have been introduced for the treatment of habitual dislocation of the patella. However, it has been known that combined procedures, not one single procedure, should be performed to achieve relatively satisfying treatment results.

Hnevkovsky et al [3] attributed habitual patellar dislocation to contracture of the quadriceps femoris and introduced a technique to lengthen the muscle with the use of a lateral retinacular release and quadricepsplasty, which did not bring about complete flexion in their patients. In our patient, genu valgum and lateral femoral condyle hypoplasia following a growth plate fracture were thought as the cause of the dislocation. A quadricepsplasty was considered unnecessary because he had no contracture of the quadriceps femoris. However, lateral retinacular release alone was not sufficient to achieve joint reduction.

Proximal realignment is the most effective treatment for reduction of patellar dislocation. However, vastus medialis advancement can cause an increase in pressure on the knee, which eventually results in patellofemoral arthritis. Recently, medial patellofemoral ligament reconstruction using semitendinosus or gracillis tendon is recommended. [4] Although the patient's medial retinaculum was extensively elongated, it was thick enough to be reefed and sutured. Therefore, a reconstruction using a medial patellofemoral ligament allograft was not

considered necessary and the reduction was maintained at the follow-up examination.

Appropriate surgical treatment methods for habitual dislocation of the patella with genu valgum still remain controversial. Gao et al [5] reported that flexion contracture of the quadriceps muscle was the cause of lateral dislocation of the patella in children and the sustained contracture also resulted in genu valgum. A release of quadriceps femoris contracture can be effective in correcting genu valgum in children who have hypoplasia of the lateral femoral condyle due to growth plate damage. [6] Still, the ideal age for the treatment has yet to be established.

The aim of the present study was to assess the radiological outcome following proximal realignment procedure (Campbell procedure) for habitual dislocation of patella.

Materials and Methods

This was a prospective study conducted on 20 patients with habitual patellar dislocation, who presented to the Department of orthopaedics, MGM Medical College and Hospital, Jamshedpur, Jharkhand, India for one year

. 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 S ulcus angle, Congruence angle. Following radiographs are taken for all the patients - Knee-anteroposterior view with full weight bearing, Knee-lateral view with full weight bearing in 30 degree flexion, 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.

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* +/- 6).

2.3. **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, 10x2cm 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 is immobilized for four weeks in the cast with knee in 30 degree flexion and then rehabilitated.

Post op protocol

Cast is opened on 12 day and suture removal was done, and cast was reapplied with knee in 30 flexion, with well padding at pressure points. They were asked to review after 1 month. Patients were evaluated clinically for wound status, range of motion, patellar tracking, deformity correction, ligament laxity and neurological status. Radiological assessment is done by measuring sulcus angle and congruence angle. Subjective evaluation was done by Kujala index scoring.

Results

Table 1: Sulcus angle

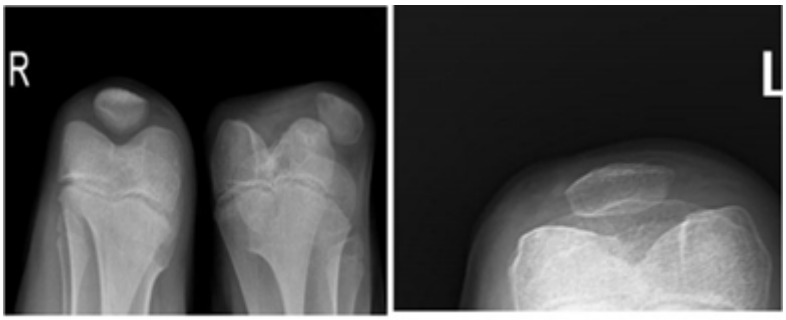
N	20
Pre-op	132.38 +/- 8.32
Post-op	134.36 +/- 8.42
P Value	0.950

The sulcus angle pre-operatively and Post-operatively was not statistically significant.

Table 2: Congruence angle

N	20
Pre-op	61.79 +/- 4.54
Post-op	16.07 +/- 4.27
P Value	<0.001

The congruence angle pre-operatively and Post-operatively was statistically significant.



Pre-operative radiographs Post-operative radiographs

Discussion

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. [7] Campbell developed the Campbell's technique as a method of proximal realignment for habitual patellar dislocation.

In adults, if genu valgum deformity remains after realignment due to the unstable patella, symptoms may also persist. Coventry [8] reported that femoral supracondylar varus osteotomy should be performed in patients with ≥12° of symptomatic genu valgum or with ≥10° of tilt of the articular surface. Healy et al [9] recommended to perform corrective osteotomy of the distal femur for ≥15° of genu valgum. Shen et al [10] suggested proximal soft tissue realignment and distal femoral osteotomy and anteromedial tibial tubercle transfer to treat genum valgum with ≥20° of femorotibial angle. The sulcus angle pre-operatively and Post-operatively was not statistically significant. The congruence angle pre-operatively and Post-operatively was statistically significant.

The etiology of habitual patellar dislocation include contracture and fibrosis of the quadriceps femoris, vastus lateralis, and lateral retinaculum, abnormal iliotibial band attach ment, 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. [11] Radiological assessment showed statistically significant changes in congruence angle. Sulcus angle almost remained unchanged on X-rays and but it doesn't always correlate with poor functional outcome. This was found in similarity with study conducted by Benoit B et al[12] in which they evaluated the long-term results of a surgical procedure performed on growing children with patellar dislocation and followed into adulthood with a follow-up period of almost 14 years. In their study no functional outcome was reported, but their reported sulcus angle was not modified.

Conclusion

We concluded that following proximal realignment procedure (Campbell procedure) for habitual dislocation of patella radiological parameters 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).

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