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Original article

Outcomes of medial patellofemoral ligament reconstruction in patients with patella alta☆

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ABSTRACT

Objective: To compare the clinical outcomes and the results of knee functional scores in patients with normal patellar height and patella alta who underwent isolated medial patellofemoral ligament reconstruction.

Methods: A total of 37 knees from 33 patients with recurrent patellar dislocation who underwent isolated medial patellofemoral ligament reconstruction were included. Retrospectively, the postoperative clinical results were compared using the Kujala and Lysholm scores in the group of patients with normal patellar height and in those with patella alta.

Results: The sample consisted of 37 patients; 16 knees of 14 patients in the group with normal patellar height, 21 knees of 19 patients in the group with patella alta. In the first group, the mean Kujala score was 85.8 and the mean Lysholm score was 85.6. In the second, the mean Kujala score was 78.1 and the mean Lysholm score was 79.7. No significant differences were observed between the groups in relation to the Lysholm ($p = 0.296$) and Kujala scores ($p = 0.181$).

Conclusion: Isolated medial patellofemoral ligament reconstruction presented similar results in patients with normal patellar height and patella alta.

Resultados da reconstrução isolada do ligamento patelofemoral medial em pacientes com patela alta

Palavras-chave:
Patela
Luxação patelar

RESUMO

Objetivo: Comparar os resultados clínicos e escores funcionais do joelho em pacientes com altura patelar normal e patela alta submetidos a reconstrução isolada do ligamento patelofemoral medial.

☆ Study conducted at Grupo de Joelho, Serviço de Ortopedia e Traumatologia, Rede Mater Dei de Saúde, Belo Horizonte, MG, Brazil.

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Articulação patelofemoral
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Métodos: Foram incluídos 37 joelhos de 33 pacientes com quadro de luxação recidivante da patela submetidos a reconstrução isolada do ligamento patelofemoral medial. Retrospectivamente, foi comparado o resultado clínico pós-operatório pelas escalas de Kujala e Lysholm entre o grupo de pacientes com altura patelar dentro da normalidade e aqueles com patela alta.

Resultados: A amostra foi constituída por 37 pacientes; 16 joelhos de 14 pacientes pertenciam ao grupo da patela com altura normal e 21 joelhos de 19 pacientes compuseram o grupo com patela alta. No primeiro grupo, a pontuação média pela escala de Kujala foi de 85,8 e pela de Lysholm, 85,6. No segundo, a pontuação média pela escala de Kujala foi de 78,1 e pela de Lysholm, 79,7. Não foi observada diferença significativa entre os grupos em relação aos escores das escalas de Lysholm (p = 0,296) e de Kujala (p = 0,181).

Conclusão: A reconstrução isolada do ligamento patelofemoral medial apresentou resultados semelhantes em pacientes com altura patelar normal e elevada.

Introduction

Several procedures have been described for the treatment of patellofemoral instability, including ligament reconstructions and patellar realignments. The procedure of choice continues to be a subject of debate, and preferences vary greatly among the different authors.[1,2]

Studies and meta-analyses have shown that patella alta is a predisposing factor for patellar instability, and recent literature suggests that medial patellofemoral ligament reconstruction (MPFL) may assist in restoring patellar kinematics.[3]

MPFL reconstruction is indicated in cases of instability generated by rupture or laxity of the stabilizing medial structures, where an increase in the patellar tilt angle is observed. Classically, the MPFL is reconstructed in isolation when patellar height and Q angle (calculated through TT-TG distance measurement) are within normal limits. To date, several reconstruction techniques have been described.[1,2,4]

Many criteria have been proposed to guide the surgical procedure. Currently, one of the important questions is when to indicate the reconstruction alone or in combination with an additional procedure. These indications remain somewhat arbitrary, and there is relatively little evidence to support these specific measures.[5–7]

The present retrospective study is aimed at evaluating the clinical results and the functional scores in patients who underwent isolated MPFL reconstruction and to compare those with normal and altered patellar height.

Material and methods

Between November 2010 and July 2016, 126 knees of 118 patients with recurrent patellar dislocation underwent MPFL reconstruction. Of these, 45 patients were excluded due to inability to contact or lack of complementary exams in their medical records. The remaining 73 patients were selected to participate in the study. Of those, 40 patients were excluded because they presented preoperative conditions that could interfere with the results, such as trochlear or patellar osteochondral lesions, tomographic TT-TG distance measurements above 25 mm, or other intrinsic lesions unrelated to instability. The study also excluded patients with open physes and those with associated injuries in the operated limb that could directly or indirectly influence the final outcome. A total of 33 patients signed the Informed Consent Form and were evaluated.

The study included 21 (67.6%) women and 12 (32.4%) men. Four patients had bilateral surgery, and therefore 37 knees were evaluated. The mean age was 26.7 years, ranging from 17 to 43. The right knee was operated in 21 cases (56.7%), while the left knee in 16 (43.3%). The minimum follow-up was six months and the maximum was 74, with a mean of 33.6 months or 2.8 years.

The Caton and Deschamps index was used to determine patellar height[8] in strict knee lateral view radiographs. Patellar height above 1.2 was considered as patella alta. Patients with normal patellar height were included in group 1, while group 2 included those with patella alta. In group 1, mean patellar height was 1.14 (standard deviation 0.03) and in group 2, 1.34 (standard deviation 0.11, $p < 0.001$), indicating a significant difference between the mean heights of the two groups.

The Kujala and Lysholm scores were used to compare the results of the isolated MPFL reconstructions between both groups.

Three surgeons (LFBPJ, MHFC, and OPN) performed the reconstructions, using a semitendinosus tendon graft. On the patella, the tendon was secured with two anchors in the upper middle third, without bone tunneling. The femoral tunnel was made by palpation of the anatomical landmarks between the adductor tubercle and the medial epicondyle (Nomura's point)[9] or by means of fluoroscopy at the intersection of a line tangent to the medial condyle and perpendicular to the posterior cortical projection (method described by Schöttle et al.),[10] according to the preference of the surgeon. The graft was secured to the femoral tunnel with absorbable interference screw or metallic screw with the knee in 30–45 degrees of flexion.

In the statistical analysis, the categorical variables were presented as calculations and percentages and the numeric variables as means, standard deviations, and minimum and maximum values. The association between the groups with the variables of gender and the operated knee was assessed using Fisher's exact test. The numerical variables were compared between the groups using the Wilcoxon Mann–Whitney test for independent samples, as this test does not require the assumption of normality of the variables. The difference between the means was considered significant if the p-value obtained was less than 0.05. The analyses were performed using the open-source program R version 3.3.2.

The work was approved by the ethics committee, under CAAE No. 58522916.5.0000.5128.

Results

The sample consisted of 37 patients. Group 1 consisted of 14 patients and 16 knees. Group 2 consisted of 19 patients and 21 knees.

Only 12 patients were male and 21 underwent right knee surgery. The mean age was 26.7 years (SD = 8 years) and the mean follow-up time was 2.8 years (SD = 1.6 years). No significant differences were observed between groups 1 and 2 regarding these characteristics (all *p*-values were higher than 0.05; Table 1).

For the entire sample, the mean Lysholm score was 82.2 (SD = 13.4; range: 55–98). The mean Kujala score was 81.5 (SD = 14.2; range: 48–100; Table 2). All patients were questioned regarding new episodes of patellar dislocation and reported that there was no recurrence of instability.

In group 1, the mean Lysholm score was 85.6 (SD = 11.4; range: 55–98); and the mean Kujala score was 85.8 (SD = 12.5; range: 51–100).

In group 2, the mean Lysholm score was 79.7 (SD = 14.5; range: 56–98), while the mean Kujala score was 78.1 (SD = 14.8; range: 48–100).

No significant differences were observed between groups 1 and 2 in relation to the Lysholm (*p*-value = 0.296) and Kujala (*p*-value = 0.181) scores (Table 2).

Discussion

MPFL reconstruction has produced good patellar stability and good functional results.[1,11–13] In a review article, Lind et al.[14] reported the absence of post-reconstruction recurrences in five out of eight studies; in the remaining three, the recurrent dislocation rates were lower than 7%, which can be considered a success. The present study also observed no cases of postoperative dislocation. In both groups, MPFL reconstruction fulfilled its goal of patellar stabilization.

The situations in which the association of different procedures would be indicated to correct patellofemoral instability are currently being discussed. The focus of the debate is which patellar height would require the combination of realignments and MPFL reconstruction.

An isolated reconstruction would bring less morbidity to the procedure and make the recovery faster, with fewer potential complications, especially those related to the recovery of the range of motion. In turn, in cases that would also require a realignment procedure, the isolated reconstruction could keep the neoligament under excessive tension and lead to poor results, including instability relapse.[5,15,16]

Feller et al.[5] assessed the results of 31 patients who underwent isolated MPFL reconstruction and ten patients who underwent combined procedures. Isolated reconstruction was performed in patients with an Insall-Salvatti index of up to 1.5. In the group in which the isolated MPFL reconstruction was performed, no cases of instability recurrence were observed. In the group of patients who underwent combined procedures, there was one recurrence. The rate of return to sports was 81% in the isolated reconstruction group and 57% in the combined procedures groups. In that series, patellar height did not influence the results, similarly to what was observed in the present

Table 1 – Sample characterization.

Variables	Entire sample (*n* = 37)*n* (%)	Group 1 (*n* = 16)*n* (%)	Group 2 (*n* = 21)*n* (%)	*p*-value
Gender				
Male	12 (32.4)	5 (31.2)	7 (33.3)	1.000
Female	25 (67.6)	11 (68.8)	14 (66.7)	
Age (years)				0.760
Mean	26.7	27.1	26.4	
Standard deviation	8	8	8.2	
Minimum	17	17	17	
Maximum	43	42	43	
Operated knee				
Right	21 (56.8)	10 (62.5)	11 (52.4)	0.739
Left	16 (43.2)	6 (37.5)	10 (47.6)	
Follow-up time (years)				0.902
Mean	2.8	2.6	2.9	
Standard deviation	1.6	1.4	1.8	
Minimum	0.6	0.6	0.8	
Maximum	8.4	5.3	8.4	

Note: The *p*-values refer to the following tests: Fisher's *F* exact and Wilcoxon Mann–Whitney for independent samples.

Table 2 – Scores for the entire sample and per group.

Variables	Entire sample ($n = 37$)	Group 1 ($n = 16$)	Group 2 ($n = 21$)	p-value
Lysholm				0.296
Mean	82.2	85.6	79.7	
Standard deviation	13.4	11.4	14.5	
Minimum	55	55	56	
Maximum	98	98	98	
Kujala				0.181
Mean	81.5	85.8	78.1	
Standard deviation	14.2	12.5	14.8	
Minimum	48	51	48	
Maximum	100	100	100	

Note: The p-values refer to the Wilcoxon Mann–Whitney test for independent samples.

study. Furthermore, no significant differences were observed between the groups regarding the Lysholm and Kujala scores, and there was no recurrent dislocation. However, although statistically insignificant, in the present study the results were slightly higher in the group of patients with normal patellar height (Table 2).

An interesting finding from the study by Feller et al.[5] is that in the combined procedures group, subchondral bone was exposed in all patients. While this was not assessed in the present patients, the fact that a theoretically more severe instability could lead to a more pronounced chondropathy would explain the worse functional scores observed in group 2 (patella alta), despite the lack of statistical significance. Although good results were achieved in both groups, the conclusion from the study by Feller et al.[5] leaves open to question how far can an isolated reconstruction be considered.

Redler et al.[17] performed a cadaveric biomechanical study with the lateralization and proximalization of the anterior tuberosity. In cases with TT-TG distance above 25 mm or a patellar height above 1.4 in the Caton and Deschamps index, the isometry of MPFL was altered, making it anisometric. The MPFL also became anisometric when there was a combination of TT-TG distance above 25 mm and patellar height above 1.2. That study is relevant for orthopedic practice, suggesting the need for combined procedures only in cases of extreme alterations in patellar heights or when these alterations are associated in the same patient. In these cases, isolated reconstruction may be prone to failure, as it interferes with MPFL isometry.

Hopper et al.[18] performed MPFL reconstruction in 72 knees, and in 22 a tuberosity osteotomy was associated with the reconstruction. The indication for the associated procedure was TT-TG distance above 17 mm or Caton and Deschamps index above 1.2. These authors observed a high failure rate in patients with a high degree of trochlear dysplasia (Dejour grades C and D), with a 100% rate of dislocation relapse in this group (seven cases). Recurrent dislocation in patients with mild dysplasia was 9.3% (five out of 54 cases). The results of the cases in which an osteotomy was associated did not present a statistically significant difference when compared with those in which the isolated reconstruction was performed. The mean Kujala and Lysholm scores were 76.2 and 73.8, respectively. Similar values were observed in the present patients, in which the mean Kujala and Lysholm scores were 81.5 and 82.2, respectively. Hopper et al.[18] concluded that, due to high failure rates, isolated MPFL reconstruction should not be performed in patients with severe trochlear dysplasia; other procedures should always be performed.

Fabricant et al.[3] performed isolated MPFL reconstruction in 27 children with recurrent patellar instability. They observed an improvement in the different indexes of patellar height when comparing the preoperative and three-month postoperative radiographs. Therefore, MPFL reconstruction, in addition to restoring the dynamics of the medial stabilizers of the patella, can also restore static stability and direct the patella medially and distally in the trochlear groove. These results suggest that surgeons can reduce patellar height even in the absence of tuberosity distalization, thus avoiding an additional procedure. In the present study, patellar height was not assessed in the postoperative period; however, good stability results were observed even in patients with patella alta, with the absence of episodes of recurrent dislocation.

Damasena et al.[19] performed tuberosity transfer and lateral release in 36 knees of 34 patients; in half of the cases, an MPFL reconstruction was associated. They used the Tegner and Kujala scores and found no differences between the groups evaluated. However, in the group where the MPFL reconstruction was associated, a greater general patient satisfaction index was observed, and computed tomography demonstrated an improvement in patellar inclination and congruence angle. Those authors observed one case of recurrent dislocation, an outcome not observed in the present study.

Conclusion

In the present study, isolated MPFL reconstruction led to similar results in patients with normal and elevated patellar height, both in terms of patellar stabilization and in relation to functional scores, with no statistically significant difference.

Conflicts of interest

The authors declare no conflicts of interest.

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