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Result of surgical treatment of recurrent patella dislocation using the Campbell technique

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Abstract: Introduction: Recurrent patellar dislocation is a condition in which the patellar surface is not maintained in congruity as it moves along the intercondylar groove of the femur during knee flexion and extension movements. The objectives of this study are to show the distribution of patients with recurrent patellar dislocation according to different sociodemographic variables and to evaluate the outcomes using the Campbell technique. Material and methods: An observational study was conducted in patients with recurrent patellar dislocation from December 2017 to December 2019. Data collection was performed through a review of medical records. The sample consisted of 19 patients, and the system proposed by the authors was used to evaluate the surgical technique. Data processing included the calculation of summary measures for qualitative variables, absolute frequencies, and percentages. Results: The female sex and the age group of 15 to 30 years were the most frequent, healing was poor in two patients, good results were obtained in 84.3% of the operated patients. Conclusions: Females and the 15- to 30-year-old age group predominated, and healing was poor in two patients. Good results were obtained in the operated patients. Although most authors recommend medial patellofemoral ligament repair as the technique of choice or the Insall technique, the Campbell technique yields good results when applied to recurrent patellar dislocations requiring proximal realignment of the extensor mechanism.

Key words: recurrent patella dislocation; Campbell technique; stability; realignment

1 Introduction

Recurrent joint dislocation occurs as a sequel to one or more traumatic dislocations when the supporting elements have not healed properly or certain anatomical conditions predispose to this condition. Patellar dislocation involves abnormal movement of the patella relative to the trochlear groove of the femur. It manifests clinically as anterior knee pain and lateral dislocation of the patella. It affects adolescents and young adults who are active in sports. It is more common in women, who are 33% more likely than men to suffer lateral patellar dislocation. Recurrent patellar dislocation occurs in up to 44% of patients treated conservatively and is more common in patients with predisposing risk factors [1][2].

Bony abnormalities such as trochlear dysplasia, patella alta, torsional defect, patellar dysplasia, and soft tissue abnormalities such as medial patellofemoral ligament tear or vastus medialis weakness may predispose to recurrent patellofemoral instability [3].

Brattstrom first described the "Q angle" as the angle formed by the line of action of the quadriceps (a line drawn from

the anterior superior iliac spine to the center of the patella) and the line of action of the patellar tendon (a line drawn from the center of the patella to the anterior tibial tuberosity), which intersect at the center of the patella. For this measurement to be accurate, the patella must be centered on the trochlea and should be measured with some flexion, approximately 20 degrees. In men, the Q angle typically measures 8 to 10 degrees, and in women, it is 15 degrees. This valgus angle provides a lateral force vector to the patellofemoral joint.

Although some patients with patellofemoral instability may improve with conservative management, most will require surgery. Surgery is indicated after the second episode of patellar dislocation; however, in the case of patellar instability in patients with an immature skeleton, surgery should generally not be performed on the bone [2].

There are some surgeries performed on distal soft tissues, such as the Roux technique, later modified by Goldthwait, which consists of transferring a longitudinal lateral portion of the patellar tendon under the medial portion of the patellar tendon and suturing it to the sartorius fascia, although the results have shown to lose effectiveness over time. Merchant and Mercer described the release of the lateral retinaculum, suggesting that in addition to improving patellar alignment, division of the lateral retinaculum partially denervates the patella and relieves venous congestion. Madigan was one of the first to propose dismantling the vastus medialis obliquus and advancing it over the patella. However, if patellar instability is due to an abnormality in the distance between the tibial tuberosity and the trochlear groove, distal realignment may be necessary. According to some authors, reconstruction of the medial patellofemoral ligament (MPFL) is the surgical procedure of choice. This reconstruction uses a mini-open technique and a stronger graft than the native MPFL (semitendinosus) to compensate for underlying risk factors for lateral patellar instability [1][3]. Although less invasive surgeries are currently preferred and associated with fewer complications and better outcomes [2][3][4], there are reports citing good results with the Campbell surgical technique, which is considered useful in children and adolescents with loose capsular elements [5].

The following objectives were proposed: to show the distribution of patients with recurrent patellar dislocation according to different sociodemographic variables and to evaluate the final results obtained with the Campbell technique for recurrent patellar dislocation.

1.1 Methodological design

A longitudinal retrospective descriptive study was conducted in patients diagnosed with recurrent patellar dislocation at the Carlos Manuel de Céspedes Hospital in Bayamo, Granma, from December 2017 to December 2019.

The sample consisted of all patients diagnosed with recurrent patellar dislocation who presented to the hospital. Twenty-nine underwent surgery, and the sample included those who underwent the Campbell technique.

1.2 Inclusion criteria

(1) Patients diagnosed with recurrent patellar dislocation, regardless of age.

(2) Those who underwent the Campbell technique.

(3) Patients who can be followed up for at least six months from the date of the operation.

1.3 Exclusion criteria

(1) Patients who do not meet the inclusion criteria.

(2) Patients whose medical records do not contain all the data for the study.

1.4 Patient follow-up (briefly)

The patients were admitted to the orthopedic emergency room. Upon arrival, they underwent diagnostic tests for recurrent patellar dislocation and associated pathologies. The necessary complementary tests were administered, and a preoperative evaluation was requested from pediatrics, internal medicine, and other specialties in case they had other

pathologies. The surgery was performed under general or spinal anesthesia, followed by follow-up care in the ward. Upon discharge, the patient was followed up in an outpatient clinic for up to six months after surgery, during which an evaluation was conducted to determine the patient's condition.

Surgical technique. An anteromedial incision is made parallel to the patellar tendon up to the knee joint capsule, starting at the level of the articular surface of the proximal tibia. A flap of capsule is detached and left inserted at its proximal end after inspecting the knee joint. The capsule is sutured. The free edge of the flap is passed through a slit in the patellar tendon and pulled medially and sutured to the adductor magnus tubercle.

To conduct this study, a data collection form was created that included modifiable and non-modifiable variables such as age, sex, complications, and final outcome.

1.5 Variables

Age: according to biological age, they were grouped into the following groups: under 15 years, from 15 to 30 years, from 31 to 45.

Sex: according to biological: female, male.

Joint hypermobility: This test assesses the elbow and knee joints by verifying mobility of more than 180° in maximum extension. Normal: up to 180°, increased to more than 180°.

Q angle: angle formed by a line joining the anterior superior iliac spine and the center of the patella and another line from the center of the patella to the anterior spine of the normal tibia between 8° and 10° increased by more than 12°.

Presence of pain three months after surgery: normal: no pain; increased: presence of continuous pain that makes it difficult to perform daily activities.

Instability: normal: The patella is centered without lateral displacement when the knee is flexed; increased: There is lateral instability when the knee is flexed.

Residual scar: Normal: flat scar with good healing; when it decreases, aesthetically acceptable flat keloids form; increased: there is a healing disorder with an unsightly hypertrophic scar.

Final result: Subjective evaluation by the authors taking into account the presence of pain, instability and scar condition three months after the operation.

The data were obtained from a review of these patients' medical records and surgical reports. Data processing included the calculation of summary measures for qualitative variables, absolute frequencies, and percentages.

2 Results

Table 1 shows that the female sex predominated, representing 68.4% of the total, and the age group of 16 to 30 years for both sexes, representing 52.6%, and 42% of the patients were under 15 years old.

Table 1. Distribution of patients with recurrent patellar dislocation according to age and sex

	Sex		Total
Age	Male, n (%)	Female , n (%)	N (%)
Less than 15 years	3 (15.7)	5 (26.3)	8 (42.1)
From 16 to 30	3 (15.7)	7 (26.3)	10 (52.6)
From 31 to 45	0 (0.0)	1 (5.2)	1 (5.2)
Total	6 (31.5)	13 (68.4)	19 (100.0)

Source: Individual medical history.

Table 2 shows that the preoperative examination revealed that three patients had joint hyperlaxity, representing 15.7% of patients, eight had an increased Q angle, and the most common complications were pain and unsatisfactory residual scarring.

Table 2. Distribution of patients with recurrent patellar dislocation according to Q angle and complications

	Increased
	n (%)
Joint hyperlaxity	3 (1.7)
Increased Q angle	8 (42.1)
Complications	
Pain	2 (10.5)
Instability	1 (5.2)
Residual scar	2 (10.5)
Infection	1 (5.2)

Source: Individual medical history.

Table 3 shows that good results were obtained in more than 84% of the operated patients.

Table 3. Patients with recurrent patellar dislocation according to final results

	Good	Regulars	Bad	Total
	n (%)	n (%)	n (%)	N (%)
Patients	16 (84.2)	2 (10.5)	1 (5.2)	19 (100.0)

3 Discussion

It is suggested that recurrent patellar dislocations are more common in sports-active adolescents and young adults; furthermore, women are 33% more likely than men to suffer lateral patellar dislocation [1][2], as was the case in this study.

The Q angle, which corresponds to the angle formed by a line joining the anterior superior iliac spine and the center of the patella and another line joining the center of the patella to the anterior spine of the tibia, was observed to be increased in five patients. It is suggested that this angle provides a vector indicating the line of traction of the quadriceps femoris, and an increase in its value makes the patella more susceptible to dislocation. Some authors report that joint hyperlaxity is present in more than 50% of adolescents with recurrent patellar dislocation; however, in this study, this condition was only observed in 15% of patients (Figure 1).

Taken by: Ismael La O.

Figure 1. Preoperative photograph of the left knee of a 12-year-old adolescent with patellar hyperlaxity, operated on for recurrent patellar dislocation

In two patients in the series, pain persisted three months after surgery. In one of them, in addition to pain, passive and active patellar instability was also observed, but without patellar dislocation. Therefore, he required further physical therapy and rehabilitation to strengthen the extensor mechanism and the use of a knee brace. After six months, his condition improved, and he returned to normal activities. In the other patient, pain control was achieved with medical treatment and rehabilitation.

Regarding healing, in two patients the residual scar did not have acceptable results, leaving aesthetically unsatisfactory scars, although functionally acceptable and without dislocations (Figure 2).

Taken by: Ismael La O.

Figure 2. Knee of a 27-year-old man operated on for recurrent patellar dislocation with the presence of a hypertrophic knee scar.

The evaluation of the final results was performed subjectively by the authors, taking into account the presence of complications, dislocations or subluxations in the postoperative period, and persistent patellar instability. Only 5.2% were classified as having poor results (the patient who required the longest rehabilitation time); two patients were in the group with regular results, and the majority (15) showed satisfactory progress, so they were classified as having good results similar to those reported by other authors [5].

4 Conclusions

The majority of patients were female and ranged in age from 15 to 30 years. Two patients had average results due to pain and inadequate scarring. Only one patient required additional rehabilitation; no patients required revision surgery due to postoperative dislocations. Good results were obtained in 84.2% of patients treated with this technique. Although most authors consulted recommend minimally invasive repair of the medial patellofemoral ligament (MPFL), the Campbell technique also yields good results when applied to recurrent patellar dislocations requiring proximal realignment of the extensor mechanism.

Our study is limited by the short six-month follow-up, the lack of inclusion of factors predisposing to patellar dislocation, and although the series is homogeneous, the sample size is small. Therefore, we recommend comparative studies with other techniques.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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