



## Conservative treatment of meniscal tears in anterior cruciate ligament reconstruction



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### ABSTRACT

**Background:** Management of small and stable meniscal tears within the vascular zone at the time of anterior cruciate ligament (ACL) reconstruction is controversial. The purpose of this study was to evaluate the outcome of meniscal tear left in situ at the time of ACL reconstruction.

**Methods:** Using the IKDC, KT-1000 and the Tegner Activity Score (TAS), we retrospectively analysed 175 cases of ACL reconstruction with meniscal tears performed from 2006 to 2012. Patients with residual laxity on clinical assessment were identified and considered as a subgroup. Clinical outcome and failure rate were evaluated.

**Results:** In 83 patients (47.4%), a meniscal tear was left in situ at the time of ACL reconstruction: 45 were medial and 38 were lateral. Patients were clinically reassessed with a minimum follow-up of 24 months. The overall failure rate of conservative meniscal treatment in patients with objective residual laxity was 87.5%, and 6.7% in patients with a stable knee ( $P < 0.001$ ). Those with stable knees had higher postoperative IKDC subjective scores ( $P = 0.0022$ ) and TAS ( $P < 0.0001$ ). Patients without residual laxity had higher failure rate for the medial meniscus compared with lateral meniscus - 10.5% versus 2.7% ( $P = 0.36$ )—and the red-red zone had lower revision rate compared with the red-white zone ( $P = 0.0322$ ).

**Conclusions:** The conservative treatment of small and stable peripheral tears of the medial and lateral menisci had low failure rate and no described complications. In our series residual laxity significantly increased the failure rate.

**Level of evidence:** level IV, therapeutic case series

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### 1. Introduction

According to recent statistics, more than 200,000 anterior cruciate ligament (ACL) reconstruction procedures are performed in the United States every year, and associated meniscal tears are present in 40 to 60% of cases [1–4].

The well-described consequences of meniscectomy may lead to cartilage involution, which contributes to greater instability [5–7]. With the aim of maintaining the function of a torn meniscus, selective arthroscopic meniscectomy, meniscus repair and no treatment of meniscal tears at the time of ACL reconstruction have been proposed over the years since the loss [8–12]. Because the loss of meniscal tissue can lead to secondary knee osteoarthritis [10–12], considerable emphasis has been placed on conserving meniscal tears in the hope of preserving force dissipation. Nonetheless, meniscal repair of longitudinal tears is

only successful in cases of stable sutures, with a reported healing rate of 75% [13–14].

Vascularity of the parameniscal area, which is estimated to cover 10 to 30% of the total surface area of the meniscus, suggests that the potential healing of a stable meniscal tear is comparable to that of other vascularised tissues, provided that the meniscal tear is stable and there is no articular laxity [3,15,16]. A literature analysis has revealed that a lateral meniscal tear is more likely to spontaneously heal than a medial meniscal tear, and it has been established that the healing rate in meniscal repair is higher when a concomitant ACL reconstruction is performed [17].

Shelbourne et al. published a series of 33 patients with tears of the posterior horn of the medial meniscus observed during ACL reconstruction surgery and not treated [18]. After a mean 10-year follow-up period, radiographic measurements showed no statistically significant difference between the objective and subjective scores for the group conservatively treated and control group without meniscal tears. In another study, Shelbourne et al. described a population of 332 patients receiving long-term follow-up for conservatively treated lateral meniscal tears, with an International Knee Documentation Committee Criteria (IKDC) score of 96, corresponding to a normal or nearly normal level, and a revision rate of 2.4% [19].

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The purpose of the present study was to evaluate the appropriateness of the conservative option for meniscal tears detected during ACL reconstruction, and to analyse the locations and types of tears that have the greatest chance of a positive outcome. A secondary objective was to evaluate the importance of articular stability in meniscal healing.

## 2. Materials and methods

### 2.1. Study design

Ethics committee approval Institutional Review Board (IRB) for this study was requested and obtained (number 074 – REG 2014, approved on 15.10.2014).

A total of 175 cases of ACL reconstruction associated with unilateral meniscal tears, performed by the same surgeon (MA-M) at the same institute from 2006 to 2012, were retrospectively analysed. Inclusion criteria were: ACL rupture with unilateral meniscal tears (medial or lateral) confirmed by arthroscopy at the time of ACL reconstruction, and a Tegner activity score (TAS) between five and 10 [20]. Exclusion criteria were: meniscal integrity, tears of both menisci, preoperative symptoms of joint locking, posterior cruciate ligament injuries, partial and bilateral ACL injuries, complex peripheral capsular injuries, previous knee surgery, severe chondral damage, associated fractures, significant axial deviation of the knee, and being aged <18 or >45 years. Bilateral ACL tears and/or reconstruction were excluded as well, because these conditions could represent a potential selection bias and confounding factor during the comparative clinical evaluation of affected knee.

To prove the role of residual instability in the evolution of small meniscal tears left in situ at the time of meniscal reconstruction, clinical outcomes and meniscal failure rates of patients with stable knees treated conservatively were compared with those of a subgroup of patients with residual laxity. Treatment was considered as failed when the patient had a secondary meniscectomy at the same site of the meniscal tears left in situ during the first ACL reconstruction or developed pain or locking during the follow-up period.

### 2.2. Clinical evaluation

With a minimum of 24 months of follow-up, all patients were clinically re-assessed by the same surgeon, with special attention to any residual meniscal symptoms and residual laxity. The clinical postoperative evaluation was systematically conducted at two, four and six weeks, three and six months, and one and two years after surgery. The evaluation was performed by means of subjective and objective parameters and using IKDC, KT-1000 (MEDmetric® Knee Ligament ARTHROMETER®) and the TAS. The authors of the present study reassessed all the clinical reports.

Patients with residual laxity on clinical assessment at one-year follow-up were selected and considered as a subgroup of patients. The authors considered the residual laxity as the presence of a pivot shift with glide or more, and a comparative Lachman Test  $\geq 6$  mm. A stable knee was considered when the pivot shift was absent and the comparative Lachman Test was <6 mm, given that the range between 0 and five millimetres of Lachman Test represents normal or nearly normal knee laxity. All the available clinical data were analysed and compared with those gathered before surgery.

### 2.3. Arthroscopic evaluation

The meniscal, ligamentous and chondral conditions of the joint documented in detail during the arthroscopic phase of ACL reconstruction were also reviewed by the authors to collect all the surgical data. The identified meniscal tears were classified according to location, size and morphological criteria. With regard to tear location, the meniscus was divided into three equally sized concentric areas and into three zones. The equally sized concentric areas, from the capsule to the free border, were: the outer, highly vascularised red-red zone (zone I); the intermediate, poorly vascularised red-white zone (zone II); and the white-white, avascular inner area (zone III). The breakdown consisted of three adjacent areas: the posterior third, middle third and anterior third of the meniscus. The size of the tear was measured using a dedicated arthroscopic probe. The depth of the tear was defined as complete (full thickness) or incomplete (partial thickness). The morphology of the tear was described as longitudinal, radial, oblique, horizontal or complex. The chondral damage detected by arthroscopy was classified using the International Cartilage Repair Society parameters [21].

### 2.4. Criteria for non-treatment of meniscus

According to the criteria for meniscal conservation, the eligible lesions were: unilateral medial or lateral meniscal tears, complete or incomplete lesions of <10 mm in length, in the vascularised area, proven to be stable, and to have good tissue quality. Regarding patients with conserved tears, there were no changes to routine rehabilitation programmes, allowing protective weight bearing on day 2 and crutches for three weeks.

During ACL reconstruction, with a view to conserve as much meniscal tissue as possible, the exclusion criteria for performing conservative treatment were: tears measuring >10 mm in length, unstable or dislocatable, meniscal degenerative tears and complex tears such as bucket handle, flap and overturned tears, and bilateral tears.

### 2.5. Statistical analysis

As measures of central location and spread of data, mean and standard deviation (SD) or median and range were calculated. The Kaplan–Meier method was used for the construction of a survival functions plot for re-tear of meniscus failure, Chi-squared test for the comparison of incidence of failure in subgroups of patients with different characteristics and *t*-test to compare the continuous variables. The non-parametric Mann–Whitney test was considered to analyse differences from the continuous values not normally distributed between unpaired groups. The nonparametric log-rank test was used to compare the survival distribution of two different groups. A *P* < 0.05 was considered statistically significant.

## 3. Results

### 3.1. Participant characteristics

In 83 patients (47.4%), the arthroscopy revealed a meniscal tear left in situ at the time of ACL reconstruction. The cohort consisted of 48 males and 35 females. The right side was most prevalent (48/83) and the average age was  $27.55 \pm 7.6$  years (Table 1). Patients were clinically reassessed with a mean follow-up of  $46.53 \pm 15.72$  months (range 24 to 79), median 48 months.

**Table 1**  
Descriptive statistics of patients.

Meniscus	<i>n</i>	M/F	Side (R/L)	Age (years)	BTB/HS	Months to surgery	Follow-up (months)
Medial	45	26/19	27/18	27.7 (mean) $\pm$ 7.7 (SD)	25/20	7.2 (mean) $\pm$ 3.5 (SD)	47.8 (mean) $\pm$ 16.2 (SD)
Lateral	38	22/16	21/17	27.3 (mean) $\pm$ 7.4 (SD)	24/14	7.0 (mean) $\pm$ 2.8 (SD)	45.5 (mean) $\pm$ 15.0 (SD)

BTB, bone patellar bone graft; F, Female; HS, Hamstring graft; L, left; M, Male; *n*, number of patients; R, right.

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