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Original article

Meniscal survival rate after anterior cruciate ligament reconstruction

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ABSTRACT

Background: Meniscal suture provides well-documented benefits. Integrity of the cruciate ligaments of the knee is a prerequisite for meniscal healing. Nevertheless, reconstruction of the anterior cruciate ligament (ACL) does not consistently prevent recurrent tearing of a sutured meniscus. We evaluated meniscal survival rates, 5 and 10 years after meniscal suture concomitant with an ACL reconstruction. We compared the outcomes of these repaired menisci to those in which no menisci tears were detected during ACL reconstruction.

Methods: In this multi-centric retrospective study, we included two groups. One group consists of patients who underwent a meniscal repair. This group was further divided into two subgroups based on whether follow-up was 5 years ($n = 76$) or 10 years ($n = 39$). The control group included 120 patients with normal menisci observed during surgery. We studied meniscal survival rates in each group, and we analyzed risk factors associated with the recurrence of meniscal lesions.

Results: The 5-year meniscal survival rate was significantly higher in the control group than in the meniscal-repair group (95% vs. 80%, respectively; $P = 0.0029$). The controls group also had a higher meniscal survival rate after 10 years, although the difference was not statistically significant (88% vs. 77%, $P = 0.07$). A difference in knee laxity greater than 4 mm was associated with a 5-fold increase in the risk of recurrent meniscal tears ($P = 0.0057$). After 5 years, the risk of recurrence was higher for the medial than for the lateral meniscus, whereas after 10 years the difference was no longer statistically significant.

Discussion: Although insufficient healing after meniscal suturing contributes to the risk of further meniscal tears, new lesions can develop in menisci that were undamaged at the time of ACL reconstruction. The risk of a new meniscal lesion is strongly associated with inadequate control of antero-posterior and rotational laxity. Some apparently "new menisci lesions" seems to have been missed during ACL reconstruction.

Level of evidence: IV, retrospective study.

1. Introduction

Among patients with anterior cruciate ligament (ACL) tears, up to 60% also have meniscal lesions [1]. The management and repair of these meniscal tears in stable or stabilised knees is now well standardised and has been reported to carry a 70 to 80% success rate

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Table 1
Epidemiological characteristics in the three groups (the data are mean ± SD or %).

	5-year subgroup	10-year subgroup	*P*	Controls	*P*
Age (years)	26.6 ± 8	30 ± 9.8	0.65	26.7 ± 7.5	0.34
BMI	23.8 ± 3.5	24.2 ± 3.8	0.77	23.7 ± 3.3	0.7
Time to surgery (months)	48.93 ± 99.4	30.1 ± 53.4	0.293	27.3 ± 64	0.114
Laxity difference vs. other knee (mm)	1.78 ± 1.1	3.9 ± 3.3	0.001	1.61 ± 1.3	0.016
Male gender	72%	67.7%	0.629	60.5%	0.102
Right knee involved	43.2%	61.5%	0.056	48.6%	0.491
Reconstruction technique					
KJ	42.3%	62.5%	0.087	48.7%	0.829
RMST	56.4%	35.0%		50.4%	
QT	1.3%	2.5%		0.8%	

Ligament reconstruction techniques: KJ: Kenneth-Jones; RMST: rectus medialis/semi-tendinosus; QT: quadricipital tendon.

[1]. In the absence of surgical stabilisation, the meniscal lesions are unlikely to heal spontaneously. Instead, they usually worsen, and new lesions may develop [2]. In patients who undergo surgical ACL reconstruction, 50% of meniscal lesions may be amenable to repair [3,4].

Surgical knee stabilisation combined with suturing of meniscal tears decreases the risk of progression to osteoarthritis [5,6]. Nevertheless, despite knee stabilisation by ACL reconstruction, about 19% of patients without detected meniscal tear have osteoarthritis after 12 years [5]. The mechanism by which osteoarthritis develops despite a favourable meniscal status at ligament reconstruction is unclear. Inadequate control of antero-posterior and rotational laxity is probably a major adverse factor [7]. A return to sporting activities combined with inadequate stabilisation of the operated knee may explain that meniscal lesions can develop some time after the ligament reconstruction procedure. Few data are available on the frequency of secondary meniscectomy in patients whose menisci were considered normal at ligament reconstruction [8].

The objective of our study was to compare outcomes of healthy and repaired menisci 5 and 10 years after ACL reconstruction.

2. Material and methods

This retrospective multicentre study (4 centres) was conducted in 2013 in preparation for the 2014 symposium held by the French Society for Arthroscopy (Société française d'arthroscopie [SFA]). Patients who had had ACL reconstruction using any technique (patellar tendon, quadricipital tendon, or hamstring tendons) in 2003 or 2008 were included, to obtain two populations with follow-ups of 10 and 5 years, respectively. Based on the surgical reports, the patients were divided into two groups: in one, the medial and/or lateral meniscus was repaired during the same procedure (meniscal repair group) and, in the other, no meniscal lesions were detected during surgery (control group).

The meniscal repair group was further divided into two subgroups depending on whether surgery was performed in 2003 ($n = 39$) or in 2008 ($n = 76$). Follow-up was thus 10 years and 5 years in these two subgroups, respectively. In the 10-year subgroup, mean age was 30 ± 10 years and 67.5% of patients were males; ACL reconstruction was performed using the patellar tendon in 62.5% of patients and the hamstring tendons or quadricipital tendon in the remaining patients. In the 5-year subgroup, mean age was 26.6 ± 8 years and 71.8% of patients were males; the hamstring tendons were used for reconstruction in 56.4% of these patients. The only statistically significant difference between the 10-year and 5-year subgroups was a greater difference in laxity versus the contralateral knee in the 5-year group.

The control group included 120 patients who underwent ACL reconstruction in the same centres and at the same dates. Mean age was 26.6 ± 7.5 years, and 60.5% of controls were males. The patellar tendon was used in 48.6% of cases, the hamstring tendons in 50.4%, and the quadricipital tendon in 0.8%.

No matching was performed between the meniscal repair patients and the controls. Tables 1 and 2 report the other epidemiological data (body mass index and characteristics of the meniscal lesions, i.e., side, size, zone, and number of implants used for repair). The only statistically significant between-group difference was a greater difference in laxity versus the contralateral knee in the meniscal repair group compared to the control group.

The meniscal suturing technique was at the discretion of the surgeon. The meniscal rim was routinely abraded using an electric knife or basket forceps. Suturing was performed by either the all-inside technique with one or more disposable hybrid sutures or the outside-in technique. In each patient, the type of implant used and the number of stitches were recorded.

After 1 year, each patient underwent a clinical evaluation including knee laxity measurements (KT1000, TELOS, or Rolimeter) to assess the effectiveness of the ACL reconstruction procedure. Patients were called by telephone at last follow-up and asked whether they had had further arthroscopic surgery for meniscectomy. If they had, the new surgical report was obtained to determine the status of the meniscus. In the control group, all meniscal lesions were classified as new. In the 5-year and 10-year meniscal repair subgroups, failure of meniscal suturing was defined as a lesion that was identical to the initial lesion (although not necessarily of the same size); in patients with new lesions, defined as lesions in the other meniscus or different lesions in the same meniscus, the suturing procedure was not considered to have failed.

Table 2
Epidemiological characteristics of the two meniscal repair subgroups, with 5 years and 10 years of follow-up, respectively.

	5-year subgroup (%)	10-year subgroup (%)	*P*
Depth			
Zone 1	62.0	58.3	0.921
Zone 2	38.0	41.7	
Location			
Posterior	64.9	50.0	0.101
Posterior + middle	12.2	34.2	
Anterior	17.6	13.2	
Anterior + middle	1.4	2.6	
Middle	4.1	0.0	
Meniscus			
Medial	73.1	75.6	0.242
Lateral	24.4	19.5	
Both	2.6	4.9	