Hong Kong Journal of Orthopaedic Research

(An Open Access Journal for Orthopedics and Trauma Research)

Research Article

Hong Kong J Orthop Res ISSN (e): 2663-8231 ISSN (p): 2663-8223 2019; 2(3): 13-16 © 2019, All rights reserved www.hkorthopaedicjournal.com

Results of three in one procedure for habitual dislocation of patella in children

Jitesh Kumar Jain¹, Arun Sharma², Ramesh Chandra Meena³

- 1 Senior Resident in Department of Orthopedics, SMS Medical College, Jaipur, India
- 2 Assistant Professor, Department of Orthopedics, SMS Medical College, Jaipur, India
- 3 Senior Professor and Head, Department of Orthopedics, SMS Medical College, Jaipur, India

Abstract

Background: Habitual dislocation of the patella (HDP) is different from recurrent dislocation of the patella as in HDP patella dislocates to lateral side with every knee flexion movement. Mere MPFL reconstruction which suffices in recurrent dislocation of patella is not sufficient to prevent HDP. **Methods:** 10 children with HDP were evaluated by x rays, CT and MRI for measurements of mechanical axis, Insall-Salvati ratio, TT:TG distance and grading of trochlear dysplasia. All were operated by same surgeon and all had lateral release, MPFL reconstruction, and medial transposition of lateral half of patellar tendon. **Results:** At mean 26.8 months follow up no recurrence was seen. All gained full movement of the knee except one patient. Kujala score improved from preoperative 60.4 to 94.9 postoperatively. The mean Lysholm score improved from 59.1 preoperatively to 95.0 postoperatively. **Conclusion:** Our results show that three in one procedure is an effective method in patients with HDP. These three procedures together can be used in patients with HDP with mild trochlear dysplasia and ligamentous laxity.

Keywords: habitual dislocation of patella, MPFL reconstruction, lateral release.

INTRODUCTION

In habitual dislocation of the patella (HDP), it dislocates to lateral side each time the knee is flexed ^[1, 2]. Etiology of this condition is multifactorial and many treatment options have been suggested in the literature with variable success rate ^[3-9]. Treatment is essentially surgical involving one or more distal and proximal realignment procedures. Children are usually brought by their parents with complaints of instability, frequent fall and disability in sports. First visit to an orthopedic surgeon usually take place when child starts walking. If not treated it invariably leads to early arthritis of the knee joint. We are here presenting midterm results of "three in one procedure" in children with habitual dislocation of the patella without severe trochlear dysplasia.

MATERIAL AND METHODS

This was a prospective study conducted between October 2015 and October 2018. 10 patients (15 knees) of habitual dislocation of the patella were managed by three in one procedure which includes Medial patello-femoral ligament reconstruction, lateral release and medial shift of lateral half of patellar tendon. All patients were subjected to detailed clinical and radiological examination which included, AP, lateral and axial views of both knee joint, MRI and CT scan of the involved knee joint and measurements of mechanical axis, Insall-Salvati ratio, TT:TG distance and grading of trochlear dysplasia. Inclusion criteria were trochler dysplasia up to type B of Dejour's classification, TT:TG ratio less than 20 and habitual dislocations of one or both knees (Table 1). All patients were clinically assessed by Kujala and Tagner-Lysholm scores pre and post-operatively, range of motion and any relapse postoperatively. Congruence angle were measured for all knees on axial X ray of knee. Ligamentous laxity was evaluated according to Beighton score. Ethical committee permission and consent from all the patients included in the study were taken.

*Corresponding author: *Arun Sharma* Assistant Professor, Department of Orthopedics, SMS Medical College, Jaipur, India Email: dr.jiteshajmera[at]yahoo.com

Operative technique (Fig. 1): All children were operated by same surgeon (JKJ). A midline incision was used in all patients to open the knee joint. After incising skin and subcutaneous tissues, lateral release was done by incising lateral patellar retinaculae, synovium and capsule in full thickness. Lateral half of patellar tendon was incised in full thickness and detached from the tibial tuberosity. It was then passed underneath the remaining medial half of the patellar tendon and stitched there.

Hong Kong J Orthop Res



Figure 1: Lateral release (White arrow), medial transposition of lateral half of the patellar tendon (Asterisk) and MPFL reconstruction for HDP (Black arrow).

A 3- to 4-cm oblique incision was made starting from tibial tuberosity and extending medially and downwards. Sartorial fascia was incised and semitendinosis tendon (SemiT) was harvested using a tendon stripper. The semitendinosis tendon was whip-stitched at both ends with No. 2 ethibond (Ethicon, Somerville, NJ). A 3-cm-long vertical incision is made along the proximal two-thirds of the medial border of the patella. Medial border of patella was palpated and two blunt' v' shaped tunnels were made from medial to lateral using 4 mm cannulated drill bit. Both tunnels were made in the proximal half of the patella starting 1 cm from the superior pole of the patella. Semi T was passed from the upper tunnel using a beath pin (with eyelet at one end) and looped around the lateral border and then passed through the lower tunnel to bring it back on the medial border. Both tunnels were separated by 1.5 cms on the medial border.

A 3 cm incision was given over the medial epicondyle to expose it. Arthrex template guide was used to choose the entry point of the femoral tunnel (Fig 2). Entry point was just proximal and anterior of the junction of the posterior border and blumensaat line. Both ends of the graft were looped around the K-wire which is then drilled into the chosen point. Now isometry was checked. In an optimally placed tunnel graft should be tight in extension and first 30 degree of flexion. It slackens with further flexion. If the graft appears to be over tensioned at any point of range of motion the entry point was changed. 6mm reamer was used to make a tunnel at chosen entry point and graft was passed using eyelet beath pin. Graft was fixed with a 6mm interference screw into femoral tunnel. After the all three procedures full ROM was ensured on the OT table for all the patients (Fig 3).



Figure 2: Template for MPFL tunnel in the femur.



Figure 3: Full ROM was achieved for all patients intra-operatively with stable patellar tracking.

RESULTS

Average age of cohort was 9.2 years (8 to 16 yrs). There were 5 boys and 5 girls. All patients except 2, were having habitual dislocation of the patella (5 bilateral, 3 unilateral) since age of walking. Two patients of unilateral patellar dislocations had a history of knee injury (fall) preceding habitual dislocation. In all patients except 1 (2 knees), patella dislocated with each knee flexion below 30 degrees. In 1 patient (2 knees) patella was dislocating to lateral side with knee extension from flexed position and coming back to trochlear notch with flexion (Video 2). Complaints of anterior knee pain, difficulty in running and frequent fall were common to all the patients. Hyperlaxity as classified by Beighton score was present in 2 girls and 2 boys all having bilateral habitual dislocation of the patella (Beighton score >4).

The mean follow-up was 26.8 months (18 to 40). All patients were operated by same technique and there were no recurrence during follow up. Loose body due to patellar cartilage injury was present in one case, which was removed during surgery (Fig.4). Patellar tracking was normal in all patents. One patient complained of occasional anterior knee pain related to activity and one patient had difficulty in repeated squatting. All patients regained full range of motion except one patient (0-100 degrees). The mean Kujala score improved from preoperative 60.4 to 94.9 postoperatively. The mean Lysholm score improved from 59.1 preoperatively to 95.0 postoperatively. Congruence angle postoperatively ranged between + 5 to -7 degrees.



Figure 4: Loose body due to patellar cartilage injury secondary to traumatic dislocation of patella.

Table 1: Patient data

SN	Side	Pre op. Kujala score	Post op kujala score	Follow up duration months	Lysholm preop	Lysholm Postoperative	Complications	ROM at final follow up	Preoperative Congruence angle	Postoperative congruence angle	hyperlaxity	Trochlear dysplasia Dejour type
1	B/L	50	98	40	45	91	Repeated squatting painful	Full	Right=+30 Left= +32	Right= +2 Left=-3	yes	В
2	B/L	63	90	37	56	90	stiffness	0-100	Right= +30 Left=+ 25	Right=-5 Left=-5	yes	A
3	L	61	97	35	54	96		Full	+22	+4	no	А
4	R	64	98	30	57	95	Anterior knee pain	Full	+16	-3	no	А
5	B/L	67	97	28	64	98		Full	Right=+19 Left =+16	Right= -5 Left=0	no	В
6	B/L	73	100	22	65	100		Full	Right=+23 Left= +29	Right=-7 Left=-2	yes	В
7	R	55	90	20	66	95		Full	+16	-4	no	А
8	B/L	58	86	20	62	95		Full	Right= +22 Left=+10	Right=+2 Left=0	yes	A
9	L	55	93	18	52	90		Full	+30	+5	no	A
10	L	58	100	18	70	100		Full	+10	-6	no	В

DISCUSSION

A plethora of surgical procedures for treatment of HDP in the literature indicates lack of consensus on the optimal management of this entity. Usually children are brought by their parents early in their teenage or adolescence before development of arthritis. Extensor mechanism malalignment problems are multifactorial and they can involve abnormalities like patella alta ^[10], excessive femoral neck ante- version or external tibial torsion [11, 12], excessive genu valgus [13] and trochlear dysplasia [14]. So management focuses on the alignment of the extensor mechanism. Three most important factor which influence the surgical decision are TT:TG distance, patella alta and trochlear dysplasia. In our series all patients had Insall-Salvati ratio between 0.8 and 1.2. TT:TG distance is a linear measurement of Q angle and below 20 mm is considered normal. HDP is different from recurrent dislocation of patella where mere MPFL reconstruction often suffices [7, 8]. For habitual dislocation of the patella both proximal and distal realignment procedures are often required. Proximal alignment procedures include MPFL reconstruction, lateral release, medial reefing, quadriceps lengthening and medial advancement of vastus medialis obliqus (VMO). Distal realignment procedures include medial shift of tibial tubercle and medial shift of lateral half of patellar tendon [15, 16].

Soft tissue anomalies causing HDP include quadriceps and lateral soft tissue contracture, and atrophy of VMO. Bony anomalies leading to HDP include trochlear hypoplasia, genu valgum, patella alta, increased femoral anteversion and external tibial torsion. Earlier many authors have reported quadriceps contracture as a causative factor causing HDP and quadriceps lengthening was described as an essential part of the management ^[17-18]. The primary frontal stabilizer for patella is the MPFL. In our study MPFL reconstruction was done by harvesting semitendinosus. Only MPFL reconstruction is not sufficient to prevent lateral dislocation in habitual dislocation as the pathology is often multifactorial. Various treatment options combining 2 or more surgical procedures have been described to address HDP with variable success ^{[9,} ^{19-20]}. Results have been disappointing with high recurrence rate when only one soft tissue procedure like semitendinosis tenodesis [21], lateral release [22] or medial transposition of patellar tendon [23] was used to treat patellar instability in children with ligamentous laxity.

Matsushita *et al.*^[19] combined lateral release with MPFL reconstruction to treat HDP successfully but, the case series was too short (only two cases) to draw any conclusion. In a more aggressive approach Joo S.Y *et al.*^[9] combined lateral release, proximal 'tube' realignment of the

patella (reattachment of vastus medialis across the patella), semitendinosus tenodesis and transfer of the patellar tendon. His series involved children with severe ligamentous laxity and trochlear dysplasia. Ravi mittal *et al.* ^[20] combined lateral retinaculum release, vastus medialis obliques (VMO) advancement, partial patellar tendon transposition and reconstruction of medial patellofemoral ligament (MPFL) to address HDP in 6 children,but in this series author did not mention about ligamentous laxity and trochlear dysplasia. Niedzielski K.R *et al.* ^[24] have successfully used similar technique in children with HDP with ligamentous laxity. Soft tissue procedures in various combinations are required to treat HDP in children. Bony procedures are required when HDP is associated with severe trochlear dysplasia or bony malalignment. With increasing severity of ligamentous laxity and trochlear dysplasia more and more procedures need to be combined.

CONCLUSION

Our series suggest that HDP with ligamentous laxity with mild to moderate trochlear dysplasia can be managed with three soft tissue procedure combined together.

Conflicts of interest: None.

Source of funding: None

REFERENCES

- Eilert RE. Congenital dislocation of the patella. Clin Orthop. 2001; 389:22– 29.
- 2. Sumit Batra. Recurrent dislocation is different from habitual dislocation of patella. International Orthopaedics. 2014; 38(10):2223–2223.
- Walter Blauth, Ingo Schwarz. Surgical treatment of habitual dislocation of the patella in childhood. Orthopedics and Traumatology. 1992; 1(1):45-50.
- 4. Sumit Batra, Sumit Arora. Habitual dislocation of patella: A review. J Clin Orthop Trauma. 2014; 5(4):245-251.
- Patellofemoral instability: classification and imaging Masimo Berruto, Paolo Ferrua, Giulia Carimati, Francesco Uboldi, Luca Gala. Joints. 2013; 1(2):7-14. Published online 2013 Oct 24. PMCID: PMC4295697
- Hingelbaum S, Best R, Huth J, Wagner D, Bauer G, Mauch F. The TT-TG Index: a new knee size adjusted measure method to determine the TT-TG distance. Knee Surg Sports Traumatol Arthrosc. 2014; 22(10):2388-95. doi: 10.1007/s00167-014-3204-1. Epub 2014 Aug 2.
- MS Krishna Kumar, Sankarram Renganathan, Clement J Joseph, TR Easwar, and David V Rajan. Medial patellofemoral ligament reconstruction in patellar instability. Indian J Orthop. 2014; 48(5):501–505.

Hong Kong J Orthop Res

- Deie M, Ochi M, Sumen Y, et al. Reconstruction of the medial patellofemoralligament for the treatment of habitual or recurrent dislocation of the patella inchildren. J Bone Joint Surg [Br] 2003; 85-B:887-90.
- Joo SY, Park KB, Kim BR, Park HW, Kim HW. The "four-in-one" procedure for habitual dislocation of the patella in children: early results in patients with severe generalised ligamentous laxity and aplasis of the trochlear groove. J Bone Joint Surg Br. 2007; 89(12):1645-1649.
- 10. Neyret P, Robinson AH, Le Coultre B, Lapra C, Chambat P. Patellar tendon length: the factor in patellar instability? Knee 2002; 9(1):3-6.
- Chassainga V, Zeitouna JM, Camarab M, Blinc JL, Marqued S, Chanceliere MD. Tibial tubercle torsion, a new factor of patellar instability. Orthopaedics & Traumatology: Surgery & Research. 2017; 103(8):1173-1178.
- 12. Robert A. Teitge, Osteotomy in the Treatment of Patellofemoral instability. Techniques in Knee Surgery, 2006; 5(1):2–18.
- Kwon JH, Kim JI, Seo DH, Kang KW, Nam JH, Nha KW. Patellar dislocation with genu valgum treated by DFO. Orthopedics. 2013; 36(6):840-3.
- Batailler C, Neyret P. Trochlear dysplasia: imaging and treatment options. EFORT Open Rev. 2018; 3(5):240-247. Published 2018 May 21. doi:10.1302/2058-5241.3.170058
- Shen HC, Chao KH, Huang GS, Pan RY, Lee CH. Combined proximal and distal realignment procedures to treat the habitual dislocation of the patella in adults. Am J Sports Med. 2007; 35(12):2101-8. Epub 2007 Aug 27.
- 16. Arendt EA, Fithian DC, Cohen E. Current concepts of lateral patella dislocation. Clin Sports Med 2002; 21:499-519.
- 17. Neil R. Bergman, Peter F. Williams. Habitual dislocation of the patella in flexion. J Bone Joint Surg [Br] 1988; 70-B:415-9.
- Kuo-An Lai, Wun-Jer Shen, Chii-Jeng Lin, Yung-Tai Lin, Chin-Yu Chen & Kong-Chao Chang. Vastus lateralis fibrosis in habitual patella dislocation: An MRI study in 28 patients, Acta Orthopaedica Scandinavica, 2000; 71(4):394-398.
- Matsushita, Takehiko *et al.* "Medial patellofemoral ligament reconstruction with lateral soft tissue release in adult patients with habitual patellar dislocation." Knee Surgery, Sports Traumatology, Arthroscopy, 2012; 21:726-730.
- Mittal R, Balawat AS, Manhas V, Roy A, Singh NK. Habitual patellar dislocation in children: Results of surgical treatment by modified four in one technique. J Clin Orthop Trauma. 2017; 8(Suppl 2):S82–S86. doi:10.1016/j.jcot.2017.03.008
- 21. Hall JE, Micheli LJ, McManama GB Jr. Semitendinosus tenodesis for recurrent subluxation or dislocation of the patella. Clin Orthop 1979; 144:31-5.
- 22. Dandy DJ, Griffiths D. Lateral release for recurrent dislocation of the patella. JBone Joint Surg [Br] 1989; 71-B:121-5.
- 23. Marsh JS, Daigneault JP, Sethi P, Polzhofer GK. Treatment of recurrentpatellar instability with a modification of the Roux-Goldthwait technique. J Pedi-atr Orthop 2006; 26:461-5.
- Niedzielski KR, Malecki K, Flont P, Fabis J. The results of an extensive softtissue procedure in the treatment of obligatory patellar dislocation in children with ligamentous laxity: a post-operative isokinetic study. Bone Jt J. 2015; 97-B(1):129–133.