Arthroscopic proximal realignment for recurrent patellar instability

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Introduction
Patellar instability is a common cause of knee pain and disability. It can be managed with conservative treatment. Patients in whom conservative treatment fails, usually some form of surgical realignment procedure is performed. Treatment of recurrent patellar instability is a source of much controversy. The operative procedures commonly used include lateral retinaculum release, proximal realignment, distal realignment, or combined procedures. The aim of this study was to evaluate the results of all-inside arthroscopic proximal realignment for recurrent patellar instability.

Patients and methods
Twenty-six patients (16 female and 10 male patients) undergoing proximal realignment procedure were treated with all-arthroscopic lateral release and medial plication. The patients were operated on under general anesthesia and tourniquet control. Postoperatively, a brace was locked in full extension for 1 week, followed by physical therapy for 2 months. All patients were assessed 6 months postoperatively on the basis of the Lysholm knee scoring scale.

Results
The mean follow-up period was 37 months (range, 29–48 months). The mean Lysholm knee scoring scale improved significantly from a mean of 55.4 points preoperatively to a mean of 91.2 points postoperatively. There was good improvement as regards pain, stability, ability to climb stairs, and confidence in the operated knees.

Conclusion
Arthroscopic proximal realignment for recurrent patellar instability is a minimally invasive procedure with minimal complications. It is associated with less morbidity. The period of rehabilitation is relatively shorter, and the results are comparable to those of the established open surgical techniques for this condition.

Keywords:
lateral release, medial plication, patellar dislocation, patellar instability

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Introduction

Malalingment of the patella is a common problem. Most patients with this condition respond well to conservative treatment methods. Severe cases of malalignment can result in instability, including patella dislocation, and may require surgical intervention for correction [1].

Recurrent lateral patellar instability as a clinical entity is typically characterized by an unstable patella in patients who suffer repeat episodes (two or more) of objective dislocation of the patella, or experience repeated symptoms of subjective subluxation of the patella without complete dislocation. Instability may be the result of underlying anatomic abnormalities of the patellofemoral articulation, including dysplastic lateral femoral condyle, dysplastic patella, patella alta, or an abnormal Q angle [2–4].

The initial treatment for patellar instability is nonoperative, but, should this fail, surgery is an option. The surgical treatment for recurrent patellar instability remains challenging. Despite the presence of numerous procedures, the surgical treatment of choice for recurrent lateral patellar instability remains controversial. A variety of surgical techniques have been reported, and the published success with each procedure has varied in the literature. The majority of these procedures involve variations in two basic techniques:

(a) Proximal soft-tissue realignment and/or
(b) Distal bony realignment of the tibial tubercle [4–6].

For patients with patellar instability and normal bony anatomy, a proximal soft-tissue realignment is often recommended. Over 100 different procedures have been described to address this condition. Good results have been reported with procedures that tighten or repair the medial retinaculum in combination with a lateral retinacular release. Earlier techniques were associated with a medial incision to achieve suture plication, although totally arthroscopic procedures have been described [4,7].

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The aim of this study was to evaluate the results of all-inside arthroscopic proximal realignment for recurrent patellar instability.

Patients and methods

Between September 2008 and February 2010, 26 patients (16 female and 10 male patients) undergoing proximal realignment procedure were treated with all-arthroscopic lateral release and medial plication. The mean age of the patients was 24.4 years (range, 18–29 years). The right knee was affected in 19 patients (73%). Inclusion criteria were recurrent lateral dislocations (a minimum of three), or frequent subluxations despite a minimum of 3-months physical therapy and bracing. Exclusion criteria were patients with fixed dislocation of patella, or those with maltracking associated with knee deformities. Patients with prior patellofemoral surgery, hyperlaxity syndromes, and/or acute dislocations were also excluded from the study.

All patients were evaluated with physical examination and radiography. Preoperative clinical assessment was carried out using the Lysholm score. Radiographic evaluation included measuring the congruence and the lateral patellofemoral angles. The normal expected range for the congruence angle is an average value of −6°, with a SD of 11° [8]. The lateral patellofemoral angle lies between a line across the tops of the femoral condyles and a line along the lateral facet of patella. Normally, this angle opens laterally and a positive angle is considered normal.

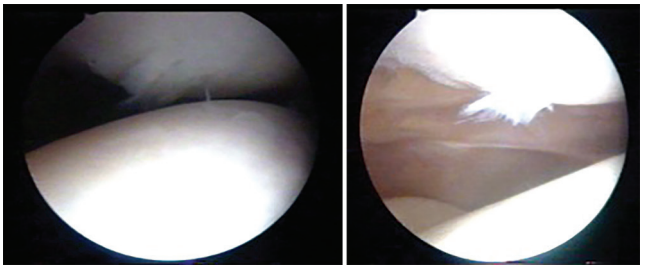
The patients were operated on under general anesthesia and tourniquet control. Physical examination under anesthesia was routine. Standard arthroscopic portals were performed, and a careful arthroscopic evaluation of the joint was carried out. Persistent lateral tilt or overhang of the lateral patellar facet over the edge of the lateral femoral condyle with the knee moving from full extension into 30°–40° of flexion suggests a lateral tracking phenomenon Fig. 1.

Through the anteromedial arthroscopic portal the medial retinaculum was then roughened under direct arthroscopic visualization by means of a soft-tissue abrader to encourage healing before insertion of the sutures. The medial plication was performed with a large curved needle and number 1 PDS suture strands inserted into the joint cavity close to the patella Figs 2 and 3.

The needle exited through the skin as far posteromedially as possible. The first percutaneous suture was located 1 cm proximal and medial to the superior pole of the patella. Similar sutures were passed above and below the first suture with 2 cm interval. Sutures were performed in a similar manner at three points (superior, middle, inferior) along the medial border of the patella.

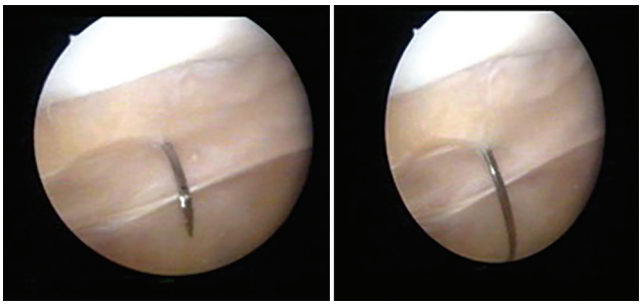
An adequate lateral release was then performed under direct arthroscopic vision using an arthroscopic ablasion device to avoid the postoperative hemarthrosis. The release extended from the superolateral corner of the patella marked by the spinal needle to the inferior extent of the lateral border of the patellar tendon Fig. 4.

Figure 1



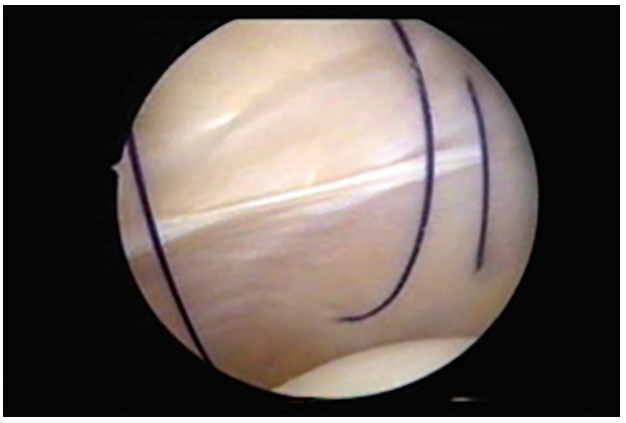
Arthroscopic views showing maltracking of the patella.

Figure 2



Arthroscopic view of the curved needle passing through medial retinaculum.

Figure 3

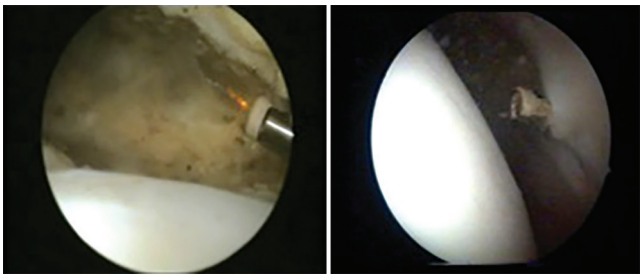


Arthroscopic picture of sutures passing through the medial retinaculum.

All medial sutures were then tied in the subcutaneous plane and the knots were buried subcutaneously. No drain was used Figs 5 and 6.

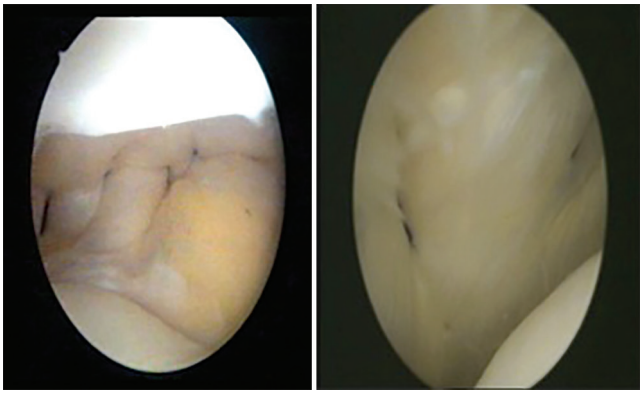
Postoperatively, a brace was locked in full extension for 1 week, followed by physical therapy for 2 months. Patients were not allowed to flex past 90° for 4 weeks, to avoid stretching of the repair. All patients were assessed 6 months postoperatively on the basis of the Lysholm knee scoring scale [8].

Figure 4



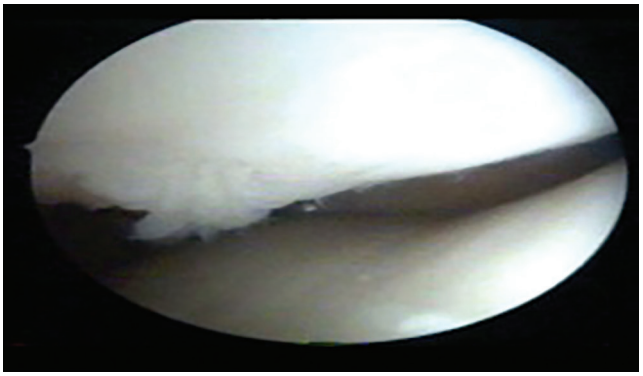
Arthroscopic view of lateral retinaculum release.

Figure 5



At 20 weeks follow-up with evident union of tibial fracture.

Figure 6



Arthroscopic view following patellar realignment.

Results

The mean follow-up period was 37 months (range, 29–48 months). The mean Lysholm knee scoring scale improved significantly from a mean of 55.4 points (range, 38–65 points) preoperatively to a mean of 91.2 points (range, 75–98 points) postoperatively ($P = 0.0001$). The results were excellent in 12 patients (46%), good in 11 patients (42%), fair in one patient (4%), and poor in two patients (8%) (Table 1).

Menisci and anterior cruciate ligaments were intact in all knees.

There was good improvement as regards pain, stability, ability to climb stairs, and confidence in the operated knees (Table 2).

The instability improved from a mean of 5 points (range, 3–10) preoperatively to a mean of 23 points (range, 18–25 points) postoperatively. Pain was also improved from a mean of 4 points (range, 3–11 points) preoperatively to a mean of 22 points (range, 18–25 points) postoperatively. All patients regained full range of motion postoperatively, except two patients who improved after physiotherapy. No patients required manipulation or repeat surgery.

Table 1 Summary of results based on the Lysholm scoring scale (26 knees)

Results	Score	Number of knees
Excellent	95–100	12
Good	84–94	11
Fair	65–83	1
Poor	<65	2

Table 2 Results based on the Lysholm scoring scale (26 knees)

Preoperative clinical data	Preoperative	End of follow-up
Instability		
Never give way	0	24
Occasional	3	2
Often	23	0
Pain		
None	1	21
Inconstant	5	3
Marked	8	2
Constant	12	0
Stair climbing		
No problem	3	21
Slightly impaired	13	4
One step at a time	10	1
Impossible	0	0
Swelling		
None	2	23
On exertion	14	3
Constant	10	0

As regards complications, one patient had a superficial portal site infection that was completely resolved with dressing and antibiotic therapy. Three patients complained from skin dimpling caused by subcutaneous suture knots.

Radiologically, there was a significant improvement in the congruence angle from a mean of +13.2 preoperatively to a mean of -7.6 postoperatively (P = 0.01). In contrast, there was insignificant difference as regards the preoperative and postoperative measurement of the lateral patellofemoral angle (P = 0.088); 20 patients (77%) had a normal preoperative angle.

At the final follow-up, 23 (88%) of the 26 knees were considered by the patients to be much better or better as a result of the operation. The other two patients had a residual intermittent pain and infrequent sublaxation.

Discussion

The treatment of recurrent patellar instability is challenging. The redislocation rate is 49% compared with 17% for a primary dislocation [4]. Risk factors for recurrence are female sex, more than one previous dislocation, and patellofemoral malalignment. Even though the risk of redislocation is decreased after a primary dislocation, up to 50% have continued symptoms of instability or pain [9,10].

Lateral retinacular release alone has only a 50% satisfactory long-term outcome and is not without problems such as medial patellar dislocation. However, in patients with patellar instability we have seen a significant decrease in results, compared with earlier follow-up assessment (72% satisfactory results in the previous 44-months follow-up evaluation decreased to 50% at the 5–12-year follow-up evaluation) [11,12].

Arthroscopic medial retinaculum suture, first described by Yamamoto [13] and later modified by several authors, offers a good chance to treat both acute and recurrent patellar dislocations. Medial retinacular plication combined with lateral retinacular release has been effective in treating acute and chronic instability. Medial plication can be performed by passing sutures through the medial retinaculum in a purely arthroscopic or arthroscopically assisted percutaneous technique. Moreover, a technique using suture anchors in the patella has been described. However, results of these repairs have shown redislocation rates of 0–8% with a minimum of 12 months' follow-up [1,7,14–17].

Several authors have since reported on an arthroscopic medial 'reefing' or plication technique for patellar instability with promising results. Small *et al.* [14] reported 92.5% good or excellent results in 27 knees. Haspl *et al.* [15] reported 100% good results and only one redislocation in their series of 17 knees. Halbrecht *et al.* [1] reported on 29 knees that showed 93% clinical improvement after an all-arthroscopic medial retinacular plication. In addition, mini-open medial reefing procedures have been reported. Nam and Karzel [18] followed up 22 knees for a mean period of 4.4 years and showed an average follow-up Kujala score of 88 points.

It is debatable whether a specific open medial patellofemoral ligament (MPFL) reconstruction is needed to provide stability for recurrent dislocations, yet there are many reports of good results without a specific reconstruction of the MPFL [1,7,14–17]. Sandmeier *et al.* [19] found that, in the presence of a well-centered quadriceps load and the absence of external lateral forces, the MPFL does not have a significant effect on patellar tracking. In addition, the vastus medialis obliquus is a major stabilizer of the patella both with in-vivo and in-vitro testing [1,20]. All patients in this study were at least 6 months from injury and were nontender over the MPFL, indicating healed medial soft tissues.

Patient satisfaction with the overall results in this study was encouraging; 88% of patients (23 of 26 cases) rated their results as either excellent or good at a mean follow-up of 37 months. Other reports of similar technique using suture medial plication show high satisfaction with short-term follow-up; 90–93% had good or excellent results at 24 months or less [1,8,21].

Radiologically, patients with recurrent patellar instability can have patellofemoral radiographic angles in the normal range. Good clinical outcomes seem independent of radiographic measurements. Although abnormal radiographic findings may be useful to aid in diagnosis, recurrent symptoms and physical examination are better measures to judge the clinical effectiveness of a treatment program [1,22,23]. These findings were similar to those reported in our study, as we found 20 patients (77%) had a normal preoperative angle.

Poor results in this study were encountered in two cases (8%) that showed infrequent subluxations. One case (4%) showed recurrent effusion and pain, with no attacks of subluxation or dislocation, and was considered fair result at the final follow-up. This is comparable to that in previously published reports.

The strengths of this study are the relative length of follow-up and the low participant dropout. In addition, only two surgeons performed all surgeries using a uniform technique. The limitation of this study is the inclusion of patients with multiple subluxations together with cases with frank recurrent dislocations.

Conclusion

The all-inside arthroscopic proximal realignment for recurrent patellar instability is a minimally invasive procedure with minimal complications and is easy to perform. It is associated with less morbidity. Moreover, the period of rehabilitation is relatively shorter, and the results are comparable to those of the established open surgical techniques for this condition.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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