Predictive Factors Associated With Short-Term Clinical Outcomes and Time to Return to Activity After Arthroscopic Partial Meniscectomy in Nonathletes

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Background: Although arthroscopic partial meniscectomy is a widely implemented surgical procedure, studies investigating the time to return to activity (RTA) are rare.

Purpose: To explore which factors are associated with the RTA times after arthroscopic partial meniscectomy and to investigate whether those factors can also improve short-term patient-reported outcomes.

Study Design: Case-control study; Level of evidence, 3.

Methods: The authors reviewed the records of patients who underwent isolated partial meniscectomy in their institution from January 2017 to December 2019. Patient and injury characteristics were documented, and time to RTA was obtained via phone interview in January 2021. Pre- and postoperative outcomes were assessed with the Lysholm score and International Knee Documentation Committee (IKDC) score. The chi-square test and independent-samples *t* test were used to evaluate differences in outcome scores and time to RTA according to the patient and injury characteristics, and risk factors with a P value $<.1$ in the univariate analysis were used in the binary regression.

Results: Included were 215 patients (87 men and 128 women; mean age, 33.7 years [range, 24-75 years]). Of these patients, 204 provided information on time to RTA (mean, 3.3 months). By 3 months postoperatively, 49.5% (101/204) of patients could perform activities without knee-related restriction; this improved to 69.6% (142/204) at 6 months and 90.2% (184/204) at 12 months. On multivariate logistic regression analysis, age (OR, 0.39; 95% CI, 0.21-1.19; $P = .044$) and injury duration (OR, 0.20; 95% CI, 0.19-1.07; $P = .032$) were significantly associated with the time to RTA. IKDC scores improved significantly from 41.2 preoperatively to 76.7 postoperatively, and in the multivariate logistic regression model, female sex (OR, 2.67; 95% CI, 1.10-6.47; $P = .030$), body mass index (BMI) $\geq$27 kg/m^2 (OR, 2.96; 95% CI, 1.02-8.66; $P = .047$), and medial meniscal tear (OR, 0.20; 95% CI, 0.04-1.00; $P = .050$) were associated with inferior outcome scores.

Conclusion: Patients aged 40 years and younger who underwent partial meniscectomy surgery within 6 months after a meniscal tear were more likely to have a shorter time to RTA, and female patients with obesity (BMI $\geq$27 kg/m2), especially those with medial meniscal tears, tended to have inferior clinical outcomes.

Keywords: partial meniscectomy; IKDC; Lysholm; return to activity (RTA); BMI; sex

Partial meniscectomy is a widely implemented surgical procedure when meniscal injury is present to relieve meniscal symptoms, including pain and knee locking.[1] The great concerns for patients after operation are "How long before I can return to normal daily activities or work?" and "How can I return to daily activities or work faster?"[21] Nevertheless, studies investigating the time to return to activity (RTA) after arthroscopic partial meniscectomy are rare. In a cohort study, Nawabi et al[22] found that patients with lateral meniscal tears need a mean of 7 weeks to return to the preinjury activity level, which is significantly longer than the 5 weeks of those with medial meniscal tears. However, in the study, only professional soccer players were included. In another study,[2] the authors concluded that approximately 77% of patients who underwent partial meniscectomy returned to play at a mean of 2 months postoperatively, and higher preoperative Knee

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injury and Osteoarthritis Outcome Score (KOOS) for pain was associated with the time of return to sports.

Another concern for patients is the extent to which they can recover after arthroscopic partial meniscectomy. A large number of studies have been performed in previous literature to investigate the predictive factors of clinical outcomes for patients who underwent partial meniscectomy.[8,9,13,16] However, we found that most of those studies either had strict inclusion criteria for participants (age-specific patients or unilateral meniscus), had a small sample size ($n < 100$), or evaluated the association of postoperative outcomes with a single specific factor.[9,15,24] Ghislain et al[12] performed a study with 117 patients comparing the clinical outcomes between traumatic and degenerative meniscal tears and concluded that patients with traumatic meniscal injury have better outcomes. In their study, the influence of other demographic variables on clinical outcomes was not evaluated. In addition, we found that little consensus has already been reached about which patient-related factors positively affected clinical outcomes.[4,9,17]

The purpose of this study was to evaluate the association of short-term patient-reported outcomes (PROs) and RTA times with patient and injury characteristics in nonathletes after arthroscopic partial meniscectomy. We hypothesized that patients with obesity who are diagnosed with lateral meniscal tears and chronic lesions (>6 months from injury) will have inferior clinical outcomes and a longer time to RTA.

METHODS

This study protocol was approved by our institutional review board. A total of 215 patients who underwent isolated partial meniscectomy in our institution from January 2017 to December 2019 by 2 surgeons (C.X. and D.C.) were included in the current study. The inclusion criteria were (1) a meniscal tear treated with partial meniscectomy surgery, (2) no other concomitant ligament injury, and (3) contact at the last follow-up.

Injury Diagnosis and Treatment

Meniscal injury was determined by clinical examination, magnetic resonance imaging (MRI), and intraoperative findings. Surgical procedures were performed by 2 independent surgeons: one with 20 years of working experience (D.C.) and the other with 5 years of working experience (C.X.). Anterolateral and anteromedial knee portals were utilized for all patients. Under arthroscopy, the meniscal tear patterns and the site, as well as the degree of chondral lesion, were directly viewed by the surgeons. Then, the surgeon determined a suitable procedure for each patient based on the following standards: (1) the location of the meniscal tear (red-on-red, red-on-white, or white-on-white zones; ie, if the location is in a red zone, the vascularity should be adequate to enhance the healing rate of the meniscus[23]) and (2) the severity of meniscal injury, that is, whether the remaining meniscal tissue was adequate to make repair viable. When meniscal repair was not viable, the injured meniscus was trimmed until a stable peripheral rim was achieved.

For patients who underwent repair surgery, an angle-adjustable brace was used until 4 weeks after surgery. The angle of knee flexion was less than 45° within 2 weeks after meniscal repair and reached a similar angle to the uninjured side 4 weeks after operation. Partial weightbearing was allowed until 4 weeks after surgery with the help of a crutch, and total weightbearing was encouraged 6 weeks after the operation. For patients who underwent partial meniscectomy, total weightbearing and flexion and extension were encouraged the day after the operation.

Study Data and Outcome Measures

The following patient and surgery data were obtained from the medical records: sex, age, body mass index (BMI), surgeon experience, time from injury to surgery, and intra-articular factors such as tear laterality (medial or lateral), degree of chondral lesion, and tear mechanism. The degree of chondral lesion was classified using the International Cartilage Repair Society (ICRS) grading system, which ranged from 0 (normal) to 4 (very severe lesions). Pre- and postoperative clinical outcomes were assessed with the Lysholm score and International Knee Documentation Committee (IKDC) score. We defined return to activity (RTA) as the time when patients could perform low-intensity activities, such as working, walking, and housework, without any knee-related restrictions. The PRO scores and time to RTA were obtained via phone interviews in January 2021. Patients were requested to answer all questions on the questionnaire.

For the purposes of this analysis, the Lysholm and IKDC scores were dichotomized into good and poor clinical

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outcomes, with their mean values (88 and 77, respectively) acting as the cutoff. Similarly, time to RTA was dichotomized into quick recovery (<3 months) and slow recovery (>3 months) according to the mean value. Based on the classifications in previous literature,[18,28,31] age was divided into older (>40 years) and younger (≤40 years), BMI was classified into 3 groups (<24, 24-27, and ≥27 kg/m^2), and time from injury to surgery was defined as delayed (>6 months) and early (≤6 months). The mechanism of injury was divided into acute and nonacute according to the presence of previous known trauma history.

Statistical Analysis

In the univariate analysis, the chi-square test was used to determine the differences in patient and injury characteristics between RTA (fast vs slow) and PRO scores (good vs poor). When the PRO scores were regarded as continuous variables, an independent-samples *t* test was used. Risk factors with a *P* value <.1 in the univariate analysis were used in the multivariate analysis. In the multivariate analysis, we used binary regression to determine the independent risk factors for better postoperative outcomes. Statistical analyses were performed with SPSS version 23.0 (IBN Corp). A *P* value <.05 indicated statistical significance.

RESULTS

From January 2017 to December 2019, 346 patients underwent arthroscopic meniscal surgery in our hospital. After excluding patients who simultaneously received other ligament reconstruction surgery or were lost to follow-up, 215 patients, including 87 men and 128 women with a mean age of 33.7 years (range, 24-75 years), were ultimately included. Of these patients, 204 patients provided the time to RTA. The patient data are shown in Tables 1 and 2.

Time to RTA

The overall time to RTA was 3.3 months (range, 1 week–1.5 years). Preoperatively, 92% of patients had knee-related activity restriction. By 3 months postoperatively, 49.5% (101/204) of patients could perform activities without knee-related restriction; this improved to 69.6% (142/204) at 6 months and 90.2% (184/204) at 12 months. The reasons for the restriction of knee-related activity are listed in Table 3. We found that knee pain was always the main reason hampering patients from doing activities or working at both 6 months and 12 months postoperation.

In the univariate analysis, 10 variables were analyzed, and 4 of them were found to be associated with the time to RTA: sex ($P = .053$), age ($P = .052$), surgeon experience ($P = .08$), and injury duration ($P = .06$). Detailed data are displayed in Table 1. When these 4 variables were analyzed in a multivariate logistic regression model to adjust for confounding factors, we found that age (OR, 0.39; 95% CI, 0.21-1.19; $P = .044$) and injury duration (OR, 0.20; 95% CI, 0.19-1.07; $P = .032$) were significantly associated with the time to RTA (Table 4).

TABLE 1
Patient and Injury Characteristics Stratified by RTA Times[a]

	RTA≤3 mo	RTA>3mo	*P*
Sex			0.053[b]
Male	48 (60.8)	31 (39.2)	
Female	56 (44.8)	69 (55.2)	
Age, y			0.052[b]
≤40	49 (59.8)	33 (40.2)	
>40	55 (45.1)	67 (54.9)	
Surgeon experience			0.08[b]
High	82 (55.8)	65 (44.2)	
Low	22 (38.6)	35 (61.4)	
Follow-up period, y			0.220
≤ 2	57 (55.9)	45 (44.1)	
> 2	47 (46.1)	55 (53.9)	
Laterality of tear			0.726
Lateral	52 (48.1)	56 (51.9)	
Medial	42 (54.5)	35 (45.5)	
Both sides	11 (64.7)	6 (35.3)	
BMI, kg/m^2			0.815
<24	46 (56.1)	36 (43.9)	
24-27	36 (48.0)	39 (52.0)	
≥27	22 (46.8)	25 (53.2)	
Tear location			0.314
Multiple	22 (47.8)	24 (52.2)	
Anterior	31 (43.7)	40 (56.3)	
Body	41 (64.1)	23 (35.9)	
Posterior	10 (43.5)	13 (56.5)	
Injury duration, mo			0.060[b]
≤ 6	75 (57.3)	56 (42.7)	
> 6	29 (39.7)	44 (60.3)	
Injury mechanism			0.230
Nonacute	43 (44.3)	54 (55.7)	
Acute	61 (57.0)	46 (43.0)	
Chondral damage			0.844
ICRS grades 0-2	72 (50.7)	70 (49.3)	
ICRS grades 3-4	32 (51.6)	30 (48.4)	

[a]Data are presented as n (%). BMI, body mass index; ICRS, International Cartilage Repair Society; RTA, return to activity.
[b]Included in the multivariate analysis ($P < .1$).

Knee Functional Scores

The IKDC score improved significantly from 41.2 preoperatively to 76.7 postoperatively, and the Lysholm score improved significantly from 75.4 preoperatively to 94.6 postoperatively. No patients underwent secondary meniscal revision surgery during our study. In the univariate analysis, 10 independent variables were analyzed, and 5 of them were found to be associated with postoperative Lysholm and IKDC scores: sex ($P = .054$ and $P = .004$, respectively), age ($P = .009$ and $P = .005$), laterality of the meniscal tear ($P = .052$ and $P = .118$), BMI ($P = .036$ and $P = .050$), and injury mechanism ($P = .093$ and $P = .023$). Detailed data are displayed in Table 2. When these variables were analyzed in a multivariate logistic regression model, the results showed that female sex (OR, 3.67; 95% CI, 1.10-6.47; $P = .030$), BMI ≥27 kg/m^2 (OR, 2.96; 95% CI,

TABLE 2
Patient and Injury Characteristics Stratified by PRO Scores[a]

	Lyshom Scores			IKDC Scores		
	≤88	>88	*P*-value	≤77	>77	*P*-value
Sex			0.054[b]			0.004[b]
Male	31 (35.6)	56 (64.4)		23 (26.4)	64 (73.6)	
Female	61 (47.7)	67 (52.3)		64 (50.0)	64 (50.0)	
Age, y			0.009[b]			0.005[b]
≤40	25 (29.1)	61 (70.9)		22 (25.6)	64 (74.4)	
>40	67 (51.9)	62 (48.1)		65 (50.4)	64 (49.6)	
Surgeon experience			0.844			0.843
High	70 (43.8)	90 (56.2)		63 (39.4)	97 (60.6)	
Low	22 (40.0)	33 (60.0)		24 (43.6)	31 (56.4)	
Follow-up period, y			0.159			0.859
≤ 2	44 (51.2)	42 (48.8)		36 (41.9)	50 (58.1)	
> 2	48 (37.2)	81 (62.8)		51 (39.5)	78 (60.5)	
Laterality of tear			0.052[b]			0.118
Lateral	43 (37.4)	72 (62.6)		44 (38.3)	71 (61.7)	
Medial	45 (54.2)	38 (45.8)		38 (45.8)	45 (54.2)	
Both sides	4 (23.5)	13 (76.5)		5 (29.4)	12 (70.6)	
BMI, kg/m^2			0.036[b]			0.050[b]
<24	33 (35.9)	59 (64.1)		33 (35.9)	59 (64.1)	
24-27	28 (38.4)	45 (61.6)		28 (38.4)	45 (61.6)	
≥27	31 (62.0)	19 (38.0)		28 (56.0)	22 (44.0)	
Tear location			0.499			0.958
Multiple	11 (30.1)	25 (69.9)		15 (41.7)	21 (58.3)	
Anterior	25 (42.4)	34 (57.6)		27 (45.8)	32 (54.2)	
Body	23 (48.9)	24 (51.1)		20 (42.6)	27 (57.4)	
Posterior	8 (47.1)	9 (52.9)		7 (41.2)	10 (58.8)	
Injury duration, mo			0.336			0.845
≤ 6	64 (45.7)	76 (54.3)		57 (40.7)	83 (59.3)	
> 6	28 (37.3)	47 (62.7)		30 (40.0)	45 (60.0)	
Injury mechanism			0.093[b]			0.023[b]
Nonacute	50 (51.0)	48 (49.0)		52 (53.1)	46 (46.9)	
Acute	42 (35.9)	75 (64.1)		35 (29.9)	82 (70.1)	
Chondral damage			0.452			0.450
ICRS grades 0-2	61 (40.4)	90 (59.6)		57 (37.7)	94 (62.3)	
ICRS grades 3-4	31 (48.4)	33 (51.6)		30 (46.9)	34 (53.1)	

[a]Data are presented as n (%). BMI, body mass index; ICRS, International Cartilage Repair Society; IKDC, International Knee Documentation Committee; PRO, patient-reported outcome.
[b]Included in multivariate analysis ($P < .1$).

TABLE 3
Reasons for Restricted Knee-Related Activity[a]

	Months Postoperatively		
	>6	>12	>24
Giving out	25 (32.9)	10 (30.3)	0
Pain	38 (50.0)	19 (57.6)	9 (81.8)
Locking	4 (5.3)	2 (6.1)	1 (9.1)
Swelling	5 (6.6)	0	0
Stiffness	4 (5.3)	2 (6.1)	1 (9.1)

[a]Data are presented as n (%).

1.02-8.66; $P = .047$), and medial meniscal tear (OR, 0.20; 95% CI, 0.04-1.00; $P = .050$) were associated with inferior PRO scores (Table 5).

TABLE 4
Multivariable Analysis of Factors Associated With the Time of Return to Activity[a]

	OR (95% CI)	*P*
Sex	0.89 (0.37-2.11)	ns
Age	0.39 (0.21-1.19)	.044
Surgeon experience	0.57 (0.23-1.44)	ns
Injury duration	0.20 (0.19-1.07)	.032

[a]ns, nonsignificant.

DISCUSSION

In the current study, we found that patients aged 40 years and younger and those who underwent partial meniscectomy surgery within 6 months after meniscal tears were

TABLE 5
Multivariable Analysis of Factors Associated With the Short-Term Follow-up Clinical Outcomes of Partial Meniscectomy[a]

	Lysholm Score		IKDC Score	
	OR (95% CI)	*P*	OR (95% CI)	*P*
Sex	1.91 (0.77-4.73)	ns	3.67 (1.10-6.47)	.030
Age	0.62 (0.25-1.56)	ns	0.61 (0.24-1.53)	ns
Laterality of tear	0.20 (0.04-1.00)	.050	—	
BMI	2.96 (1.02-8.66)	.047	2.84 (0.98-8.21)	.051
Injury mechanism	0.56 (0.22-1.42)	ns	0.56 (0.23-1.34)	ns

[a]BMI, body mass index; IKDC, International Knee Documentation Committee; ns, nonsignificant.

2.56 times ($P = .044$) and 5.0 times ($P = .20$) more likely to have a shorter time to RTA, respectively. The second finding was that female patients ($P = .030$) with obesity (BMI, >27 kg/m^2; P.047 = .047), especially those who had a medial meniscal tear ($P = .050$), tended to have an inferior clinical outcome.

The time to RTA is one of patients' most concerning questions. However, there is a scarcity of studies investigating the predictive factors associated with a short time to RTA after performing arthroscopic partial meniscectomy. In a study by Aune et al[3] of 72 football players who underwent partial meniscectomy, the authors concluded that speed-position players were 4.0 times less likely to return to play than non–speed-position players, and that no other factors were associated with the time to return to play. However, the authors included only patients with lateral meniscal injury. In another study, Nawabi et al[22] compared the time to return to play among 90 soccer players and found that it was significantly longer after lateral meniscectomy than after medial meniscectomy.

In the aforementioned studies, the participants were professional athletes. However, there are many more nonathletes with meniscal injuries than athletes. Agarwalla et al[2] included 94 nonathletes in their study and found that a higher preoperative KOOS was associated with an increased rate of return to sports. However, the small sample size of their study may have weakened its statistical power. In the current study, we included 204 nonathletes. The mean time to RTA was 3.3 months, which was longer than those reported by Agarwalla et al[2] (2 months) and Lee et al[19] (7-9 weeks). This difference may be explained by the fact that rehabilitation centers are not as common in China as in Western countries; thus, when patients have knee-related symptoms, they are less likely to ask physical therapists for help, which may hinder the rehabilitation process.[20]

The influence of the duration of meniscal injury symptoms on the time to RTA has rarely been reported. However, several studies have demonstrated that a shorter injury duration is associated with better postoperative PRO scores.[14,27] Haviv et al[14] concluded that patients with acute meniscal lesions (symptoms existing <3 months) had better improvement in clinical outcomes than those with chronic lesions. The explanation for this is that when partial meniscectomy was delayed, the incidence of secondary chondral damage would increase, which has been shown to be a risk factor for inferior clinical outcomes.[7,29] In our study, 6 months may not be the threshold value of injury duration that can significantly influence PRO scores, but performing surgery for patients within 6 months after meniscal injury can help them RTA quickly. In addition, when patients undergo long-standing nonoperative treatment, their quadriceps femoris muscle may become atrophic, which could negatively affect the rehabilitation process.[10,11]

No consensus has been reached on whether older patients are more likely to have inferior clinical outcomes compared with younger patients.[5,6,26] Eijgenraam et al[9] performed a review of factors associated with the clinical outcomes of partial meniscectomy and concluded that 11 studies had investigated the effect of age. Five of the 11 studies found worse outcomes in older patients, and the remaining 6 studies did not find a significant association. In the current study, we found that patients aged 40 years or younger tended to have higher PRO scores, even though the effect became insignificant in the multivariate analysis. However, the time to RTA in the older group was significantly longer than that in the younger group. In a subgroup analysis of patients' age and chondral lesion (outcomes were not listed), we found that patients aged more than 40 years were 5.21 times more likely to have a severe chondral damage ($P < .001$). Thus, the knee-related symptoms are less likely to be relieved in older patients because of the concomitant cartilage lesions or osteoarthritis.[30]

In our study, we found that a medial meniscal tear was correlated with inferior postoperative clinical outcomes, which is contrary to the findings of a study conducted by Haviv et al.[16] In a study performed by Nawabi et al,[22] they also claimed that lateral meniscal tears were more likely to have adverse events and a slow rehabilitation process. We cannot explain the inconsistent findings between our study and those of previous literature. More studies are needed in the future to evaluate the influence of the laterality of the meniscal tear on clinical outcomes.

The effect of sex on the clinical outcomes after partial meniscectomy was accordant with that reported in previous literature.[16,25] In a study performed by Fabricant et al,[11] the authors found that women had worse knee function, which is consistent with our findings. This can be explained by the fact that women with meniscal tears in our study were older than men (48.1 vs 42.6), which has been reported as a risk factor for worse clinical outcomes.[16] In addition, performing arthroscopic meniscal surgery was more challenging for surgeons because of the smaller joint space in women. However, considering that a substantial number of studies did not find an association of sex with knee function,[9,27] more studies with comparable demographics and clinical characteristics are needed.

BMI has been widely studied in previous literature to investigate its influence on knee function scores.[6,13] In a review study performed by Eijgenraam et al,[9] 7 papers observed the effect of BMI, and 5 of them concluded that patients with a BMI >27 kg/m^2 are more likely to have worse outcomes, which is consistent with our findings. We

explained that a high BMI may increase the stress on the meniscus.

Participation in activities is the priority for many patients.[2] However, studies investigating the predictive factors for a short time to RTA after partial meniscectomy, especially based on nonathletes, are scarce. In our study, we included 204 nonathletes and found 2 independent factors that were associated with the time to RTA, which has seldom been reported in previous literature. In addition, we evaluated the short-term follow-up PRO scores and found 3 variables that were correlated with them. However, most of those risk factors have been reported in other studies. We believe that our findings can provide further evidence for these conflicting opinions.

This study has several limitations. First, selection bias may have been present in terms of participant enrollment because some patients with inferior clinical outcomes may have declined to participate in our phone interview. However, the follow-up rate was relatively high, and the large sample size in our study may reduce the influence of selection bias on clinical outcomes. Second, all patients included in this study were nonathletes; thus, if they could perform low-intensity activities, such as working, walking, and housework, without knee-related restrictions, we regarded them as having reached the standard of return to sports. Consequently, the rate of RTA may be higher and the time to RTA may be shorter than in other studies including professional athletes. However, we believe that return to general activity is the priority for many nonathletes. Third, the time to RTA may not be absolutely accurate, as it depends on patient memory; however, we excluded all patients who were not sure or could not remember the time to RTA.

CONCLUSION

The mean time to return to sports after arthroscopic partial meniscectomy was 3.3 months. Patients aged 40 or younger, especially those with knee-related symptoms for less than 6 months, were more likely to have a shorter time to RTA. In addition, women with obesity, especially those who have medial meniscal tears, should be preoperatively informed about the greater possibility of having worse short-term clinical outcomes.

REFERENCES

1. Abrams GD, Frank RM, Gupta AK, et al. Trends in meniscus repair and meniscectomy in the United States, 2005-2011. *Am J Sports Med*. 2013;41(10):2333-2339.
2. Agarwalla A, Gowd AK, Liu JN, et al. Predictive factors and duration to return to sport after isolated meniscectomy. *Orthop J Sports Med*. 2019;7(4):2325967119837940.
3. Aune KT, Andrews JR, Dugas JR, Cain EL Jr. Return to play after partial lateral meniscectomy in National Football League athletes. *Am J Sports Med*. 2014;42(8):1865-1872 .
4. Bailey O, Gronkowski K, Leach WJ. Effect of body mass index and osteoarthritis on outcomes following arthroscopic meniscectomy: a prospective nationwide study. *Knee*. 2015;22(2):95-99.
5. Basques BA, Gardner EC, Varthi AG, et al. Risk factors for short-term adverse events and readmission after arthroscopic meniscectomy: does age matter? *Am J Sports Med*. 2015;43(1):169-175.
6. Chatain F, Adeleine P, Chambat P, Neyret P. Societe Francaise d'Arthroscopie. A comparative study of medial versus lateral arthroscopic partial meniscectomy on stable knees: 10-year minimum follow-up. *Arthroscopy*. 2003;19(8):842-849.
7. Chen KH, Chiang ER, Wang HY, Ma HL. Correlation of meniscal tear with timing of anterior cruciate ligament reconstruction in patients without initially concurrent meniscal tear. *J Knee Surg*. 2019;32(11):1128-1132.
8. Dwyer T, Zochowski T, Ogilvie-Harris D, et al. Determining the patient acceptable symptomatic state for patients undergoing arthroscopic partial meniscectomy in the knee. *Am J Sports Med*. 2020;48(4):847-852.
9. Eijgenraam SM, Reijman M, Bierma-Zeinstra SMA, van Yperen DT, Meuffels DE. Can we predict the clinical outcome of arthroscopic partial meniscectomy? A systematic review. *Br J Sports Med*. 2018;52(8):514-521.
10. Eitzen I, Grindem H, Nilstad A, Moksnes H, Risberg MA. Quantifying quadriceps muscle strength in patients with ACL injury, focal cartilage lesions, and degenerative meniscus tears: differences and clinical implications. *Orthop J Sports Med*. 2016;4(10):2325967116667717.
11. Fabricant PD, Rosenberger PH, Jokl P, Ickovics JR. Predictors of short-term recovery differ from those of long-term outcome after arthroscopic partial meniscectomy. *Arthroscopy*. 2008;24(7):769-778.
12. Ghislain NA, Wei JN, Li YG. Study of the clinical outcome between traumatic and degenerative (non-traumatic) meniscal tears after arthroscopic surgery: a 4-years follow-up study. *J Clin Diagn Res*. 2016;10(4):RC01-RC04.
13. Gowd AK, Lalehzarian SP, Liu JN, et al. Factors associated with clinically significant patient-reported outcomes after primary arthroscopic partial meniscectomy. *Arthroscopy*. 2019;35(5):1567-1575.e3.
14. Haviv B, Bronak S, Kosashvili Y, Thein R. Does timing of arthroscopic partial meniscectomy in stable knees matter? *J Knee Surg*. 2017;30(1):47-50.
15. Haviv B, Bronak S, Kosashvili Y, Thein R. Gender effect on the outcome of partial medial meniscectomy. *Orthopedics*. 2015;38(10):e925-e928.
16. Haviv B, Bronak S, Kosashvili Y, Thein R. Which patients are less likely to improve during the first year after arthroscopic partial meniscectomy? A multivariate analysis of 201 patients with prospective follow-up. *Knee Surg Sports Traumatol Arthrosc*. 2016;24(5):1427-1431.
17. Kluczynski MA, Marzo JM, Wind WM, et al. The effect of body mass index on clinical outcomes in patients without radiographic evidence of degenerative joint disease after arthroscopic partial meniscectomy. *Arthroscopy*. 2017;33(11):2054-2063.e10.
18. Krutsch W, Zellner J, Baumann F, et al. Timing of anterior cruciate ligament reconstruction within the first year after trauma and its influence on treatment of cartilage and meniscus pathology. *Knee Surg Sports Traumatol Arthrosc*. 2017;25(2):418-425.
19. Lee YS, Lee OS, Lee SH. Return to sports after athletes undergo meniscal surgery: a systematic review. *Clin J Sport Med*. 2019;29(1):29-36.
20. Liu H, Lou VWQ. Functional recovery of older stroke patients discharged from hospital to home: the effects of cognitive status and different levels of therapy intensity. *J Clin Nurs*. 2019;28(1-2):47-55.
21. Lubowitz JH, Ayala M, Appleby D. Return to activity after knee arthroscopy. *Arthroscopy*. 2008;24(1):58-61.e54.
22. Nawabi DH, Cro S, Hamid IP, Williams A. Return to play after lateral meniscectomy compared with medial meniscectomy in elite professional soccer players. *Am J Sports Med*. 2014;42(9):2193-2198.
23. O'Shea JJ, Shelbourne KD. Repair of locked bucket-handle meniscal tears in knees with chronic anterior cruciate ligament deficiency. *Am J Sports Med*. 2003;31(2):216-220.
24. Pihl K, Turkiewicz A, Englund M, et al. Change in patient-reported outcomes in patients with and without mechanical symptoms undergoing arthroscopic meniscal surgery: a prospective cohort study. *Osteoarthritis Cartilage*. 2018;26(8):1008-1016.

25. Rosenberger PH, Dhabhar FS, Epel E, Jokl P, Ickovics JR. Sex differences in factors influencing recovery from arthroscopic knee surgery. *Clin Orthop Relat Res*. 2010;468(12):3399-3405.
26. Scheller G, Sobau C, Bulow JU. Arthroscopic partial lateral meniscectomy in an otherwise normal knee: clinical, functional, and radiographic results of a long-term follow-up study. *Arthroscopy*. 2001; 17(9):946-952.
27. Sofu H, Oner A, Camurcu Y, et al. Predictors of the clinical outcome after arthroscopic partial meniscectomy for acute trauma-related symptomatic medial meniscal tear in patients more than 60 years of age. *Arthroscopy*. 2016;32(6):1125-1132.
28. Steadman JR, Matheny LM, Singleton SB, et al. Meniscus suture repair: minimum 10-year outcomes in patients younger than 40 years compared with patients 40 and older. *Am J Sports Med*. 2015;43(9):2222-2227.
29. Stone JA, Perrone GS, Nezwek TA, et al. Delayed ACL reconstruction in patients $\geq$40 years of age is associated with increased risk of medial meniscal injury at 1 year. *Am J Sports Med*. 2019;47(3):584-589.
30. Tsujii A, Nakamura N, Horibe S. Age-related changes in the knee meniscus. *Knee*. 2017;24(6):1262-1270.
31. Zhang T, Jauregui JJ, Foster M, et al. Outcomes of partial meniscectomy in obese patients: a systematic review and meta-analysis. *Cartilage*. 2021;13(1 suppl):216S-227S.