Is Single-Stage Bilateral Knee Arthroscopy a Safe Option?

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ABSTRACT

Introduction: Single-stage bilateral arthroscopic surgery allows the patient to undergo a single postoperative and rehabilitation period. The aim of this article was to evaluate the functional-clinical outcomes and time to return to work and sports in a series of patients who had undergone single-stage bilateral arthroscopy. **Materials and Methods:** We evaluated a retrospective series of patients who had undergone single-stage bilateral knee arthroscopy from April 2016 to April 2019. Short- and medium-term clinical-functional outcomes, and time to return to work and sports were analyzed. **Results:** The average age of the patients was 41 years (range 18 - 63), with an average follow-up of 18 months (6-37). The average anesthesia time was 105 minutes (range 60 - 170) and the average surgical time was 85 minutes (50 to 150). The average time to return to work was 2 months (range 1-5). Joint range of motion was fully recovered in all patients. **Conclusion:** Although single-stage bilateral arthroscopy has shown good clinical outcomes in selected patients, no relevant comparisons or conclusions can be established due to the low casuistry and the great diversity of the surgeries performed. The main advantage would be in avoiding procedures in two surgical stages, which would imply two operations, twice the anesthesia and two different rehabilitation programs.

Keywords: Bilateral arthroscopy; single-stage arthroscopy; knee arthroscopy.
Level of Evidence: IV

Artroscopia bilateral de rodilla en un solo tiempo quirúrgico, ¿es una opción segura?

RESUMEN

Introducción: La artroscopia bilateral de rodilla en un solo tiempo quirúrgico permite cursar un solo posoperatorio y una única rehabilitación. El objetivo de este estudio fue evaluar los resultados clínico-funcionales y el tiempo hasta el retorno laboral y deportivo en una serie de pacientes sometidos a una artroscopia bilateral en un solo tiempo quirúrgico. **Materiales y Métodos:** Se evaluó a una serie retrospectiva de pacientes desde abril de 2016 hasta abril de 2019, que fueron sometidos a una artroscopia bilateral de rodilla en un solo tiempo quirúrgico. Se analizaron los resultados clínico-funcionales a corto y mediano plazo, y el tiempo para el retorno laboral y deportivo. **Resultados:** La edad promedio fue de 41 años (rango 18-63). El seguimiento promedio fue de 18 meses (rango 6-37). Los tiempos de anestesia y quirúrgico promedio fueron 105 min (rango 60-170) y 85 mi (rango 50-150), respectivamente. El tiempo promedio para el retorno laboral fue de 2 meses (rango 1-5). Todos los pacientes recuperaron el rango completo de movilidad articular. **Conclusión:** Si bien se han obtenido buenos resultados clínicos con la artroscopia bilateral de rodilla en un solo tiempo, en pacientes seleccionados, no se pueden establecer comparaciones ni conclusiones relevantes debido a la baja casuística y a la gran diversidad de las cirugías realizadas. La principal ventaja radicaría en evitar procedimientos en dos tiempos quirúrgicos, lo que implicaría dos operaciones, dos anestesias y dos programas de rehabilitación diferentes.

Palabras clave: Artroscopia bilateral; artroscopia en un tiempo quirúrgico; artroscopia de rodilla.
Nivel de Evidencia: IV

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INTRODUCTION

When a patient requires arthroscopic surgery on both knees, the procedure can be performed in a single surgical stage or planned in two stages. Single-stage bilateral arthroscopy can be performed sequentially, with a single medical team,[1-3] or simultaneously with two different teams.[4,5] This allows the patient to undergo a single postoperative period and a single rehabilitation. In turn, the time to return to work and sports, while depending on the type of surgery, is usually similar to that of surgeries in two different surgical stages.[1,4-6]

Single-stage bilateral procedures involve a lower cost than those that are performed in two stages. In different series, a reduction in costs of between 29% and 64% compared to that of two-stage surgery was reported. This was mainly attributed to surgical and hospitalization charges.[1-3,6]

In none of the reported series was an increased risk of complications between single-stage and two-stage surgeries observed.[1-3,6]

At present, few published articles report on the clinical or return-to-work outcomes following bilateral arthroscopic surgery.

The main aim of this study was to evaluate a number of patients who had undergone single-stage bilateral knee arthroscopy, from a clinical and functional point of view, as well as to analyze the time to return to work and sports.

MATERIALS AND METHODS

A series of cases that included 11 patients who had undergone arthroscopic surgery of both knees in a single surgical time, either sequentially or simultaneously, between April 2016 and April 2019, was retrospectively analyzed. The minimum follow-up was six months.

All procedures were performed in the Orthopedics and Traumatology Service of our hospital. The search was conducted in the institution's electronic medical records database.

The following data were recorded: type of surgical procedure, pre-surgical risk by the classification of the American Society of Anaesthesiologists (ASA),[7] anesthesia time and surgical time.

The pain was evaluated before and after surgery, using the visual analog scale, and the degree of postoperative satisfaction was determined with the Likert scale.[8] The range of motion of the joint was determined by a goniometer in the last appointment. It was considered complete in the range of 0-10º extension and >120º flexion.

The time until the return to work and sports was analyzed. Surgical complications were recorded according to Dindo-Clavien's classification.[7]

Surgical technique

The patient was placed in supine decubitus position. The surgeries were performed under general and locoregional anesthesia. Both lower limbs were placed within the same sterile field. Operations were performed by surgeons specializing in knee arthroscopy. We have a single arthroscopy tower and two surgical teams, so in single-stage arthroscopies, the procedures were performed sequentially. Conversely, in those that included arthroscopy and open surgery, while one of the teams performed arthroscopy on one knee, the other team performed open surgery on the other. The hemostatic cuff (in cases of anterior cruciate ligament surgery) was used only for the arthroscopic stage (Figure).

Surgical procedures are summarized in Table 1. Regarding the plastic of the anterior cruciate ligament, in all cases, a technique involving hamstring grafting, cortical button fixation on the femur and interference screw in the tibia was performed.[8]

Rehabilitation protocols were individualized according to the type of surgery.

Figure. Reconstruction surgery of the anterior cruciate ligament. On the right knee, the arthroscopic stage ended and the graft was fixed. On the left knee, the graft was taken during the arthroscopic stage on the right (in preparation at the surgical table) and the arthroscopic stage was advanced.

FINDINGS

Five women and six men were evaluated, with an average age of 41 years (range 18-63) and an average follow-up of 18 months (range 6-37). The surgical risk was ASA 1 (6 patients), ASA 2 (4 patients) and ASA 3 (1 case). The average anesthesia time was 105 min (range 60-170). The average surgery time was 85 min (range 50-150). Seven procedures were day-case and four required hospitalizations: three anterior cruciate ligaments and one avascular bone necrosis (Tables 1, 2 and 3).

The average pain score on the visual analog scale was 7/10 (range 3/10 to 10/10) before the intervention and 2/10 (range 0/10 to 6/10) afterward. According to Likert's satisfaction scale, nine patients reported being "very satisfied" and two "satisfied" with postoperative results. Faced with the question "would you undergo the same single-stage bilateral procedure?" they all replied that they would.

In the last follow-up appointment, all patients had regained the range of joint motion.

The time until return to work and sports is described in Tables 1 and 2.

In the immediate postoperative period, two minor complications were recorded: one patient with persistent pain and one with hemarthrosis.

DISCUSSION

Regardless of underlying conditions, satisfactory results have been achieved with single-stage bilateral knee arthroscopy.[1-3,6] Larson et al. did not find statistically significant differences for complication rates, instability tests or functional outcomes between patients with bilateral anterior cruciate ligament insufficiency operated in a single stage and those operated on in two stages.[2]

Table 1. Summary of surgical procedur

Patient	Diagnosis	Bilateral arthroscopic treatment	Anesthesia time	Surgical time	Time until return to work (weeks)	Time until return to sport (weeks)
1	Patellar OCL	Microperforations + PRP	60 min	50 min	20	12
2	ACL rupture + IMS	ACL reconstruction + meniscal suture	170 min	140 min	16	32
3	OCL in femoral condyle + IMS	Microperforations + partial meniscectomy	70 min	50 min	12	12
4	OCL in femoral condyle + IMS	Microperforations in femoral condyle + partial meniscectomy	75 min	60 min	8	8
5	ACL rupture + IMS	ACL reconstruction + partial meniscectomy	110 min	75 min	8	32
6	ACL rupture + IMS	ACL reconstruction + partial meniscectomy	150 min	105 min	8	36
7	IMS	Partial meniscectomy	90 min	80 min	1	6
8	Avascular necrosis in femoral condyle	Microperforations in femoral condyle + bone marrow concentrate	85 min	75 min	The patient does not work.	8
9	Trochlea OCL	Mosaicplasty + bone marrow concentrate	165 min	150 min	8	12
10	IMS	Partial meniscectomy	80 min	60 min	3	8
11	Patellar OCL	Mosaicplasty	110 min	90 min	8	12

OCL - osteochondral lesion, ACL - anterior cruciate ligament, IMS - internal meniscal syndrome, PRP - platelet-rich plasma.

Table 2. Average anesthesia and surgical times, and time until return to work and sports.

n = 11	Average	SD	Minimum	Maximum
Anesthesia time (min)	106	± 38.38	63	169
Surgery time (min)	88	± 42.02	49	181
Time until return to work (weeks)	9	± 5.61	1	20
Time until return to sport (weeks)	16	± 11.26	6	36

SD = Standard Deviation

Knee arthroscopy does not usually require hospitalization; however, in single-stage bilateral proceedings, there is no clear consensus.[2,3,9,10] Some authors recommend a hospital stay of at least one day, due to the difficulty to walk and lower range of motion of these patients,[2,3,9]whereas others prefer day-case management.[3,10] In our series, patients undergoing bilateral anterior cruciate ligament reconstruction were hospitalized due to the regional block of both lower limbs. The remaining patient was hospitalized due to the high surgical risk (ASA3) from his history of pulmonary transplantation. The rest of the surgeries were day-case, as they were performed under local and general anesthesia.

Table 3. Number of day-case and inpatient surgeries, and ASA score

Type of intervention	Total
Day-case	7
Inpatient	4
	n = 11
ASA score	
1	6
2	4
3	1
	n = 11

An important factor to consider when performing a single-stage bilateral arthroscopy is the understanding and desire of the patient, as this is of paramount importance for good evolution and rehabilitation. Lack of conviction can be a limiting factor in performing single-stage bilateral arthroscopy.[4,5]

The return to work and sports after a simple arthroscopy depends not only on the initial diagnosis and the type of treatment proposed, but also on intraoperative factors, such as the treatment of joint cartilage, the need for osteotomies or ligament reconstructions, which could even extend the time return to work to more than three months. In the series published by Jari et al.,[1] no significant differences were found in time until return to work between patients who had undergone single-stage surgery and those with surgeries in more than one stage.

Table 4, compares the average time to return to work and sports based on the type of surgery when it is unilateral or bilateral. While lapses may be slightly larger when operating both knees in a single stage, the patient does not require a second procedure, although the time until return to work and sport would be longer. The advantage of operating both knees in a single stage lies in having a single postoperative period.

While the period until return to work was similar to that of other published series,[1,4] we should emphasize that it depends to a large extent on the type of intervention and the type of activity each patient engages in.

The published complication rate for single-stage simple and bilateral arthroscopies are similar, between 1% and 6%. The most common complications in bilateral surgeries are pain and hemarthrosis,[9-12] which coincides with the two complications observed in our series.

Table 4. Comparison of the average time to return to work and sports in single-stage unilateral and bilateral surgeries, according to each pathology, expressed in weeks.

	Unilateral		Bilateral	
	Return to work	**Return to sport**	**Return to work**	**Return to sport**
Plastic of anterior cruciate ligament	8	32	11	32
Partial meniscectomy	2	6	2	7
Mosaicplasty	7	12	8	12
Microperforations	5	8	10	9

Several publications indicate that single-stage bilateral arthroscopy represents a lower hospital cost.[2,6,13] In the series published by Sajovic et al., which compares the costs of single-stage and two-stage bilateral reconstruction of the anterior cruciate ligament, the total savings are 2925 euros.[6] In their retrospective series, Larson et al. reported savings of more than US$3750 and attribute the higher percentage of this figure to day-case surgery and the possibility of a single postoperative rehabilitation.[2]

At our institution, the costs of operating room inputs, as well as surgical, rehabilitation and hospitalization time for bilateral knee arthroscopy, were compared, and the amount saved for the healthcare system was US$750.[13]

The main limitation of our study is that, as this is a series of retrospective cases, without a control group, with great heterogeneity in surgical procedures and a low casuistic, it is not possible to establish relevant comparisons or conclusions. However, it reports on the safety and outcomes of single-stage bilateral knee arthroscopy, a subject with few reports in the international literature and without publications in the national literature.

CONCLUSIONS

While single-stage bilateral knee arthroscopy has achieved good outcomes from a clinical point of view and is a cost-effective procedure in selected patients, no relevant comparisons or conclusions can be established due to low casuistics and the great diversity of surgeries performed in this study. The main advantage would lie in avoiding two-stage procedures, which would involve two surgeries, twice the amount of anesthesia and two different rehabilitation programs.

Conflict of interests: The authors declare they do not have any conflict of interests.

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