

Superior Knee Function and Higher Activity Level After Circumferential Repair Versus Partial Meniscectomy for Meniscus Horizontal Cleavage Tears: A Minimum 2-Year Propensity-Matched Comparative Study

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INTRODUCTION: Traditionally, meniscal horizontal cleavage tears have been treated with partial meniscectomy or debridement with single leaflet preservation, but increasing recent attention has been turned to repair (**Figure 1**). While circumferential meniscus repair has been described in the literature, clinical outcomes for this technique remain underreported. The purpose of the present study was to report and compare clinical outcomes for patients with isolated meniscal horizontal cleavage tears who underwent either circumferential repair or partial meniscectomy.

METHODS: Patients with isolated meniscal horizontal cleavage tears undergoing primary circumferential repair at a single institution between 2015 and 2022 were included. Patient demographics, surgery details, and clinical findings were retrospectively extracted from the institutional electronic medical records. A control group of patients with isolated meniscal horizontal cleavage tears undergoing primary partial meniscectomy was propensity matched 1:1 for age, sex, body mass index, knee laterality, and meniscal laterality. Visual Analogue Scale (VAS) for pain with rest and with use, Tegner Activity, and International Knee Documentation Committee (IKDC) scores, and return to sport data were collected at a minimum 2-year follow-up and analyzed. Differences between the circumferential repair and partial meniscectomy groups were assessed with 2-tailed independent-samples Student t-tests and a non-parametric permutation test (R v 4.4.1; RStudio).

RESULTS: Thirty-six knees (22 right, 14 left; 19 lateral menisci, 17 medial menisci) in 36 patients (25 male, 11 female; mean age, 30 ± 12 years) who underwent circumferential repair of a meniscal horizontal cleavage tear were followed for a mean of 5.9 years (range, 2.1-8.2 years) (**Table 1**). The partial meniscectomy group consists of 36 knees (18 right, 18 left; 23 medial menisci, 13 lateral menisci) in 36 patients (26 male, 10 female; mean age 35 ± 12 years) and were followed for a mean 4.1 years (range, 2.2-6.9 years). Circumferential repair patients were significantly more likely ($p = 0.016$) to play sports preoperatively compared to partial meniscectomy patients. Intraoperative characteristics can be found in **Table 2**. At a minimum of 2-years postoperative, 4 (15%) of the circumferential repair patients had reoperations or failures; 5 (19%) of the partial meniscectomy patients had reoperations or failures. At the time of final follow-up, circumferential repair patients had significantly superior IKDC scores ($p < 0.001$) and Tegner Activity Scale scores ($p = 0.046$) compared to partial meniscectomy patients. After a non-parametric permutation test, circumferential repair patients performed significantly better for all patient reported outcome measures ($p = 0.029$) compared to partial meniscectomy patients (**Figure 2**). Eighteen (86%) circumferential repair patients and 9 (90%) partial meniscectomy patients returned to sport.

DISCUSSION AND CONCLUSION:

At a minimum of 2-years of follow-up, patients who underwent circumferential repair of meniscal horizontal cleavage tears demonstrated superior knee function (IKDC) while also having a higher activity level (Tegner) compared to patients who underwent partial meniscectomy. The circumferential repair group demonstrated an acceptable all-cause reoperation rate of 14%, like repair of other meniscus tear configurations, and a lower failure rate compared to the partial meniscectomy group. Therefore, circumferential meniscus repair should be considered at the time of surgery in select patients with symptomatic

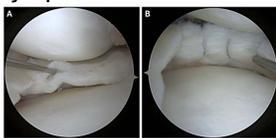


Figure 1. Arthroscopic images of a 25-year-old male's lateral compartment of his left knee demonstrating (A) a medial meniscus horizontal cleavage tear (B) and circumferential repair using 4 sutures.

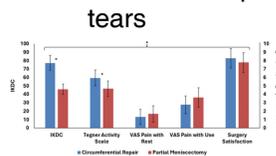


Figure 2. Clinical outcomes for the circumferential repair and partial meniscectomy groups. The circumferential repair group contained 27 responses, and the partial meniscectomy group contained 26 responses. Error bars are reported with 95% Confidence Intervals. An asterisk represents a significant difference with a P-value of <0.05.

Table 1. Patient demographics.

Variable	Circumferential Repair	Partial Meniscectomy	P Value
Age at Surgery, y	30 ± 12	35 ± 12	0.062
Body Mass Index, kg/m ²	27.7 ± 6.0	29.0 ± 6.3	0.513
Sex, n (%)			>0.999
Female	11 (31%)	10 (28%)	
Male	25 (69%)	26 (72%)	
Follow-up, y (range)	5.9 (2.1-8.2)	4.2 (2.2-6.7)	0.636
Knee Laterality, n (%)			
Right	22 (61%)	18 (50%)	
Left	14 (39%)	18 (50%)	
Meniscal Laterality, n (%)			0.236
Lateral	19 (53%)	13 (36%)	
Medial	17 (47%)	23 (64%)	

Values are provided as mean ± standard deviation unless otherwise specified.

Table 2. Intraoperative characteristics and simultaneous procedures in addition to circumferential meniscal repair.

Variable	Circumferential Repair	Partial Meniscectomy
Meniscus Laterality ^a		
Lateral	19 (53%)	13 (36%)
Medial	17 (47%)	23 (64%)
Suture Technique Occurrences		
All-inside	23 (64%)	
Inside-out	11 (33%)	
All-inside and inside-out	1 (3%)	
Additional Injuries		
ACL	4 (11%)	2 (6%)
MCL	1 (3%)	
Contralateral Meniscus	1 (3%)	
Simultaneous ACL Reconstructions		
Autograft	3 (8%)	1 (3%)
Allograft	1 (3%)	1 (3%)
Simultaneous Chondroplasties, No. of Procedures ^b		
Patella	4	2
Femoral Trochlea	2	3
Lateral Femoral Condyle		2
Medial Femoral Condyle	1	4
Lateral Tibial Plateau		2
Medial Tibial Plateau		2

Values are provided as sample size and N (%) unless otherwise specified.

^aAll horizontal cleavage tears were treated with rasping end/ or/ trapezation.