

Repair Results of Horizontal Meniscus Tears in Patients Over 40 Years of Age

Serkan Surucu¹, Ugur Onur Kasman², Mahmud Aydın³, Ozgur Korkmaz⁴

¹, University of Missouri-Kansas City, Department of Orthopaedics, Kansas City, USA

², Bahçeşehir University, Faculty of Medicine Department of Orthopedics and Traumatology, Istanbul, Turkey

³, Haseki Education Research Hospital, Department of Orthopedics and Traumatology, Istanbul, Turkey

⁴, VM Medicalpark Pendik Hospital, Department of Orthopedics and Traumatology, Istanbul, Turkey

ORCID; 000-0003-1551-4525, 0000-0001-6647-2682, 0000-0002-2235-1480, 0000-0001-7068-2033

Abstract: Previous studies have reported discrepant findings regarding the effect of age on meniscal repair results. This study aimed to determine the results of our patients aged ≥ 40 years with horizontal cleavage meniscal tears treated with all-inside meniscus sutures and to compare our results with the literature and evaluate the effect of sex on clinical outcomes. Seventy-five patients were included in this study: 52 men and 23 women. The mean age was 44.3 ± 1.9 years. The clinical results of meniscal repair were evaluated using preoperative and postoperative Lysholm scores and physical examination. The mean preoperative and 12-month postoperative follow-up Lysholm scores of the patients were 42.11 ± 11.40 and 69.62 ± 8.49 , respectively. The preoperative and postoperative Lysholm scores differed significantly ($p < 0.05$). The mean preoperative Lysholm scores were 40.85 ± 11.39 and 45.33 ± 11.06 in the male and female groups, respectively. The mean postoperative Lysholm scores were 69.00 ± 8.76 and 71.24 ± 7.73 in the male and female groups, respectively. The scores of the two groups, however, did not differ significantly. Furthermore, sex had no effect on the clinical outcomes. Successful clinical results can be obtained with all-inside meniscal repair of isolated horizontal cleavage meniscal tears in patients aged ≥ 40 years. In the early follow-up, reoperation was not needed, and the clinical results were found to be independent of gender.

INTRODUCTION

The surgical treatment of meniscal tears has changed over the years. In the past, open meniscectomy was performed for the surgical treatment of meniscal tears¹. Degenerative changes were detected in the knee as a result of further follow-up after open meniscectomy². Partial meniscectomy and meniscal repairs are used as treatment approaches with the introduction of arthroscopy³. Meniscal tears are treated differently depending on the type, shape, location, and duration of the tear, as well as the patient's age.

Horizontal cleavage meniscal tears are generally observed in older age groups. The probability of a horizontal cleavage meniscal tear occurring at age > 40 years is approximately 36%. Conservative treatment, partial meniscectomy, and arthroscopic repair are treatment options for horizontal cleavage meniscal tears⁴.

The long-term success rate after all-inside meniscal repairs has been reported to be 73%⁵. The average failure rates after meniscal repairs have been reported to be 22%–24%⁶. However, some studies have reported that meniscal repair is not very effective in older age groups (age > 40 years), whereas other studies have shown that age has no effect on treatment success^{7,8}.

Therefore, we aimed to determine the results of our patients aged ≥ 40 years with horizontal cleavage meniscal tears treated with all-inside meniscal sutures and to compare our results with the literature and evaluate the effect of gender on clinical outcomes.

PATIENTS and METHODS

The institutional committee's ethical criteria and the Helsinki Declaration of 1975, as revised in 2013, were followed when conducting this retrospective investigation. The local review board granted permission to conduct human study (No 2020-217).

Between January 2012 and December 2019, 355 patients underwent all-inside meniscal repair. Inclusion criteria were patients aged 40 to 48 years with isolated horizontal meniscal tears without additional intra or extra articular pathology, such as anterior cruciate ligament rupture, cartilage pathologies, without varus or valgus malalignment who were treated with arthroscopic all-inside meniscal repair

Received : 05/06/2021

Received in revised form : 07/09/2021

Accepted : 08/10/2021

Available online : 01/15/2022

Keywords:

Age

Gender

Meniscal repair

Lysholm score

Corresponding Author:

Mahmud Aydın

E-mail; mahmut_aydn@windowslive.com

<http://dx.doi.org/10.29228/jamp.52542>

Int J Acad Med Pharm,

2022; 4 (1); 42-45



and had a follow-up period of >12 months. Patients with Lysholm scores in the preoperative and postoperative were included in the study. Exclusion criteria were as follows: additional anterior cruciate ligament injury, stage 2 and higher cartilage pathologies, previous knee surgery, smokers, patients with a horizontal tear smaller than 1 cm and concomitant knee pathology. Patients with <12 months of follow-up and those with missing Lysholm scores were also excluded. Magnetic resonance imaging was performed in all patients to evaluate meniscal tears and additional pathologies before treatment. However, the diagnosis of meniscal tear was determined arthroscopically, not radiologically.

Surgical Technique and Postoperative Care

Arthroscopic all-inside medial meniscal repair was performed. Arthroscopic procedures were performed by two experienced orthopaedic surgeons. Routine anterolateral and anteromedial portals were used in the surgical procedures. All the knee compartments and meniscal tears were examined. All patients had a horizontal tear in the medial meniscus, and all of them were repaired with the all-inside meniscal repair (Figures 1, 3). Meniscal repair was performed with FasT-Fix (Smith & Nephew, Andover, MA) all-inside meniscal repair device in all patients. No additional procedures, such as mechanical abrasion, fibrin clot delivery, augmentation, and use of gelatine hydrogels with fibroblast growth factor 2, were performed. Full weight bearing was not allowed for the treated side for 6 weeks, and exercises were performed with a flexion range of <90°.



Figure 1: Degenerative horizontal cleavage meniscal tear

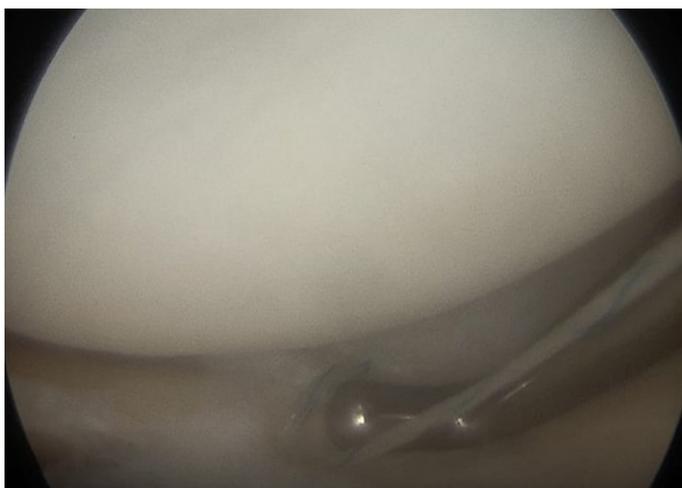


Figure 2: All-inside meniscal repair



Figure 3: Arthroscopic view after rep

Evaluation

All patients were followed up regularly for a minimum of 12 months postoperatively. The clinical results of meniscal repair were evaluated using preoperative and postoperative Lysholm scores and physical examination. Postoperative complications such as infection, deep vein thrombosis, hemarthrosis, arthrofibrosis, and mechanical limitation of the range of motion were evaluated.

Statistical Analysis

The compliance of the data to normal distribution was tested, and the Wilcoxon test, which is a non-parametric version of the paired t-test, was used to compare preoperative and postoperative Lysholm scores, as they were not normally distributed. A paired t-test was used for comparison of preoperative and postoperative Lysholm scores of the male and female groups. Statistical significance was set at $p < 0.05$, with a confidence interval of 95%.

RESULTS

Among 355 patients, 75 were finally included in the study (52 men (69.33%) and 23 women (31.66%)). The mean age was 44.37 ± 1.93 years, and the mean follow-up period was 21.89 ± 4.49 months. Arthroscopic meniscal repair was performed on the right knee in 48 patients and on the left knee in 27 patients. One all-inside meniscal repair suture was used in 60 patients; 2 sutures, 14 patients; and 3 sutures, 1 patient. Four patients underwent hemarthrosis after surgery. One patient had arthrofibrosis. The hematoma was aspirated in patients with hemarthrosis. Arthroscopic release was performed in the patient who developed arthrofibrosis, and the patient was referred to the physical therapy and rehabilitation clinic in the early period. Table I shows the patient demographics and clinical results. The statistical analysis of the preoperative and postoperative Lysholm scores of the female and male patients showed no significant difference between the two groups ($p \geq 0.05$) (Table 2).

DISCUSSION

Our study reported successful clinical results with all-inside meniscal repair of isolated horizontal cleavage meniscal tears in patients aged >40 years. In the early follow-up, re-operation was not needed, and gender did not influence the clinical results.

Vascularity in the periphery of the meniscus in people aged >50 years regresses up to 10%–30%⁸. In elderly patients, the possibility of recovery of the repaired meniscus after meniscal repair is lower than that in younger patients⁸. Horizontal cleavage meniscal tears are non-traumatic tears that are usually seen on a degenerative background and are usually found in older age groups⁹.

Table 1. Demographic data of patients and clinical results

	Number	Minimum	Maximum	Mean	Standard deviation
Age (years)	75	41.00	48.00	44.3733	1.93665
Preop LYHS	75	11.00	70.00	42.1067	11.40480
Postop LYHS	75	37.00	80.00	69.6267	8.49129
Follow-up period (months)	75	12.00	36.00	21.8933	4.99885
Number of meniscus sutures	75	1.00	3.00	1.2133	,44398
Preop LYHS (female)	23	11.00	68.00	40.8	11.6
Postop LYHS (female)	23	42.00	80.00	69.8	8.3
Preop LYHS (male)	52	11.00	70.00	42.2	11.8
Postop LYHS (male)	52	37.00	80.00	69.2	8.5

LYHS: Lysholm score; Preop: preoperative; Postop: postoperative

Table 2. Comparison in post-operative Lysholm score increases by gender

Gender	Number	Mean	Standard deviation	P value
Male	54	28,15	11,802	0,484
Female	21	25,90	13,874	

Repair results of non-traumatic isolated medial meniscal tears are worse than those of other meniscal tears¹⁰. The mean age of the patients in this study was 44.37±1.93 years, which is consistent with the age group in which horizontal cleavage meniscal tears on the degenerative background were observed.

Advanced age was thought to be one of the causes of insufficiency after meniscal repair¹¹. A recent study on patients aged >40 years and those aged <40 years found that a higher repair failure rate was not detected in patients aged >40 years and the insufficiencies after meniscal repairs were independent of age¹².

Good results have been reported for bone marrow stimulation, which can be an additional treatment for horizontal meniscal tears with repair¹³. In this study, additional procedures, such as mechanical abrasion, fibrin clot delivery, augmentation, and use of gelatine hydrogels with fibroblast growth factor 2, were not used for any patient.

Regardless of the age of the athletically active patients, it is recommended to protect the meniscus tissue as much as possible and to repair the meniscus in meniscal tears even with extension to the avascular zones¹⁴. A previous study reported no difference between the failure rates in patients with similar activity levels before surgical treatment with meniscal repair, and the failure rates were not affected by age. The failure rates were found to be worse in patients with low activity levels, regardless of age¹⁵.

No difference was found in the early clinical results of patients who underwent meniscectomy and meniscal repair; however, clinical outcomes regressed in patients who underwent meniscectomy in the later follow-up period. The clinical outcomes were better in patients who underwent long-term meniscal repair¹⁶. Barret et al. reported a success rate of 86.5% in patients aged >40 years who underwent meniscal repair. They found that the results of meniscal repairs performed with the appropriate surgical technique in appropriate meniscal tears were similar to the results achieved in younger patients¹⁷. Buyukuscu et al. studied meniscal repairs in patients over the age of 40 and discovered that the patient's functional capacity, the location of the tear, the degree of arthritis in the knee, and the meniscus tissue quality all affect treatment success rates¹⁸. However, no difference was found between the long-term clinical results of the study in which patients aged >40 years and those aged <40 years were compared and meniscal repair was performed using inside-out meniscus sutures¹². In our study, all meniscal repairs were performed using all-inside sutures, and early results were good in patients aged ≥40 years. We recommend using an all-inside suture, especially in posterior horn horizontal

cleavage meniscal tears, because the possibility of complications is lower with the use of all-inside sutures and the surgical technique is easier.

A 5-year follow-up of patients aged ≥40 years showed that although age and meniscal repair were not correlated, early meniscal repair was more inadequate in patients aged ≥40 years than in younger patients⁷. Our average follow-up period was 21 months, and we successfully performed meniscal repair in patients aged ≥40 years.

Compared to meniscal repairs, isolated partial meniscectomies had a reduced rate of reoperation. In the short-term (0–4 years) follow-up, the reoperation rates were as follows: 1.4% after meniscectomy and 16.5% after meniscal repairs; 16.5% need for surgery after meniscectomy in the long-term follow-up (>10 years), and 3.9% after meniscal repair needed 20%¹⁹. Our study also did not report high rates of reoperation in the early period after meniscal repair.

After meniscal repair, Zimmerer et al. discovered that the failure rate was considerably higher in female patients⁵. The clinical results of male and female patients also did not differ significantly. As a result of our study the female sex has no effect on the repair results.

Horizontal cleavage repair can restore contact pressure to near-normal levels¹⁸. However, a meta-analysis reported no difference between the outcomes of repaired and non-repaired horizontal meniscal tears²¹. After employing the overlock approach to treat degenerative horizontal tears, Tiftikçi et al. reported improved Lysholm and International Knee Documentation Committee subjective scores²². Our study also reported improved Lysholm scores after all-inside meniscal repair of isolated horizontal cleavage meniscal tears in patients aged >40 years.

Our study has some limitations. First, our study did not include patients aged <40 years and a comparison group. Second, the preoperative activity levels of the patients were not determined.

Conclusion

All-inside meniscal repair of isolated horizontal cleavage meniscal tears in patients aged >40 years yielded successful outcomes. In the early follow-up, re-operation was not needed, and the clinical results were found to be independent of gender.

Conflict of interest

Authors declare that they have no financial interests or personal conflicts that may affect the study in this article.

Financial disclosure

The authors declared that this study has received no financial support.

Ethical approval

The institutional committee's ethical criteria and the Helsinki Declaration of 1975, as revised in 2013, were followed when conducting this retrospective investigation. The local review board granted permission to conduct human study (No 2020-217).

Authors' contributions

Conceptualization: S.S, Ö.K, U.O.K Data curation: S.S, M.A Formal analysis: U.O.K, Ö.K Investigation: S.S, U.O.K, Methodology: S.S, M.A Validation: U.O.K, Ö.K Visualization: S.S, Roles/Writing original draft: S.S, Ö.K, U.O.K Writing – review & editing: M.A

REFERENCES

1. Fairbank TJ. Knee joint changes after meniscectomy, *J Bone Joint Surg*. 1948; 30: 664-670.
2. Walker PS, Erkman MJ. The role of the menisci in force transmission across the knee. *Clin Orthop Relat Res*. 1975; 109:184-192.
3. Arnold J, Cooker T, Heaton L, et al.: Natural history of anterior cruciate tears. *Am J Sport Med*. 1979; 7: 305-313.
4. O'Connor R: Meniscal lesions and their treatment. O'Connor's textbook of arthroscopic surgery. Philadelphia: 124, 1984.
5. Zimmerer A, Sobau C, Nietschke R, Schneider M, Ellermann A. Long-term outcome after all inside meniscal repair using the FasT-Fix system. *J Orthop*. 2018 May 8;15(2):602-605.
6. Nepple JJ, Dunn WR, Wright RW. Meniscal repair outcomes at greater than five years: a systematic literature review and meta-analysis. *J Bone Joint Surg Am* 2012; 94: 2222-2227.
7. Poland S, Everhart JS, Kim W, Axcell K, Magnussen RA, Flanigan DC. Age of 40 Years or Older Does Not Affect Meniscal Repair Failure Risk at 5 Years. *Arthroscopy*. 2019 May;35(5):1527-1532.
8. Amoczky SP, Warren RF. Microvasculature of the human meniscus. *Am J Sports Med* 1982; 10:90-95.
9. Terzidis IP, Christodoulou A, Ploumis A, Givissis P, Natsis K, Koimtzis M. Meniscal tear characteristics in young athletes with a stable knee: arthroscopic evaluation. *Am J Sports Med*. 2006;34(7):1170-5.
10. Venkatachalam S, Godsiff SP, Harding ML. Review of the clinical results of arthroscopic meniscal repair. *Knee*. 2001; 8(2):129-33.
11. Egli S, Wegmüller H, Kosina J, Huckell C, Jakob RP. Long-term results of arthroscopic meniscal repair. An analysis of isolated tears. *Am J Sports Med* 1995; 23:715-20.
12. Steadman JR, Matheny LM, Singleton SB, Johnson NS, Rodkey WG, Crespo B, 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: 2222-2227.
13. Ahn JH, Kwon OJ, Nam TS. Arthroscopic repair of horizontal meniscal cleavage tears with marrow-stimulating technique. *Arthroscopy*. 2015;31(1):92-8.
14. Noyes FR, Barber-Westin SD. Arthroscopic repair of meniscus tears extending into the avascular zone with or without anterior cruciate ligament reconstruction in patients 40 years of age and older. *Arthroscopy*. 2000 Nov;16(8):822-9.
15. Everhart JS, Magnussen RA, Poland S, DiBartola AC, Blackwell R, Kim W, Kaeding CC, Flanigan DC. Meniscus repair five-year results are influenced by patient pre-injury activity level but not age group *Knee*. 2020;27(1):157-164.
16. Lee WQ, Gan JZW, Lie DTL. Save the meniscus- Clinical outcomes of meniscectomy versus meniscal repair. *J Orthop Surg (Hong Kong)*. 2019;27(2):2309499019849813.
17. Barrett GR, Field MH, Treacy SH, Ruff CG. Clinical results of meniscus repair in patients 40 years and older. *Arthroscopy*. 1998;14(8):824-9.
18. Buyukkusu MO, Misir A, Hamrayev AJ, Ozcafer R, Cetinkaya E. Clinical and radiological outcomes following isolated vertical medial meniscal tear repair in patients over 40 years old. *J Orthop Surg (Hong Kong)*. 2019;27(2):2309499019836300.
19. Paxton ES, Stock MV, and Brophy RH. Meniscal repair versus partial meniscectomy: a systematic review comparing reoperation rates and clinical outcomes. *Arthroscopy* 2011;27(9): 1275-1288.
20. Koh JL, Yi SJ, Ren Y, Zimmerman TA, Zhang LQ. Tibiofemoral contact mechanics with horizontal cleavage tear and resection of the medial meniscus in the human knee. *J Bone Joint Surg Am* 2016; 98:1829-1836.
21. Kurzweil PR, Lynch NM, Coleman S, Kearney B. Repair of horizontal meniscus tears: a systematic review. *Arthroscopy*. 2014;30(11):1513-9.
22. Tiftikci U, Serbest S. Repair of isolated horizontal meniscal tears with all-inside suture materials using the overlock method: outcome study with a minimum 2-year follow-up. *J Orthop Surg Res*. 2016; 28;11(1):131.