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Research Article

Functional Results in Patients with Knee Multiligamentary Injury Operated in an Arthroscopic way in a Single Surgical Time

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Abstract

Introduction: The multiligamentary knee injury is a clinical entity characterized by the injury of two or more ligaments of the knee secondary to a traumatic episode and which causes a residual instability, even when it is reduced spontaneously. It is considered a rare and serious injury that results in devastating consequences on the quality of life of the patient.

Objective: To determine the functional results of patients with multiligamentary knee injury operated via arthroscopic approach in a single surgical event. Material and method: Patients with a diagnosis of multiligamentary knee injury who underwent arthroscopic surgery in a single surgical event and with at least 3 months after surgical treatment were included to later evaluate their functional and stability results according to LYSHOLM and IKDC scores.

Result: A total of 14 patients were included in the study (11 [78.6%] men and 3 [21.4%] women). Age range was 16 to 42 years and with an even laterality of 50% for the right knees and 50% for the left knees. A correlation between the nerve injury and the functional outcomes were found, negatively affecting it. The average IKDC score was 70,864 whilst the LYSHOLM score had an average of 73.64.

Conclusion: The multiligamentary instability of the knee is a rare pathology, with a high rate of neurovascular complications and with an anatomical profile of heterogeneous lesion. We consider that our results support the arthroscopic treatment in a single surgical time of this type of lesions, however, it is pertinent to carry out new prospective studies that allow us to obtain more information about the cases, as well as a greater patient follow-up.

Keywords: Patients; Multiligamentary; Arthroscopic

Background

The dislocation or multiligamentary knee injury is a clinical entity characterized by the injury of multiple ligaments of the knee secondary to a traumatic episode and that conditions a residual instability, even when it is reduced spontaneously [1].

Considered a rare lesion, it has an incidence according to the series consulted, ranging from 0.02% to 0.2% of all orthopedic injuries [2], and which is believed to be underdiagnosed because it may present a spontaneous reduction; In addition, it is an injury that is increasing mainly due to the greater number of motor vehicle accidents and the increase participation of the young population in contact sports [1].

Likewise, it is a serious injury that results in the loss of passive and active stabilizers of the knee with devastating consequences on the quality of life of the patient [2-4].

Injury mechanism

Among the mechanisms of injury are those of high energy that include motorcycle accidents, motor vehicle accidents, industrial accidents and falls of a height greater than 5 meters; while within

the low energy is mainly sports and the fall of a height of less than 5 meters [4].

Classification

The classification used in this study is that of Shenck. This classification stratifies the dislocation based on the injured ligaments, the presence or absence of fracture and the associated neurovascular injury [3,5]. According to them, dislocations are classified as type I when there is a cruciate ligament injury and a collateral ligament, such as type II when the lesion is of both cruciate ligaments but with intact collateral ligaments, type IIIM when there is injury of both cruciate ligaments with medial collateral ligament injury, type IIIL with both cruciate ligament injuries plus lateral collateral injury, type IV when there is injury to all ligament structures and type V when there is a dislocation fracture [3,5].

Associated injuries

During the acute period, it is important to evaluate the possibility popliteal artery damage, which occurs in 10 to 40% of cases and it is related to the fibrous anchorage in the hiatus of the adductors and distally in the soleus arch. 3,6), The importance of a prompt revascularization within 8 hours of the injury, has resulted in viability of 89% of the limbs; While if revascularization time exceeding 8 hours, 86% of the patients progressed to amputation [1,2,4]. It is for this reason that signs of poor perfusion, such as delayed capillary refill, decrease in temperature and coloration, must be intentionally sought. If there are no pulses, if they are weak or the ankle arm index is less than 0.8, an emergency arteriography is required [1,4,6]. The incidence of nerve injury is reported in 20% to 30% of cases of knee dislocation, with common peroneal nerve injury being more common than that of the tibial nerve [1,6,7]. The prognosis in this type of injury is bad with a 30% recovery [1,7].

Another frequently associated injury are periarticular fractures, usually in the patella, tibial plateau, supracondylar femoral region or avulsion-type fractures (head of the fibula); which in most cases require surgical fixation to achieve stability [3,4].

Initial handling

In most cases of those patients with knee dislocation without associated injuries, the initial management consists of manual reduction under sedation. If the reduction is achieved satisfactorily, a physical examination should be performed that includes measurement of the ankle arm index in search of an associated neurovascular lesion [3]. Most authors recommend mechanical knee protection as well as surveillance of vascular status for 48 hours [3]. In case of finding alteration in the neurovascular state, it is recommended to perform the emergency arteriography and sent to the vascular surgery service before 8 hours. In case of not having the resource of arteriography, Doppler ultrasound should be considered [3].

External fixation is indicated in those cases in which closed reduction is achieved but it is not possible to maintain joint congruency, in which vascular repair is performed, and in lesions of the exposed type. Likewise, open surgical reduction would be necessary in cases where closed reduction is not possible [3].

In the case of exposed dislocations, it is important to emphasize the need for surgical cleaning and debridement, antibiotic management and skin coverage [3].

Final handling

Historically, the definitive management of knee dislocations consisted of prolonged immobilization, which was associated with the loss of mobility arcs, residual laxity and a poor functional result [3,4]. Currently, the goal is the anatomical reconstruction of the ligaments and meniscus with the aim of obtaining a stable knee, without pain, functional and with the least amount of sequelae [3].

The recent trend is to postpone the surgical procedure in most cases from 14 to 21 days, allowing the decrease of edema, improve the strength of the quadriceps and partial healing of the joint capsule [30].

Although there is controversy about the surgical deferral time, most studies are inclined to late repair, since it has been found higher frequency of residual anterior instability as well as joint stiffness in patients who were acutely intervened [8,9]. Conversely, patients who were managed in a deferred manner had a lower proportion of good/excellent subjective results compared to those that were managed acutely [8].

Some injuries of the anterior cruciate ligament (ACL), posterior cruciate ligament (PCL) and medial collateral ligament (MCL) can be treated by immobilization for the healing of the MCL and later perform the surgical repair of both cruciate ligaments 4 to 6 weeks later. Other cases may require repair or reconstruction of the medial structures, so it is important to individualize the case [4].

In cases where the presence of rupture of ACL, PCL and posterolateral corner is confirmed, the substitution of the PCL is debatable, since functional outcomes in patients managed with ACL substitution and repair of the posterolateral corner but without PCL substitution were acceptable, and there was no evidence of osteoarthritis at 6 years follow-up [10].

Regarding the posterolateral complex, the importance of its repair is demonstrated, as its deficiency increases the varus load in the anterior cruciate ligament graft, with an increased risk of rupture thereof [10]. A clinical study by Corten and Bellemans suggested that undiagnosed posterolateral complex lesions would explain the high number of revisions in anterior cruciate ligament surgeries (24%) that occurred in their cohort of reconstructed knees with multiligamentary injury [11].

In a systematic review by Bonanzinga., *et al*. It was concluded that in injuries where both cruciate ligaments are involved, the reconstruction of both is the most effective way to approach it [12].

In conclusion, although there are studies that guide us to a treatment regimen, most of them have a deficient methodology, so it does not exist in a well-defined algorithm to address this serious injury, which is why it is vitally important to identify each case.

The objective of this study was to determine the functional results in patients with multiligamentary knee lesions that were managed via arthroscopic approach in a single surgical event.

Material and Methods

An observational study was performed in which patients with an age range of 25 to 55 years with a diagnosis of multiligamentary knee injury confirmed by MRI who underwent arthroscopic surgery in a single surgical event, between April 2016 and April 2017 managed by the Arthoroscopy department of our tertiary care unit. We included patients with postoperative diagnosis of multiligamentary knee injury who underwent ligamentous substitution in a single surgical event according to the arthroscopy service database of our unit and that had 3 months of postoperative follow-up.

We excluded all patients in whom more than one surgical event was performed, patients who could not be located, or those patients who did not have sufficient or legible information in the clinical file.

Once the cases were selected, the file was reviewed, documenting mechanism of injury, sex, age, associated lesions, type of graft used, and complications recording these data on the collection sheet designed for this purpose. The patients were located by telephone and the questionnaires of LYSHOLM and IKDC were used to determine the functional results.

Descriptive statistics and frequencies were used, for the quantitative variables the Pearson correlation test was used and Spearman test was used for qualitative variables. Any value of $p < 0.05$ was taken as significant.

Results

A total of 14 patients were included in the study (11 [78.6%] men and 3 [21.4%] women). We found an average age of 29.14 9.46 years with a range of 16 to 42 years and an even laterality of 50% for the right knees and 50% for the left knees.

The most frequent combination was the combined lesion of the anterior cruciate ligament ACL + PCL rupture found in 5 patients (35.7%), followed by the ACL + lateral collateral ligament (LCL) in 3 patients (21.4%), the ACL + MCL in 2 patients (14.3%) and those of the ACL + posterolateral complex, ACL + PCL + MCL; ACL + PCL + posterolateral complex; and ACL + PCL + LCL + posterolateral complex, each with one patient (7.1%).

Ten of the patients presented meniscal injury; while five presented chondral injury; all being managed with meniscal remodeling and microfractures respectively.

Most frequent injury mechanisms: Traffic accident occupied the first place with 5 patients (35.7%), secondly, sports practice was found (28.6%), thirdly, being run over (21.4%) and fourth, falling less. of 1.5 meters and recreational activities with one patient each (7.1%). Of these patients, one presented a neurovascular lesion that required revascularization by means of a saphenous vein graft.

All patients underwent arthroscopy-assisted ligament substitution in only one surgical event, autograft was used in 10 (71.4%) of the patients, while allograft was used in 4 (28.6%). The mean time of postoperative time when performing the evaluation was 8.57 4.32 months, with a range of 4 to 15 months.

Two of the patients (14.3%) presented permanent damage to the common fibular nerve secondary to the surgical event (this being the only complication presented).

The average IKDC score obtained was 70,864 15,625, with a range of 47.1 to 88.5.

On the other hand, the LYSHOLM scored an average of 73.64 13.523 was found, with a range of 46 to 94. According to this, 4 of our patients obtained a poor result (28.6%), 5 acceptable (35.7%), 4 good (28.6%) and 1 excellent (7.1%).

A correlation was found between the mechanism of injury and combined lesion of the anterior cruciate ligament with posterior cruciate ligament (independently of the rest of the ligaments or injured structures), finding lesions of at least these two ligaments in 4 of the 5 patients who presented an accident. of transit (80%), in 3 of the 3 patients who had a run over (100%), in 1 of the 4 patients who presented the injury during sports practice (25%), and in no patient who presented his injury to the fall of 1.5 meters and during recreational activities (p = 0.019).

On the other hand, the nerve injury was correlated with poor functional results both in the assessment with the LYSHOLM questionnaire (p = 0.008) and in the assessment with the IKDC tool (p = 0.004).

Finally, a correlation was found between the assessment scale of LYSHOLM and IKDC (p = 0.001).

Discussion

According to the study, we found functional results similar to those of other authors. Peskun and Whelan [13] found functional results according to ours in patients operated for multiligamentary instability without specifying if the procedure was performed in a single surgical time or not. Also the average age was similar, so we can consider this type of injury a pathology of the young patient of productive age.

With regard to sex, the prevalence was higher in men, which is similar to that reported in the literature [15].

The association between the mechanism of injury and the concomitant lesion of both cruciate ligaments should be noted, with this combination with high-energy mechanisms, such as traffic and road accidents being more frequent.

We consider the most important finding of our study, the relationship that exists between the nerve injury (whether it occurs during dislocation or during the surgical procedure) with the functional result, negatively affecting it. Krych., *et al*. report similar functional outcomes in patients with and without nerve injury; However, the follow-up is longer and the functional evaluation is performed after granting treatment to the nerve lesion (tendon transfer, nerve transfer, neurolysis) [7].

Finally, we believe that due to the size of our sample, no statistically significant relationship was found between the functional result and the age of the patient, the type of graft used, the presence of chondral and/or meniscal damage. Other factors that could have influenced our results are the postoperative follow-up time.

Conclusion

The multiligamentary instability of the knee is a pathology considered uncommon, with a high rate of neurovascular complications and an anatomical profile of heterogeneous lesion, making it difficult to evaluate the functional results of it. Similarly, there is no well-defined algorithm for the management of this lesion, however, it is currently considered superior to surgical management over the conservative. We consider that our results support the arthroscopic treatment in a single surgical time of this type of lesions, since functional results similar to those published by other authors were obtained. However, we consider it pertinent to carry out new prospective studies that allow us to obtain more information about the cases, as well as a greater patient follow-up.

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