


Osteochondral autograft transplantation for the treatment of osteochondral injuries of the knee: evaluation of 62 patients with an average follow-up of 8 years

JUAN PABLO ZICARO, AGUSTÍN MOLINA ROMOLI, CARLOS H. YACUZZI, MATÍAS COSTA PAZ

Orthopedics Department, Hospital Italiano de Buenos Aires, Ciudad Autónoma de Buenos Aires

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ABSTRACT

Introduction: Osteochondral autograft transplantation is a surgical alternative for osteochondral defects of the knee. The aim of this study was to analyze a series of 62 patients treated with osteochondral autograft transplantation of the knee and an average follow-up of 8 years.

Methods: A total of 62 patients treated with osteochondral autograft transplantation between 2001 and 2014 were evaluated. Patients with focal osteochondral lesions who underwent osteochondral autograft transplantation alone or associated with another procedure and a minimum follow-up of 2 years were included. Lysholm score, IKDC, and Kellgren-Lawrence radiographic scale were used. Forty-five men and 17 women (average age 36 years) were evaluated. Lesions were localized in medial condyle (35), lateral condyle (12), patella (12), and three were combined. Forty-two patients underwent isolated osteochondral autograft transplantation while 20 patients underwent associated surgical procedures.

Results: Mean Lysholm score was 80.1 and IKDC score was 66.7. There were no significant differences in the Lysholm and IKDC scores between groups. Radiographic results demonstrated complete graft incorporation in 30 patients. Clinical evaluation revealed satisfactory results.

Conclusion: Osteochondral autograft transplantation to treat osteochondral lesions is a procedure with a high clinical satisfaction and good functional results in patients with focal osteochondral lesions.

Key words: Osteochondral autograft transplantation; cartilage; knee; osteochondral lesion.

Level of Evidence: IV

TRASPLANTE OSTEOCONDRALE AUTÓLOGO PARA TRATAR LESIONES OSTEOCONDRALES DE LA RODILLA: EVALUACIÓN DE 62 PACIENTES CON UN SEGUIMIENTO PROMEDIO DE OCHO AÑOS

RESUMEN

Introducción: El trasplante osteocondral autólogo es una alternativa quirúrgica en lesiones focales del cartílago articular. El objetivo de este estudio fue evaluar una serie de 62 pacientes tratados con trasplante osteocondral autólogo de rodilla y un seguimiento promedio de ocho años.

Materiales y Métodos: Se evaluó retrospectivamente a 62 pacientes operados entre 2001 y 2014. Se incluyeron pacientes con lesión focal de cartílago sometidos a un trasplante osteocondral autólogo aislado o asociado a otros procedimientos

Conflict of interests: The authors have reported none.

quirúrgicos, con un seguimiento mínimo de dos años. Para las evaluaciones se emplearon las escalas de Lysholm y de Kellgren-Lawrence, y el puntaje IKDC. Se evaluó a 45 hombres y 17 mujeres (edad promedio 36 años). La localización de las lesiones era: cóndilo interno (35), cóndilo externo (12), rótula (12) y combinadas (3). A 42 pacientes se los sometió a un trasplante osteocondral autólogo aislado y a 20, a uno asociado a otro procedimiento.

Resultados: El valor promedio en la escala de Lysholm al momento de la evaluación fue 80,1 y el IKDC fue de 66,7. No hubo diferencias significativas en las escalas de Lysholm e IKDC entre los grupos con trasplante osteocondral autólogo aislado y asociado a otro procedimiento. En 30 pacientes evaluados con radiografía, se observó una inclusión satisfactoria del taco óseo. En nuestra serie de pacientes, las evaluaciones clínicas mostraron resultados satisfactorios.

Conclusión: El trasplante osteocondral autólogo para tratar lesiones osteocondrales es un procedimiento con un alto grado de satisfacción y buenos resultados funcionales en pacientes con lesiones focales del cartílago articular.

Palabras clave: Trasplante osteocondral autólogo; cartílago; rodilla; lesión osteocondral.

Nivel de Evidencia: IV

Introduction

Knee osteochondral injuries cause pain and functional impairment, with serious implications in working activities and sport life.¹ Defects in cartilage can hardly heal and regenerate due to the cartilage's avascular and hypocellular profile.^{1,2} For these reasons, surgical treatment is very important, especially in young and active patients, in whom the goal is to recover joint surface so as to relieve pain and recover function, and decrease progression to osteoarthritis.³ There are reports on multiple surgical techniques to treat osteochondral lesions: bone marrow stimulation (microfractures), osteochondral autograft transplantation (OAT), cadaveric graft transplantation and biological therapies (chondrocytes autograft or mesenchymal stem cells, among others).⁴

The OAT consists of gathering a bone cylinder with a healthy cartilage surface from a donor zone that bears less weight so as to insert it in the defect³ (Figures 1 and 2). Although it causes some morbidity at the level of the donor zone,¹ this procedure provides tissues with hyaline cartilage to cover lesions.⁵

All therapeutic alternatives have showed good clinical and functional results according to specialized bibliography. The current treatment that is accepted as appropriate for the different osteochondral lesions varies as the size of the lesion, the patient's age and the patient's level of activity do.²

The aim of this study was to evaluate a series of 62 patients treated at our Centre with OAT and an average follow-up of eight years.

Materials and Methods

We carried out a cross-sectional study in patients treated with OAT between January 2001 and January 2014. We included patients with focal knee cartilage lesion who received OAT either isolated or associated with other surgical procedures, with a minimal follow-up of

two years. Patients' data and information about the type of surgery they were subject to were collected from electronic medical histories at our Centre. We contacted the patients for clinical follow-up evaluation, which included the Lysholm' subjective scale and the International Knee Documentation Committee (IKDC) score, together with patients' satisfaction rates, the visual analogue scale, and imaging studies (Figure 3). The degenerative component was classified by the Kellgren-Lawrence's radiographic scale.

Results were analyzed by the Research and Statistics Department at our Centre.

Results

Among the 169 patients operated on in the established time, we were able to contact 62 patients available for clinical follow-up evaluation: 45 males and 17 females who at the time of the surgery averaged 36.2 years old (standard deviation= 10.5). Median follow-up was 108 months (interquartile range= 73-132).

According to the anatomic location of the lesion, 35 (57%) were on the medial condyle; 12 (19%), in the lateral condyle; 12 (19%) in the patella; and three (5%) were a combination (2 trochlea and patella and 1 trochlea and medial condyle). Forty-two procedures (68%) were isolated OATs and 20 (32%) were OATs associated with another procedure (Table 1). In the 42 isolated OAT cases, the osteochondral lesion resolved with a unique osteochondral graft and, in 14 cases, with two; in four cases, with three and, in two cases, with four.

All the patients adhered to the same postoperative rehabilitation protocol: four weeks without weight-bearing focusing on range of motion, followed by two weeks with partial weight-bearing, and gradual return to impact sports as of the fourth month consecutive to the injury. Average results on the Lysholm scale at the time of follow-up were 80.1 (standard deviation=14.1) and average IKDC score results were 66.7 (standard deviation=13.5).

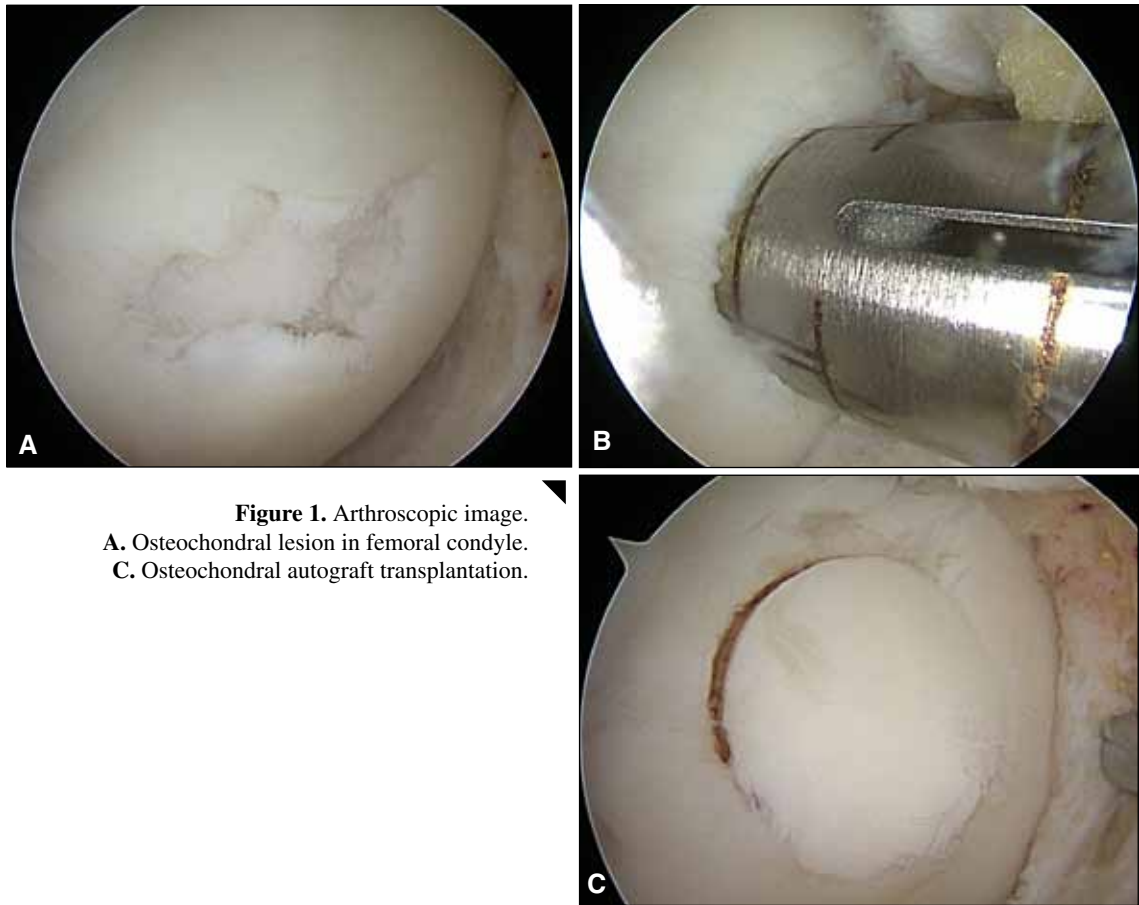


Figure 1. Arthroscopic image.
A. Osteochondral lesion in femoral condyle.
C. Osteochondral autograft transplantation.

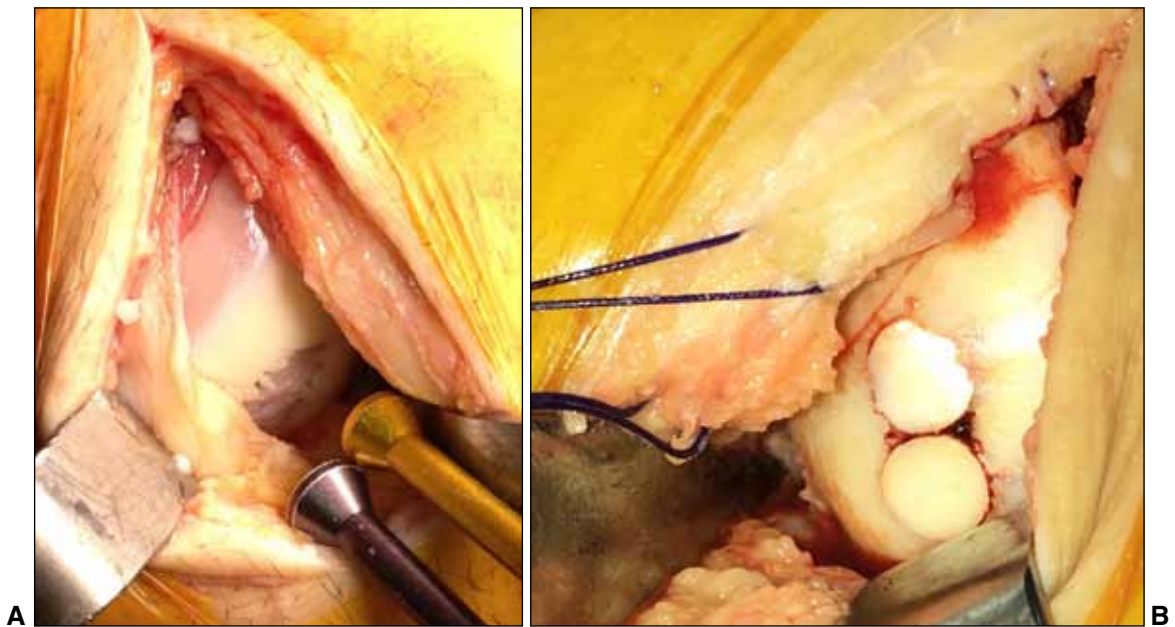


Figure 2. Osteochondral autograft transplantation by miniarthrotomy. A. Assessment of lesion.
B. Restoration with two grafts.

Table 1. Type of surgery

Procedure	n
Isolated osteochondral autograft transplantation	42
Osteochondral autograft transplantation + Reconstruction of anterior cruciate ligament	12
Osteochondral autograft transplantation + Valgus tibial osteotomy	5
Osteochondral autograft transplantation + Meniscal transplantation	2
Osteochondral autograft transplantations + Patello-femoral surface prosthesis	1
Total	62

Patients were divided into two groups as whether they had received isolated OAT or OAT associated with another procedure. We evaluated the patients' demographic and surgical characteristics, and their clinical scales (Lysholm and IKDC score). We did not find statistically significant differences between the two groups (Table 2). Among the 30 patients evaluated with X-rays, the group of isolated OAT showed lower figures in the Kellgren-Lawrence scale as compared with the group of OAT associated with another procedure (Figure 4). This difference was statistically significant ($p=0.03$) (Table 3).

Table 2. Comparison of patients' demographic and clinical data between groups

	Isolated osteochondral autograft transplantation (42)	Osteochondral autograft transplantation associated with another procedures (20)	p
Age median (IQR)	32 (27-43)	39 (33-43)	0.07
Follow-up median (IQR)	96 (60-132)	108 (84-120)	0.6
Male sex n (%)	27 (66)	17 (85)	0.1
Median IKDC (IQR)	67 (56-77)	70 (57-79)	0.7
Median Lysholm (IQR)	85 (72-89)	86 (72-95)	0.3

IQR = Interquartile range.

Discussion

The aim of surgical treatment in knee osteochondral lesions is to decrease joint pain and increase joint function for patients to return to day-to-day activities and for they to potentially maintain their sport life.²

Surgical alternatives can be divided into reparative—techniques of bone marrow stimulation (microfractures), which resolve osteochondral lesions with formation of fibrocartilage; restorative—osteochondral autograft or cadaveric graft transplantation; and cellular therapies—the ones that might give hyaline cartilage back to the defect. It has been shown that all these techniques improve patients' clinical status as compared with their preoperative status.^{2,4-7} There are just few long-term follow-up studies.⁵

In 2009, Cole et al. published a treatment algorithm which considers not only the lesion size but also its localization and concomitant lesions. Moreover, it considers patients' age, BMI, types of symptoms, occupation, rehabilitation and specific worries about their problem, which are significant preoperative variables.²

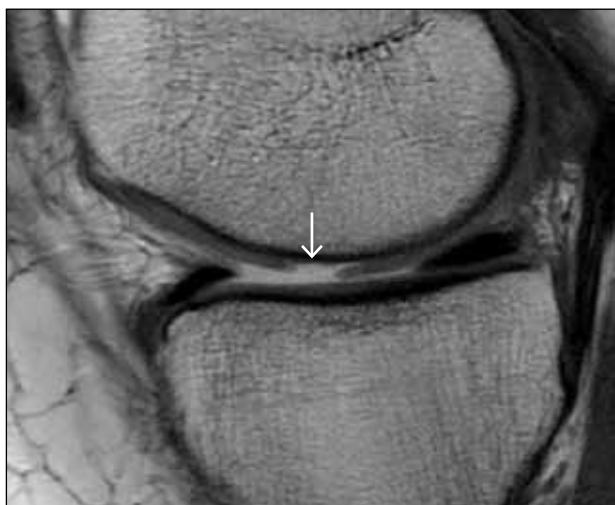
Shaha et al. evaluated results in their active military population and did not find clinical differences in results at the time of comparing patients with isolated OAT and patients with OAT plus associated procedures.⁸ Other publications have reported good clinical results by associating OAT with valgus tibial osteotomy in the treatment of osteochondral lesions associated with varus misalignment.⁹

With respect to patients' radiographic evaluation, previous studies have shown that, in spite of osteoarthritis progression, there is no correlation with clinical results.⁵ Notwithstanding, this conclusion may be biased by follow-up times.

In 2000, Larrain et al.¹⁰ described this surgical technique for lesions in the femoral condyles and evaluated results in their series of 14 patients with 18-month follow-up and very good functional results. In 2002, at the Hospital Ital-

Table 3. Kellgren-Lawrence scale comparison

Radio-graphic scale n (%)	Isolated osteochondral autograft transplantation (20)	Osteochondral autograft transplantation associated with another procedure (10)
0	7 (35)	1 (10)
1	7 (35)	0
2	0	4 (40)
3	5 (25)	3 (30)
4	1 (5)	2 (20)



▲ **Figure 3.** IMR. Osteochondral lesion (arrow).

Figure 4. Radiographic follow-up. Osteochondral autograft transplantation associated with valgus tibial osteotomy ▶



iano, the authors of this very study¹¹ described technical aspects in patellar osteochondral lesions in a series of 13 patients with average 12-month follow-up. In 2012 we published one case treated with a retrograde technique in tibial plateau osteochondral lesions.¹²

In our series of 62 patients with average eight-year follow-up, we got satisfactory results in clinical evaluations (Lysholm and IKDC score). At the time of dividing the population into two groups (isolated OATs and OATs associated with other procedures), we detected a greater degree of osteoarthritis in the Kellgren-Lawrence scale in those patients with an associated procedure as compared with those with isolated OAT. Nevertheless, we did not find significant differences in functional results between these two groups.

Our study has the limitations inherent in retrospective descriptive studies. Moreover, we lost patients to follow-up because some of them lived far away from the institution of reference or their contacting data were modified sometime in the past and, therefore we could not contact them. By not counting on preoperative evaluation we cannot compare preoperative results with current results. The

heterogeneity of associated procedures is another of our limitations; however, we were able to take advantage of this variable to make comparisons between groups.

However, it is worth highlighting that we were able to make a long-term clinical evaluation in a large number of patients, as well as comparative analyses between the groups.

Conclusion

The OAT is a procedure associated with high mid-term and long-term satisfaction levels and good functional results in patients with focal lesions in articular cartilage.

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