






# CLINICAL RESULTS OF MEDIAL PATELLOFEMORAL LIGAMENT RECONSTRUCTION

## RESULTADOS CLÍNICOS DA RECONSTRUÇÃO DO LIGAMENTO PATELOFEMORAL MEDIAL

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### ABSTRACT

**Objective:** To assess clinical results of patients who underwent medial patellofemoral ligament (MPFL) reconstruction after a minimum of two years of follow-up. **Methods:** Patients' medical records were assessed for residual instability, patient satisfaction, and post-operative functional outcomes. **Results:** Fifty-one patients were analyzed, out of which 56.87% were women. Patients' mean age was 30.8 years (16 to 57 years). The mean follow-up time was 68.7 months (37 to 120 months). Length between first dislocation and surgery was less than 1 year for 58.82% of patients, between 1 and 5 years for 37.25%, and over 5 years for 3.93%. Patients showed a high degree of satisfaction (96.08% would undergo surgery again), with recurrence rate of 11.76%. Twenty-two patients reported knee symptoms, including pain from movements (72.72%), weakness (18.18%), constant pain (13.63%), and crepitus (4.54%). Considering dissatisfied patients, patients with dislocation recurrence, and patients with symptoms, five cannot practice physical activity, out of which only three blame their knee. **Conclusion:** MPFL reconstruction showed a recurrence rate of 11.7%, with high patient satisfaction, good functional results, and high rate of return to sports, after a minimum of two years of follow-up. **Level of Evidence IV, Case Series.**

**Keywords:** Patellofemoral Joint. Patellar Dislocation. Patella. Reconstructive Surgical Procedures.

### RESUMO

**Objetivo:** Avaliar o resultado clínico de pacientes submetidos à reconstrução do ligamento patelofemoral medial (LPFM), acompanhados por mínimo de dois anos. **Métodos:** Avaliação de prontuários para informações sobre instabilidade residual, satisfação do paciente e resultado funcional pós-operatório. **Resultados:** Foram analisados 51 pacientes. 56,87% do sexo feminino e média etária 30,8 anos (16 a 57). Tempo médio de acompanhamento de 68,7 meses (37 a 120). Intervalo entre primeira luxação e cirurgia foi menos de 1 ano em 58,82%, entre 1 e 5 anos em 37,25% e mais de 5 anos para 3,93%. Os pacientes apresentaram alto grau de satisfação (96,08% fariam a cirurgia novamente), com 11,76% de recidiva. Houve persistência de sintomas em 22 pacientes, sendo dor ao movimento o principal (72,72%), seguido de fraqueza (18,18%), dor constante (13,63%) e crepitações (4,54%). Somando os pacientes insatisfeitos aos que tiveram recidiva da instabilidade e os sintomáticos, 5 não conseguem praticar atividade física, mas apenas 3 por causa do joelho. **Conclusão:** A reconstrução isolada do LPFM demonstrou índice de recidiva de 11,7%, com alto nível de satisfação dos pacientes, ótimos resultados funcionais e alta taxa de retorno ao esporte, em acompanhamento mínimo de 2 anos. **Nível de Evidência IV, Série de Casos.**

**Descritores:** Articulação Patelofemoral. Luxação Patelar. Patela. Procedimentos Cirúrgicos Reconstructivos.

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### INTRODUCTION

The medial patellofemoral ligament (MPFL) is the main primary medial restrictor of the patella in the first 30° of flexion, restricting its lateral dislocation in 60% to 80%.<sup>1,2</sup> After the first dislocation episode, the chance of recurrence is about 50%, even with adequate conservative treatment.<sup>2</sup> Surgical procedures for the treatment of this pathology have recently become more known, with increased knowledge of the

biomechanics of the patellofemoral joint and the pathophysiology of patellar instability and advanced surgical techniques.<sup>3,4</sup> Professionals discuss which of the techniques would be more effective, which would have fewer post-operative complications, and what types of graft and fixation material to use.<sup>2,3</sup> Preferences vary from one country to another, but the current trend would be a specific indication for each patient depending on their joint changes.<sup>3,5</sup>

All authors declare no potential conflict of interest related to this article.

The study was conducted at the Uniort.E Hospital de Ortopedia and the Hospital Evangélico de Londrina.

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Isolated medial patellofemoral ligament (MPFL) reconstruction is the most used treatment for recurrent patellar instability. It is also associated with other stabilization methods, including tibial tubercle osteotomy and trochleoplasty.<sup>3,6</sup>

MPFL reconstruction has complications like all surgical treatment, despite its high success rates. Most common complications include the recurrence of patellar instability, recurrent seizure, joint stiffness, and patellar fracture.<sup>1,2,7,8</sup> A careful surgical technique can prevent these by reconstructing ligament anatomy and isometry, followed by adequate rehabilitation.<sup>9</sup> Gravesen et al.<sup>10</sup> report that the risk of persistent patellar morbidity after eight years of MPFL reconstruction surgery can reach 21%.

Surgeons should therefore wisely choose between isolated MPFL reconstruction or reconstruction associated with other procedures to increase final stability and improve functional results.<sup>11-13</sup>

This study aimed to assess patients who underwent isolated MPFL reconstruction on their degree of satisfaction, incidence of recurrent instability, time between the first dislocation and surgery, most common symptoms, and how many of them returned to physical activities without knee-related limitations.

## MATERIALS AND METHODS

The study was approved by the Research Ethics Committee of the Associação Evangélica Beneficente de Londrina — AEBEL under CAAE no. 28015219.0.0000.5696.

Patients subjected to reconstruction of the medial patellofemoral ligament with flexor tendon graft by the same medical team were selected. Three experienced surgeons performed the surgeries (MVD, AOQ, and JPFG). Patients should have a minimum follow-up of two years, with complete medical records and possibility of contact to complement data when needed. Surgery was indicated in the case of a second episode of instability after attempting an unsuccessful conservative treatment for at least three months.

Exclusion criteria were patients with less than 24 months of surgery and patients who had undergone any other patellofemoral stabilization procedure, including tibial tubercle osteotomy, lateral retinacular release, or trochleoplasty.

**Surgery technique:** the patients were operated on under spinal anesthesia, with tourniquet. Longitudinal access was performed on the goose foot to remove one of the flexor tendons (semitendinosus tendon in 40 patients and the gracilis in 11 patients). Grafting was prepared with two free grafts. Standard portal arthroscopy was then performed for joint evaluation. Double medial longitudinal access (one incision in the medial region of the patella and another in the medial femoral condyle) was performed in 16 patients whereas single longitudinal access (between the patella and the medial femoral condyle) was performed in 35 patients. Two anchors were placed in the medial region of the patella (one in the superomedial and the other in the middle). In four patients, two confluent tunnels were used instead of anchors, in the same anatomical points of the patella. The graft was then fixed to the anchors or passed through the patellar tunnels. Next, a guide wire was placed between the adductor tubercle and the medial epicondyle of the femur to assess graft isometry. If isometry is correct, a tunnel as thick as the graft was performed. The free graft was transposed into this tunnel and fixed with an interference screw with the knee at 30° of flexion, without excessive tension. Patients used no type of orthosis post-operatively. Crutches were recommended for partial load until the patient felt safe walking at full load. Range of motion was allowed according to what the patient could endure, gradually increasing with physiotherapy. Stationary biking was allowed two weeks after surgery, going for a walk after six weeks, running and going to the gym after three months, and returning to contact sports after six months.

Initially, 87 patients were selected, out of which 28 had incomplete medical records, one died, and seven were lost to follow-up, thus being excluded from the final analysis (Figure 1).

In total, 51 patients were analyzed. Medical records were consulted for the following information: name; date of birth; date of surgery; operated side (right or left lower limb); degree of satisfaction with the surgery (dissatisfied, partially satisfied, satisfied, or extremely satisfied); if the patient would do the surgery again (yes or no); had a new episode of patellar dislocation after surgery (yes or no); length between the first episode of dislocation and surgery (1 year, between 1 and 5 years, over 5 years); currently has symptoms in the knee (yes or no), if yes, which symptoms: weakness; "feeling that the knee will bend on its own and the risk of falling," crepitus, joint swelling/effusion, pain on stairs or slopes/when squatting or getting up from chairs, constant pain; practices physical activities (yes or no), if yes, does the knee interfere with the activity? (yes or no), if not, is the knee the reason for not practicing? (yes or no).

Data obtained were analyzed by descriptive statistics.

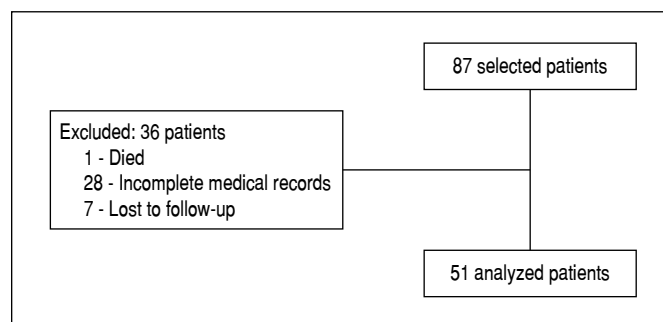


Figure 1. Study flowchart.

## RESULTS

Out of the 51 patients analyzed, 22 (43.13%) were men and 29 (56.87%) were women. The mean age was 30.8 years, ranging from 16 to 57 years. The right side was the most affected, corresponding to 50.98% of the cases. The mean follow-up time was 68.7 months, ranging from 37 to 120 months. Regarding the degree of satisfaction, one patient was dissatisfied, five were partially satisfied, 21 were satisfied, and 24 were extremely satisfied. Out of the six dissatisfied or partially satisfied patients, five would undergo surgery again and three could practice physical activity. The three who could not practice physical activity blamed their knee for it. The time between the first dislocation and surgery was less than 1 year for 58.82% of patients, between 1 and 5 years for 37.25%, and over 5 years for only 3.93%. Out of the 51 assessed patients, 49 (96.08%) would do the surgery again.

Six patients reported instability recurrence (11.76% index), out of which four were satisfied with the surgery, one was extremely satisfied, and only one was partially satisfied. All would undergo surgery again and only one of the two who did not practice physical activity blamed the knee symptoms.

Among the 22 patients who still complained of symptoms in the knee, 16 reported pain from movements (going up and down stairs, slopes, getting up from the chair, squatting), four reported weakness, three had constant pain, and only one had crepitus (Tables 1 and 2).

Among the 51 patients, 32 practiced physical activity, out of which 30 felt that their knee did not interfere with exercising. Of the 19 patients who did not practice physical activity, only four blamed the knee for their limitation (Table 2).

No cases of patellar fracture or joint stiffness were observed.

**Table 1.** Data from the medial patellofemoral ligament reconstruction questionnaire.

		No.	%
Gender	Male	22	43.13
	Female	29	56.87
Age (years)	Mean	30.8	
	Maximum	57	
	Minimum	16	
Side	Right	26	50.98
	Left	22	43.13
	Bilateral	3	5.89
Degree of satisfaction	Unsatisfied	1	1.96
	Partially satisfied	5	9.8
	Satisfied	21	41.17
	Extremely satisfied	24	47.07
Would undergo surgery again	Yes	49	96.08
	No	2	3.92
Length between first dislocation and surgery	< 1 year	30	58.82
	1-5 years	19	37.25
	> 5 years	2	3.93
Post-operative time (months)	Mean	68.7	
	Maximum	120	
	Minimum	37	

**Table 2.** Data from the medial patellofemoral ligament reconstruction questionnaire.

Symptoms	Yes	22	Weakness	4	
		43.13%	Crepitus	1	
			Pain from movements	16	
			Constant pain	3	
	No	29			
	56.87%				
Do you practice physical activities?	Yes	32	Does your knee get in the way?	Yes	2
		62.74%		No	30
	No	19	Is it because of your knee?	Yes	4
		37.26%		No	15

## DISCUSSION

This study's main outcome was that most patients who underwent isolated reconstruction of MPFL with a minimum follow-up of two years had a high degree of satisfaction, returned to sports, and had few symptoms. This indicates that the surgery could sufficiently restore patellar stability and knee function in these patients, with low morbidity.

The mean age of the patients (30.8 years) corroborated with that of patients from other studies, always ranging between 20 and 30 years old.<sup>7,8,12,14-17</sup> Our patients' mean follow-up time of 68.7 months was longer than that in most studies.<sup>5-8,12,15-18</sup>

Length between first dislocation and surgery was less than 1 year for 58.82% of patients, between 1 and 5 years for 37.25%, and over 5 years for 3.93%. This shows that patients sought treatment early, probably due to several symptoms and limitations and the low success rate of the conservative treatment, which causes instability recurrence in about 50% of patients.<sup>2</sup>

The literature on this procedure reports several complications, the most common being joint stiffness, anterior knee pain, patellar fracture, and instability recurrence.<sup>1,2,7,8</sup> This study had no cases of patellar fracture or stiffness.

The 11.76% incidence of instability recurrence was slightly higher than described in the literature, usually ranging from 0 to 10%.<sup>2,5-9,11,13-15,18-22</sup> However, several studies divide the recurrence rates of dislocation, subluxation, and apprehension, which, if counted together, can increase the overall rate, thus being comparable to our results. The study's data was obtained using a questionnaire completed by the patient, who might have considered other symptoms as instability. The "black out" symptom of the quadriceps, for example, is very often confused with instability. Out of the 51 patients, 22 still had knee-related complaints after surgery. The study by Zhang and Li<sup>16</sup> assessed 68 patients, out of which eight presented symptoms during daily activities, 46 during sports practice, and none felt pain while resting. In our study, 16 patients still had movement-related pain and three had constant pain. In Feller, Richmond and Wasiak's<sup>19</sup> study, 40% of patients complained of anterior knee pain. The study by Von Engelhardt et al.<sup>18</sup> assessed 23 patients, out of which four had knee-related complaints.

Among our patients, only four did not return to physical activities because of their knee. In their study, Von Engelhardt et al.<sup>18</sup> reported that of 23 patients evaluated, only one did not return to sports practice. The study by Feller, Richmond and Wasiak<sup>19</sup> found that 81% of assessed patients undergoing isolated reconstruction of the patellofemoral ligament returned to sports.

About 96.08% of our patients would undergo surgery again, whereas all of Von Engelhardt et al.'s<sup>18</sup> patients would do the surgery again.

This study has limitations. This is only an assessment of the results of a surgical technique, not to be compared with other techniques or the conservative treatment. A final physical examination and imaging of these patients could have eliminated bias, showing a more comprehensive analysis of the results. Similarly to Feller, Richmond and Wasiak,<sup>19</sup> we used a simple and non-validated questionnaire, focusing on the key points of our objectives, including satisfaction, symptoms, and knee function. No questionnaire, such as the Tegner Activity Scale, for example, assessed the level of physical activity. However, none of our patients were professional athletes, practicing only recreational activities. No questionnaire was applied before surgery, limiting our statistical result assessment and comparison with the literature. The variation of the type of graft used (semitendinosus or gracilis tendon) and of the patellar fixation (tunnel confluences or anchors) could have also biased the study. Matzkin<sup>9</sup> states that choosing graft and fixation methods is less important to the final success than reconstructing the original anatomy of the ligament; however, literature shows that the gracilis tendon graft can cause a higher rate of dislocation recurrence.<sup>23</sup>

## CONCLUSION

Isolated reconstruction of the medial patellofemoral ligament showed a recurrence rate of 11.7% with high patient satisfaction, excellent functional results, and a high rate of return to sports, all after at least two years of follow-up.

**AUTHORS' CONTRIBUTIONS:** Each author contributed individually and significantly to the development of this article. RGJ: literature review, data collection and analysis, writing of the article; HSE: literature review, data collection and analysis; JPPG: data analysis, final review of the article; AOQ: final review of the article; MVD: data analysis, final review of the article.

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