
APPRAISAL OF SURGICAL TREATMENT OF 47 CASES OF PATELLOFEMORAL INSTABILITY

Roberto Freire da Mota e Albuquerque, Alexandre Pagotto Pacheco, Arnaldo José Hernandez, Marco Martins AmatuZZi, José Ricardo Pécora and Alexandre Estevão Vamos Kokron

RHCFAP/3078

ALBUQUERQUE RF da M e col. - Appraisal of surgical treatment of 47 cases of patellofemoral instability. *Rev. Hosp. Clín. Fac. Med. S. Paulo* 57(3): 2002.

INTRODUCTION: Patellofemoral instability is a common knee disease. Its etiology is complex and variable, with many components making different contributions in each individual, resulting in several distinct clinical presentations. Our goal was to analyze the results of surgical treatment in our hospital over a period of 10 years.

PATIENTS AND METHODS: We analyzed 55 knees of 47 patients who underwent surgery for patellofemoral instability and were classified into 2 main groups: proximal realignment and combined proximal and distal realignment. Three other groups were analyzed according to the duration of preoperative symptoms: less than 1 year (group I); 1 to 10 years (group II); and more than 10 years (group III).

RESULTS: There were 62% good results overall, with 78% good results in groups I and II. Group III had 81% bad results, showing that a late diagnosis of advanced disease results in a poor prognosis. In addition to late diagnosis, bad results were usually associated with incorrect diagnosis or choice of surgical technique. There was no significant difference between isolated proximal realignment and combined proximal and distal realignment in groups I or II, but in group III, the combined technique yielded better results.

DISCUSSION: Our results indicate that patellofemoral instability should be addressed in its early stages. Patients with long-lasting symptoms or more severe disease seem to achieve better results with combined techniques.

CONCLUSION: Proximal and distal realignments produce better results than isolated proximal realignment in patients with joint degeneration or with greater duration of disease. The realignment surgery does not produce good results in patients with advanced disease.

DESCRIPTORS: **Knee. Patella. Surgery.**

Patellofemoral instability is a common knee disease, mainly affecting young female adults. Its etiology stems chiefly from quadriceps muscle dysplasia, malalignment of the inferior limb, and trochlear dysplasia. It can vary from a painful syndrome with increased lateral patellar pressure to recurrent dislocation of the patella^{2,14,18}.

Treatment is clinical in the less severe cases and operative in the more severe cases when the clinical treatment fails. Operative treatment was first described by Roux and revised in Paris in

1888¹⁷. Since then, more than 100 techniques have been described⁴⁻⁷, representing two broad categories: proximal realignment and combined proximal and distal realignment. In proximal realignment, satisfactory results vary from 62% to 91%^{1,2,3,5,8,11-13}. In combined proximal and distal realignment, satis-

From the Department of Orthopedics and Traumatology, Hospital das Clínicas, Faculty of Medicine, University of São Paulo.

factory results vary from 50% to 93%⁰. In proximal realignment, the techniques are a combination of lateral retinacular release with advancement of the vastus medialis muscle. In the combined proximal and distal realignment, in addition to the proximal techniques, a medial transfer of patellar tendon is made, which may or may not be associated with elevation of the tibial tubercle or a distal insertion of the patellar tendon; the great majority of operations involve only the medial transfer of the tendon. Also, for less severe cases, isolated lat-

eral retinacular release is sometimes done².

The choice of the type of realignment should involve consideration of many aspects^{3,4,7,9,11}. Patellar compression syndromes with patellar tilt and recurrent subluxation or dislocation of the patella for patients without skeleton maturity should be treated by proximal realignment. Combined proximal and distal realignment is commonly used in patients with an increased Q angle or extreme pain or patellar inclination. This technique is also indicated for patients whose joints are already in a degenerative process.

It is known that degenerative joint disease develops relatively quickly in young people with non-treated patellofemoral instability. However, the question remains whether a longer duration of the disease-along with the characteristic alterations, especially degenerative ones that it causes-is related to the final result of a realignment operation.

The present study appraised surgically treated patellofemoral instability regarding the relationship between the duration of presurgical symptoms and the results obtained by the surgical technique employed.

PATIENTS AND METHODS

Between the years of 1987 and 1997, 50 patients were hospitalized in this service with the diagnosis of patellofemoral instability. Only those who were surgically treated, had more than 6 months of follow up, and at least one good subjective indication of their evolution were included in the survey. Two cases were excluded because they had less than 6 months of follow up and one because of lack of documentation; 47 were left for appraisal.

Of the 47 patients, 39 were female and 8 male. Eight patients had both knees treated, totaling 55 knees. From these, 27 were on the right side and 28 on the left side. The age at the beginning of the symptoms ranged from 4 to 53 years, with an average of 26.3 years.

The most frequent complaints were of patellofemoral pain, dislocation of the patella, and joint instability. The most common findings of the physical examination were hypotrophy of the vastus medialis muscle, patellar crepitation, positive apprehension test, and patellar dislocation.

Sixty-four operations were performed; 1 patient was operated on 5 times, 2 patients were operated on 4 times, 2 patients 3 times, and 3 patients twice. Proximal realignment was done in 23 operations, and combined distal and proximal realignment in 29, corresponding respectively to 36% and 45% of the total number of procedures, with 15% left for all the other types. Only 2 isolated distal realignments and 1 isolated lateral retinacular release were done. Table 1 shows the frequency of the surgical techniques employed; note that those which did not involve realignment sometimes were done together with surgical realignment.

The follow-up period ranged from 6 months to 11 years, with an average of 3.4 years.

Two groups were established: good and bad postoperative results. A result was considered good when the patient progressed without pain or with occasional pain that was not significant, did not experience any limitations in normal household or sporting activities, and progressed without recurrent dislocation. A result was considered bad when a patient progressed with any significant pain, limitation to activities, recurrent dislocation, or joint degeneration.

Table 1 - List of surgeries.

Type of operation	Number
Proximal realignment	23
Proximal and distal realignment	29
Isolated distal realignment	2
Isolated lateral release	1
Trochleoplasty	1
Lateral facetectomy	4
Tibial tubercle reattachment	1
Osteotomy for correction of valgus deformity	3
Shaving	3
Surgical debridement	2

Patients were also classified according to the time elapsed between the beginning of the symptoms and the operation (presurgical duration of symptoms) into 3 groups: less than 1 year (group I), between 1 and 10 years (group II), and more than 10 years (group III).

The 3 variables-surgical technique, presurgical duration of symptoms, and outcome after surgery-were compared with each other in tables showing numbers and percentages. These data were statistically evaluated with the chi-square test.

RESULTS

Fifty-eight operations were evaluated statistically-23 proximal realignments, 29 combined proximal and distal realignments, 2 isolated distal realignments, 1 isolated lateral release, and 3 isolated facetectomies. From the 58 procedures, 30 patients progressed without complaint and with complete remission of symptoms, 6 patients progressed with occasional pain that was not significant to them and with no limitation to their everyday activities; these results were considered good ones. Seven other patients progressed with moderate or significant pain, although with a reasonable quality of life, and 17 other patients progressed with significant pain or recurrent dislocation, with a great limitation to everyday activities; these 2 sets of results were considered bad ones. Therefore, totals of 62% good and 38% bad results were achieved.

From the 22 cases of bad results, 5 patients presented significant patellofemoral arthrosis before surgery. Two other patients with more than 10 years of complaints presented persistent pain. Seven surgeries were done in patients with habitual bilateral recurrent dislocation, 5 of which were in the same patient, and 2 were in another patient. Two patients experienced recurrent dislocation after surgery. One patient experienced pain after surgery, and a new realignment was done with good results. Two patients experienced significant

Table 2 - Comparison between the surgical technique and the result of surgery.

Surgical Technique	Results	
	Good	Bad
Proximal realignment	14 (61%)	9 (39%)
Proximal and distal realignment	20 (69%)	9 (31%)

P = 0.54221

Table 3 - Comparison between presurgical duration of symptoms and the result of surgery.

Duration of symptoms	Results	
	Good	Bad
Group I	18 (78%)	5 (22%)
Group II	15 (79%)	4 (21%)
Group III	3 (19%)	13 (81%)

Group I: patients with symptoms up to 1 year.
 Group II: patients with symptoms from 1 to 10 years.
 Group III: patients with symptoms for more than 10 years.
 P = 0.00014974*

Table 4 - Comparison between the presurgical duration of symptoms and surgical techniques.

Duration of Symptoms	Surgical Technique	
	Proximal realignment	Proximal and distal realignment
Group I	10	11
Group II	5	13
Group III	8	5

Group I: patients with symptoms up to 1 year
 Group II: patients with symptoms from 1 to 10 years.
 Group III: patients with symptoms for more than 10 years.
 P = 0.16107

valgus knee pain that developed after surgery. One patient with an isolated lateral facetectomy had persistent pain in spite of surgery. Another patient who experienced poliomyelitis sequela with valgus knee and shortening of the surgically treated limb was the only case that developed infection after surgery.

Table 2 compares the surgical technique with the outcome. Even though

Table 5 - Comparison between the presurgical duration of the symptoms and the surgical result in patients undergoing proximal realignment.

Duration of Symptoms	Results	
	Good	Bad
Group I	9 (90%)	1 (10%)
Group II	4 (80%)	1 (20%)
Group III	1 (13%)	7 (87%)

Group I: patients with symptoms up to 1 year
 Group II: patients with symptoms from 1 to 10 years.
 Group III: patients with symptoms for more than 10 years.
 P = 0.0022551*

Table 6 - Comparison between the presurgical duration of the symptoms and the surgical result in patients undergoing proximal and distal realignment.

Duration of Symptoms	Results	
	Good	Bad
Group I	08 (73%)	03 (27%)
Group II	10 (77%)	03 (23%)
Group III	02 (40%)	03 (60%)

Group I: patients with symptoms up to 1 year
 Group II: patients with symptoms from 1 to 10 years.
 Group III: patients with symptoms for more than 10 years.
 P = 0.29859

the combined proximal and distal realignment apparently yielded better results, these results were not statistically significant.

Table 3 compares the presurgical duration of symptoms and the surgical result, showing a large percentage of good results in groups I and II and a large percentage of bad results in group III (more than 10 years). These data were statistically significant.

The relationship between the chosen realignment technique-either proximal realignment or combined proximal and distal realignment-and the presurgical duration of symptoms is shown on table 4. Of the 23 cases of proximal realignment, 10 (43%) were indicated for patients in group I, 5 (22%) for patients in group II, and 8 (35%) for patients in group III. From the 29 cases

of combined proximal and distal realignment, 11 (38%) were indicated for patients in group I, 13 (45%) for patients in group II, and 5 (39%) for patients in group III. The analysis of table 4 did not show statistical significance (P = 0.16), which suggests there was no influence of the presurgical duration of symptoms on the choice of surgical technique.

The 23 cases of proximal realignment were analyzed on table 5, considering the presurgical duration of the symptoms and the surgical outcome. There was a high percentage of good results in groups I and II and a high percentage of bad results in group III, with statistical significance, which suggests that the greater the time of evolution of the pathology, the worse the result of proximal realignment.

The 29 cases of combined proximal and distal realignment were similarly analyzed on table 6. There was an equally high percentage of good results in groups I and II, but a lower percentage of bad results in group III compared to cases of proximal realignment; however, the results were not statistically significant, which suggests that the result of combined proximal and distal realignment did not worsen with increasing presurgical duration of symptoms.

DISCUSSION

With a total of 47 patients and 55 knees and with equality between the sides (27 on the right side and 28 on the left side), predominance of females (83%), and a median age of young adults (26.3% years), our sampling is similar to samples reported in the literature concerning this pathology^{2,14,18}. The procedure for estimation of the subjective result is similar to that reported in the literature in which subjective and objective responses are expressed in very near percentages, and with in general a larger percentage of good results in the objective analysis than in the subjective one, lending credibility to our results.

The finding of 62% good results is compatible to that found in the literature. Concerning results of the presurgical duration of symptoms, we had 78.3% good results in group I and 78.9% good results in group II, a 16% improvement over the best results found in the literature². In the cases with more than 10 years of evolution (group III), the 81.3% bad results shows the failure associated with surgical treatment with a late indication. The statistically significant data of table 3 ($P=0.000149$) suggests strongly that the indication for realignment only in cases with longer presurgical duration of symptoms, usually complicated by significant joint degeneration, is wrong.

The 22 cases of bad results suggest that poor outcome is caused by 1) wrong diagnosis; 2) inadequate surgical technique for the case; and 3) advanced disease with anatomical and degenerative irreversible alterations.

Concerning the choice of surgical procedure, there was an apparent equivalency between the choice of proximal realignment (23) and of combined proximal and distal realignment (29), which represented 85% of all surgeries and so were numerically superior to the others. Our data indicate that the duration of presurgical symptoms conferred no influence on the choice of surgical technique. However, there was a preference for the combined proximal and distal realignment in the most severe cases, such as those with habitual dislocation or with previous surgery.

Only two isolated distal realignment surgeries were done, one in a chronic patient who already had arthritis and the other in the previously mentioned patient who had polyomyelitis and valgus knee, in addition to an infection as a complication. Both had bad results; however, they also had a dubious prognosis. Thus, nothing could be concluded concerning the isolated realignment technique. Only one isolated lateral

retinacular release procedure was done using an arthroscopic technique in a patient in group I who presented a light pathology. This case had a good result.

Proximal realignment yielded 60.78% good results compared to 69.0% good results from the combined proximal and distal realignment. Although these results suggest a tendency for better results from the combined proximal and distal realignment, the comparison is not statistically significant.

The cases treated with proximal realignment had 80% to 90% good results for patients in groups I and II, similar to the best results reported in the literature^{1,2,3,5,12,13}. In group III, 87.5% of the results were bad. Bad results from proximal realignment surgery on patients in group III were significantly more frequent than good results, indicating that proximal realignment is not a good choice for cases with chronic pathology.

Combined proximal and distal realignment yielded 72.7% and 76.9% good results in groups I and II, respectively, also comparable to the best in literature. For patients in group III, combined proximal and distal realignment yielded 60% bad results, which was significantly less than isolated proximal realignment. Thus, it would appear that in cases involving pathology of more than 10 years duration, the combined proximal and distal realignment yields better results than proximal realignment alone. Nevertheless, the 60% bad results in group III patients undergoing combined proximal and distal realignment indicates that further improvements in technique are needed.

In groups I and II, there were better results with isolated proximal realignment (90% and 80%) than with combined proximal and distal realignment (72.7% and 76.9%), giving the impression that the proximal realignment is the better choice for these two groups. However, it should be noted that the combined proximal and distal realignment procedure was chosen for the

most severe cases in these groups. From the 6 cases of combined proximal and distal realignment with bad results in these groups, 3 presented the picture of habitual dislocation from which 2 developed recurrent dislocation and 1 severe pain. One of these patients had undergone 2 previous surgeries. One case presented 1 episode of dislocation after surgery but no further symptoms. But that one, even so, was classified as a bad result. The patellar tendon ruptured in 1 case, which was therefore considered a bad result. The choice of combined proximal and distal realignment procedure for the more severe cases of these groups has therefore non-randomly skewed the results of the statistical analysis in favor of isolated proximal realignment.

It has been suggested that combined proximal and distal realignment^{3,4,7,9,11} is indicated in advanced pathology with some degree of joint degeneration. Furthermore, this technique is also indicated in pathology with excessive patellar malalignment, significantly increased Q angle, and for failure in the proximal realignment. It is particularly contra-indicated in patients with skeletal immaturity because the growth plate may be damaged in the procedure.

CONCLUSIONS

1) Proximal and distal realignment procedures yield better results than the isolated proximal realignment in patients with joint degeneration or with a greater presurgical duration of disease.

2) Realignment surgery does not yield good results in cases of advanced disease, particularly with significant signs of joint degeneration.

3) A greater percentage of bad results occur in cases associated with incorrect diagnosis or choice of surgical technique.

RESUMO

RHCFAP/3078

ALBUQUERQUE RF da M e col. - Avaliação do tratamento cirúrgico da instabilidade fêmoro-patelar em 47 casos. **Rev. Hosp. Clín. Fac. Med. S. Paulo** 57(3): 2002.

A instabilidade fêmoro-patelar (IFP) é patologia freqüente cuja etiologia é complexa e variável com diversos componentes cuja importância varia em cada indivíduo, resultando em diversas apresentações clínicas. Nosso objetivo foi analisar os resultados do tratamento cirúrgico em um período de 10 anos.

MATERIAL E MÉTODO: Nós analisamos 55 joelhos de 47 pacientes operados por IFP em dois grupos principais: realinhamento proximal e

realinhamento proximal e distal. Três outros grupos de acordo com a duração dos sintomas: <1 ano (grupo I); entre 1 e 10 (grupo II); e >10 anos (grupo III).

RESULTADOS: Obtivemos 62% de bons resultados globalmente e 78% de bons resultados nos grupos I e II. O grupo III apresentou 81% de maus resultados, demonstrando que a indicação tardia não é boa. Os maus resultados, além do já mencionado, estavam em geral associados a erros diagnósticos ou de escolha de técnica cirúrgica. Não houveram diferenças significantes entre os resultados do realinhamento proximal isolado e do realinhamento proximal e distal combinados nos grupos I e II mas no grupo III o rea-

linhamento combinado apresentou melhores resultados.

DISCUSSÃO: Nossos resultados indicam que a instabilidade fêmoro-patelar deve ser tratada na fase inicial. Nos casos de longa evolução e nos casos mais graves, o realinhamento proximal e distal tem melhores resultados.

CONCLUSÃO: O realinhamento proximal e distal tem melhor resultado que o realinhamento proximal isolado em pacientes com alterações degenerativas e naqueles com longa evolução. A operação de realinhamento não apresenta bons resultados nos casos de doença avançada.

DESCRITORES: Joelho. Rótula. Cirurgia.

REFERENCES

1. ABRAHAM E, WASHINGTON E & HUANG TL - Insall proximal realignment for disorders of the patella. **Clin Orthop** 1989; **248**:61-5.
2. AGLIETTI P, BUZZI R & INSALL JN - Disorders of the patellofemoral joint. In: INSALL JN - **Surgery of the Knee**. 2th ed. New York, Churchill Livingstone, 1993. p. 241-385.
3. CERULLO G, PUDDU G, CONTEDEUCA F et al. - Evaluation of the results of extensor mechanism reconstruction - **Am J Sports Med** 1988; **16**:93-6.
4. CHRISMAN O D, SNOOK G A & WILSON TC - A long-term prospective study of the Hauser and Roux- Goldthwait procedures for recurrent patellar dislocation. **Clin Orthop** 1979; **144**:27-30.
5. CROSBY BE & INSALL JN - Recurrent dislocation of the patella: relation of treatment to osteoarthritis. **J Bone Joint Surg [Am]**, 1976; **58**:9-13.
6. DE CESARE WF - Late results of Hauser procedure for recurrent dislocation of the patella. **Clin Orthop** 1979; **140**:137-44.
7. FIELDING JW, LIEBLER W, URS NDK et al. - Tibial tubercle transfer: a long- range follow- up study. **Clin Orthop** 1979; **144**:43-4.
8. FONDREN FB, GOLDNER JL & BASSET FH - Recurrent dislocation of the patella treated by the modified Roux Goldthwait procedure: a prospective study of forty-seven knees. **J Bone Joint Surg [Am]** 1985; **67**:993-1005.
9. FULKERSON JP & SCHUTZER SF - After failure of conservative treatment for painful patellofemoral malalignment: lateral release or realignment? **Orthop Clin North Am** 1986; **17**(2):283-7.
10. GRANA WA & O'DONOGHUE DH - Patellar-tendon transfer by the slot-block method for recurrent subluxation and dislocation of the patella. **J Bone Joint Surg [Am]** 1977; **59**:736-41.
11. HUGHSTON JC & WALSH WM - Proximal and distal reconstruction of the extensor mechanism for patellar subluxation. **Clin Orthop** 1979; **144**:36-42.
12. INSALL JN, AGLIETTI P & TRIA AJ - Patellar pain and incongruence. II. Clinical application. **Clin Orthop** 1983; **176**:225-32.
13. INSALL JN, BULLOUGH PG & BURSTEIN AH - Proximal "tube" realignment of the patella for chondromalacia patellae. **Clin Orthop** 1979; **144**:63-9.
14. PHILLIPS BB - Recurrent dislocations. In: CAMPBELL'S WC - **Operative orthopaedics**. 9th ed. St. Louis, Mosby-Year Book, 1998. p. 1334-50.
15. PICKETT JC - Patellofemoral disorders: editorial comment. **Clin Orthop** 1979; **144**:2-3.
16. REIGLER HF - Recurrent dislocation and subluxations of the patella. **Clin Orthop** 1988; **227**:201-9.
17. ROUX C - The classic. Recurrent dislocation of the patella: operative treatment. **Clin Orthop** 1979; **144**:4-8.
18. TACHDJIAN MO - Recurrent subluxation or dislocation of the patella. In: **Pediatric Orthopaedics** 2th ed. Philadelphia, Saunders, 1990. c. 4, p. 1551-82.

Received for publication on August 23, 2001.