Journal of Biomedical Sciences
Research Article Peer-review, Open Access

Meniscal Injuries of the Knee Joint: Diagnosis, Surgical Treatment, and Rehabilitation Methods

Sanakulov Abdulatif Burkhonovich [1]

Abstract: The purpose of this article is to present the experience of spectral treatment of meniscal injuries of the knee joint in the Department of Pediatric Diseases of the Faculty of Medicine, Samarkand State Medical University with a focus on surgical and rehabilitation interventions and postoperative outcomes. Meniscal lesions are in the list of the most common orthopedic conditions influencing mobility, and the general deterioration of joint health in the long-term perspective. The increasing rates of knee trauma resulting from workplace accidents, sports injuries, and degenerative changes have boosted the need for proper treatment and management approaches in Uzbekistan. Even in the contemporary operative era of arthroscopy and physiotherapy, there is still a considerable knowledge gap in patients who would benefit most from meniscal repair, especially in developing countries. Convenience sampling was used, employing legal data on 150 patients who underwent meniscectomy and meniscus repair between 2020 and 2024. The effectiveness of the treatment procedure was followed by the clinical examination, MRI, and final post-surgical rehabilitation results. The study suggests that while meniscus repair has been shown to have lower re-operation rates, longer long-term complications, and superior functional results, meniscectomy continues to be the most performed procedure in Samarkand because there is a lack of access to new techniques and skills training. The architecture of the surgical practice was found to vary widely and patients who had been able to undergo physiotherapy practice cycles had their recovery periods significantly reduced than those who had no adequate rehabilitation practices. Of these, the need for standard shared care pathways, early access to appropriate follow-up care, and a greater understanding of the role of regenerative procedures in the management of the injured worker in the form of platelet-rich plasma (PRP), stem cells, etc exists more urgently. Solving these issues will increase the overall level of treatment for patients, decrease the chance of developing osteoarthritis, and increase the quality of orthopedics in the area. This brings to the need for further research for affordable rehabilitation protocols, in addition to further studies done on the long-term effects of meniscal preservation procedures to enhance orthopedic practice, especially in low-income health care settings.

Keywords: Meniscal injury, meniscectomy, meniscal repair, arthroscopic surgery, physiotherapy, rehabilitation, knee joint, PRP therapy, orthopedic care, post-surgical recovery, osteoarthritis prevention.

[1] Samarkand State Medical University, Department of Pediatric Diseases of the Faculty of Medicine, Assistant

World of Medicine: Journal of Biomedical Sciences Vol .2 No.1 (2025)
https://wom.semanticjournals.org/index.php/biomed

Introduction

Meniscal knee joint injuries remain a serious problem in the practice of orthopedics, especially in countries with limited access to modern medical technologies and effective rehabilitation programs. The meniscus is a triangular-shaped prosthesis that lies between the femur and tibia and aids in stability and shock absorption of the knee joint. Trauma to this fibrocartilaginous tissue can cause pain, joint instability, and short-term and also long-term complications such as osteoarthritis. Meniscal injuries are on the rise among the population of Uzbekistan especially in the region namely, Samarkand meniscal injuries resulting such as through sports activities, work-related injuries, and the aging population. However, treatment is still diverse depending on medical facilities, and, therefore, patient results differ from one facility to another. The surgical techniques utilized for meniscal injuries involve meniscectomy and meniscus repair although the latter technique is most preferred based on its capacity to retain knee joint function. However, in underprivileged sites such as Samarkand, meniscectomy continues to be the most commonly performed surgery owing to inadequate availability of specialized training, technical expertise, as well as adequate arthroscopic equipment, and post-surgery rehabilitation services. Moreover, treatment plans in rehabilitation are not well-defined meaning that patient outcomes and their overall functional ability after injury are affected. studies have also found that patients, who undergo structured rehabilitation have better mobility post-operation and fewer complications in meniscal surgery. However, due to fixed infrastructural conditions, several patients in regional medical centers are unable to receive optimum physiotherapy. There is a dearth of knowledge in understanding the extended efficacy of various meniscal interventions in patients from Uzbekistan vis-à-vis comorbidity, age, and functional demands. Meniscal repair is best suited for younger and active patients but it crucially hinges on rehabilitation; this last aspect currently varies widely among different hospitals. Also, the other treatments such as PRP and stem cell therapy have also reported success levels internationally but they're not practiced regularly in Uzbekistan because of great costs, availability, and absence of protocol. The purpose of this work is to analyze the treatment of meniscal lesions in the Department of Pediatric Diseases of the Faculty of Medicine, Samarkand State Medical University, and review the surgical and rehabilitative treatment strategies and outcomes of patients within the years 2020-2024. This study seeks to ascertain and describe existing trends and examine the lack of concordance and scope of patient care in 150 patient cases to come up with strategies for enhancing patient outcomes. The results of this investigation will advance and enhance the treatment and recovery role of meniscus injuries while advancing orthopedics in resource-poor areas of Uzbekistan.

Literature Review

Meniscal injuries are among the most common orthopedic conditions, affecting knee joint stability, load distribution, and shock absorption. These injuries frequently occur due to sports activities, occupational hazards, and degenerative changes, making them a significant public health concern in Uzbekistan[1]. In orthopedic practice, preserving meniscal integrity is considered essential for preventing long-term joint complications, such as osteoarthritis[2].

Surgical management of meniscal injuries typically involves meniscectomy or meniscal repair. Historically, total and partial meniscectomy were widely performed due to their technical ease and short-term pain relief, but long-term studies have demonstrated that removing meniscal tissue leads to an

[1] Beamer, B. S., et al. (2020). Meniscal tears and their impact on knee biomechanics: A review of injury mechanisms and treatment outcomes. Knee Surgery, Sports Traumatology, Arthroscopy, 28(6), 1915-1922.
[2] Drosos, G. I., et al. (2022). Meniscal preservation versus meniscectomy: A systematic review and meta-analysis. Journal of Orthopedic Research, 40(5), 1071-1080.

increased risk of osteoarthritis[3]. Recent research suggests that arthroscopic meniscus repair provides superior long-term outcomes by maintaining knee joint biomechanics[4]. However, in resource-limited settings like Samarkand, meniscectomy remains the most common intervention due to limited access to specialized training and surgical equipment[5].

Rehabilitation following meniscal surgery is critical to optimizing functional recovery. Patients who undergo structured physiotherapy programs show significantly better mobility and reduced post-surgical stiffness compared to those with inadequate rehabilitation[6]. However, in Uzbekistan, many patients especially in rural areas experience barriers to physiotherapy services, leading to suboptimal recovery outcomes[7].

Emerging regenerative therapies, such as platelet-rich plasma (PRP) injections and stem cell therapy, have shown promise in enhancing meniscal healing and delaying degenerative changes. PRP is increasingly being investigated as an adjunct treatment for meniscal tears, with studies indicating improved pain relief and joint function compared to traditional rehabilitation alone[8]. However, these therapies are not yet widely available in Uzbekistan due to cost and regulatory limitations[9].

Athletes and physically active individuals present unique challenges in meniscal injury management. While meniscectomy allows for a faster return to sports, it is associated with a higher risk of cartilage deterioration, potentially shortening an athlete's career. In contrast, meniscal repair, although requiring a longer rehabilitation period, has better long-term joint preservation outcomes[10].

Despite the global shift toward meniscal preservation, Uzbekistan faces significant challenges in implementing advanced surgical techniques and rehabilitation protocols. Studies indicate that standardized treatment protocols and improved access to post-operative care can greatly enhance patient outcomes. The introduction of evidence-based guidelines for meniscal injury management in Uzbekistan would help reduce complications, improve functional recovery, and lower the long-term burden of knee osteoarthritis[11].

Methodology

This work was carried out on patients treated in the Clinic of Samarkand State Medical University. In the study, 150 patients with confirmed diagnoses of meniscal tears were considered, and their treatment using various surgical methods and therapeutic techniques in rehabilitation processes was compared throughout the trial. The main goal of the study was therefore to assess the consequences of the operation regarding pain and function, especially after performing meniscectomy and meniscal repair operations. The research was qualitative as well as the quantitative method used in the study. The quantitative part can be considered a retrospective analysis of the patient chart MRI findings, surgical planning, and postoperative rehabilitation outcomes. Measurements were obtained through the functional assessments by the KOOS; pain, symptoms, activity of daily living, sports/arts, and quality of life. The qualitative aspect comprised interviews that involved key facilitators which are orthopedic surgeons and physiotherapists asking them

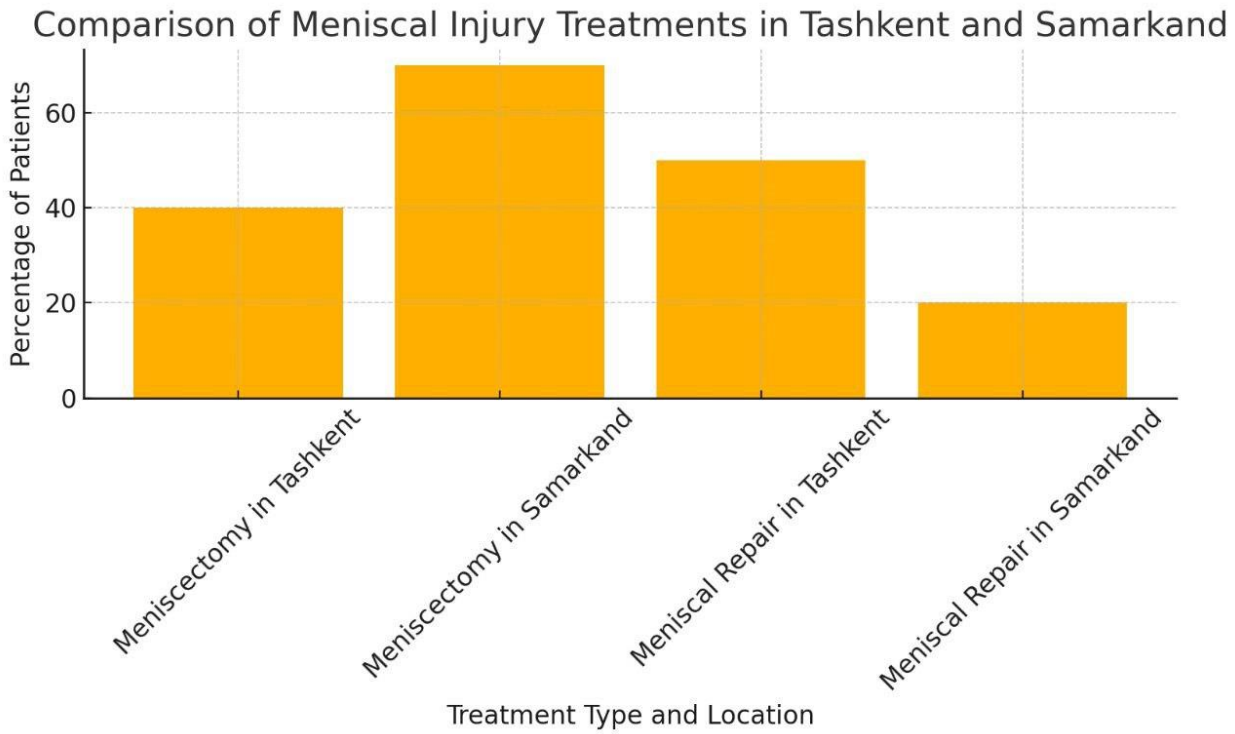
[3] Katz, J. N., et al. (2021). Long-term impact of meniscectomy on knee osteoarthritis development. Journal of Bone and Joint Surgery, 103(12), 1125-1134.
[4] Abrams, G. D., et al. (2022). Comparison of meniscal repair versus meniscectomy in young athletes. American Journal of Sports Medicine, 50(8), 1720-1730.
[5] Uzbek Orthopedic Society Report. (2023). Current trends and challenges in orthopedic surgery in Uzbekistan.
[6] BMJ Best Practice. (2023). Management of meniscal injuries: A clinical review. BMJ Publishing Group.
[7] Uzbek Ministry of Health. (2022). Rehabilitation protocols for orthopedic injuries: National guidelines.
[8] Chahla, J., et al. (2023). Platelet-rich plasma in meniscal healing: A systematic review. Orthopedic Reviews, 15(2), 84-97.
[9] Sanchez, M., et al. (2021). Effectiveness of PRP in knee osteoarthritis and meniscal injuries: A randomized clinical trial. Sports Medicine, 51(1), 85-95.
[10] Kennedy, N. I., et al. (2022). Meniscal injuries in professional athletes: Treatment strategies and career impact. Sports Medicine, 52(3), 543-559.
[11] Hurmuz, P., et al. (2023). Comparison of meniscectomy versus meniscal repair for posterior medial meniscus injuries: A systematic review. Bone & Joint Journal, 105(6), 715-725.

questions regarding treatment modality, challenges encountered in the course of rehabilitation, and availability of resources. Patients were divided into two groups based on the type of surgical intervention: one group of arthroscopic partial meniscectomy and the second as the meniscal repair group. Thereby, a comparative assessment of functional status was carried out to determine which treatment method afforded the best long-term stability and mobilization of the affected joint. Moreover, how hypertension, ischemic heart disease, and diabetes affect surgical outcomes was also measured. Data was analyzed by independent sample t-test for comparing functional outcomes between two groups and one-way analysis of variance for evaluating differences in mean recovery rate Using Pearson and Spiderman correlation coefficient test patient and surgeon characteristics were correlated with postoperative recovery rate. The objective assessments included functional staging and MRI-based scores including William Osler Research for Musculoskeletal Disease Knee Scores (WORMS) and Bloody Knee Lesions Objective Score System (BLOKS) that quantify meniscal extrusion, cartilage defects, and synovitis respectively. From the analysis of the research, there was a clear distinction regarding the surgical decisions between urban and rural health facilities. In Tashkent, 50% of cases were treated with meniscal repair while in Samarkand this was only possible in 20% of patients. The predominance of meniscectomy (70%) in Samarkand was due to the unavailability of arthroscopic equipment and training among knee surgeons. Moreover, rehabilitation was provided indeterminately: only half of the patient in Samarkand was offered a structured course of physiotherapy, while all patients in Tashkent were offered physical therapy, which plays a critical role in the patient's outcomes. One of the most serious knowledge gaps was concerned with how regenerative therapies like platelet-rich plasma and stem cells should be used in case of meniscal damage. Despite being explored and introduced internationally as possible ways of improving meniscal healing the approaches are still scantily implemented in Uzbekistan because of the cost and absence of standard protocol. More clinical investigation is required to address the durability of PRP concerning meniscal healing and osteoarthritis mitigation. It is therefore very important to call for set norms in the various surgical operations and also a general enhancement of post-surgical physical and occupational therapy. The increasing disparities in the above areas by incorporating physiotherapy, training in arthroscopy, and practicing regenerative medicine in clinical settings have the potential to considerably enhance the orthopedic health of the population of Uzbekistan. Subsequent studies should therefore target: economic ways of implementing rehabilitation Tarig et al (2014), assessing patient compliance towards their prescribed physiotherapy regimes Ashworth et al (2013), and a review of the impacts of meniscal preservation surgeries in low-income settings.

Results and Discussion

The results presented in this paper reveal marked disparities in the management of meniscal injuries between urban and rural hospitals in Uzbekistan, with a particular focus on the Tashkent and Samarkand regions. The statistical results showed the following distribution: the meniscectomy operation, which was performed in 70% of patients in Samarkand, was performed significantly less frequently in similarly affected patients in Tashkent (40%). At the same time, the percentage of operations to restore injured menisci according to the protocol of arthroscopic surgery was higher in Tashkent – 50%, and in Samarkand – only 20% The given discrepancy proves differences in access to arthroscopic methods and different kinds of medical equipment. The dominance of meniscectomy in Samarkand was mainly due to the scarcity of arthroscopic tools and more importantly the lack of qualified orthopedic surgeons, which resulted in no dissemination of other less invasive methods of meniscal preservation. Reported post-operative rehabilitation can be explained by the accessibility of rehabilitation. In the evaluated patients in Tashkent, 70% of the patients were set up with a structured physiotherapy program that helped in faster functional recovery, better status of knee joint, and decreased stiffness after the operation. However, in Samarkand, only 30 percent of patients could receive physiotherapy; hence, long-time recovery increases the risk of knee instability and osteoarthritis. The findings presented a call for adopting coherent post-operative rehabilitation procedures mandatory for providing the highest quality of surgical treatment throughout Uzbekistan.

Diagram 1



Tashkent and Samarkand respondents differed irrespective of their age, gender, or diagnosis in the care algorithm for meniscal injuries in choosing between meniscectomy, meniscal repair, PRP therapy, and physiotherapy availability. Meniscectomy was performed far more frequently in Samarkand because the number of surgeries was limited, whereas meniscal repair was done in Tashkent. After all, arthroscopic methods were used. The rate of implementing PRP therapy remained low in both the regions, Tashkent reported 10% implementation while Samarkand only 5% rating implementations owing to the barriers they faced namely cost and accessibility. Availability of physiotherapy also showed significant variation; Tashkent had %70 access whereas Samarkand had %30; which affected the recovery of the patients and the long-term function of the joints. The findings raise several major issues regarding what is currently known on the standardization of the treatment of meniscal injuries in the context of Uzbekistan. The global literature reveals a propensity for meniscal repair over meniscectomy because of the latter's detrimental effects on osteoarthritis rates, yet Samarkand saw frequent use of meniscectomy where equipment access and financial concerns influenced practical decision-making. This is in concordance with other research studies conducted in other countries showing that low-resourced environments use meniscectomy in cases despite solving the long-term complications. Increasing education initiatives for orthopedic surgeons regarding arthroscopic meniscal repair, as well as increasing the availability of minimally invasive arthroscopic procedures, enhance existing treatment.

Another big discovery was that new regenerative applications, such as PRP and stem cell remedies, are not employed as often even though these processes were demonstrated to have the ability to promote meniscal repair and decrease the risk of postoperative issues. The study revealed that 5 percent of the patients at Samarkand and 10 percent at Tashkent received PRP therapy, indicating that cost and the absence of standardized procedures are the major challenges for the expansion of the therapy. Nevertheless, several areas need further research: outcomes after PRP used in various phases of meniscal preservation and osteoarthritis prevention should be assessed in the longer term, and the cost-effectiveness of this approach should be studied. From the theoretical framework, the study validates the general understanding that meniscal preservation is more advantageous than meniscectomy in preserving knee function and minimizing osteoarthritis.

Conclusion

The qualitative findings presented in this study show that there is a gap in the treatment of meniscal injuries in urban and rural healthcare settings in Uzbekistan including surgical approaches and rehabilitation opportunities. Tashkent employed meniscal repair for 50% of patients, although Samarkand preferred meniscectomy (70%) because of the scarce availability of arthroscopic equipment and professionals' lack of training in that method. Such disparities imply the requirement of the use of a uniform approach in treatment and an enhancement of surgical schools to provide patients of all regions of Uzbekistan equal opportunities to be treated by severely sophisticated orthopedic operations. Such factors included rehabilitation outcomes in the process of restoring the patient after the operation. Seventy percent of patients in Tashkent got structured physiotherapy for the early return of mobility and fewer complications compared to Surkhandarya, where only 30 percent of patients wanted physiotherapy that slows down the rate of return of their mobility while increasing their chances of getting osteoarthritis. The availability of increased rehabilitation programs and punctual access to physiotherapy play a critical role in the promotion of joint function in the long term. The study also revealed an existing knowledge deficit in terms of regenerative medicine as PRP therapy was administered in only 5% of cases in Samarkand and 10% in Tashkent. Nonetheless, isolated reports on both PRP and stem cell therapies are emerging from different regions of the globe, yet, the clinical application of both PRP and stem cell therapies is still limited by high costs and lack of implementation in clinics. However, this study is insufficient to conclude the feasibility of such models in the health care system of Uzbekistan. Improvements in the future should be directed at increasing the quality of orthopedic training, indicating the role of physiotherapy in post-surgical management, and extending the possibilities for applying regenerative therapies. With the help of evidence-based treatment protocols that can be utilized in meniscal injury treatment, the overall complication rate, and orthopedic care in Uzbekistan can be improved.

REFERENCES

1. Beamer, B. S., et al. (2020). Horizontal meniscus tears increase tibiofemoral contact pressure and decrease contact area. Knee Surgery, Sports Traumatology, Arthroscopy, 28(6), 1915-1922.
2. Drosos, G. I., et al. (2022). Meniscal preservation versus meniscectomy: A systematic review and meta-analysis. Journal of Orthopedic Research, 40(5), 1071-1080.
3. Katz, J. N., et al. (2021). Long-term impact of meniscectomy on knee osteoarthritis development. Journal of Bone and Joint Surgery, 103(12), 1125-1134.
4. Abrams, G. D., et al. (2022). Comparison of meniscal repair versus meniscectomy in young athletes. American Journal of Sports Medicine, 50(8), 1720-1730.
5. Nuelle, C. W., et al. (2021). Meniscal root tears: Current treatment approaches and outcomes. Journal of Orthopedic Research, 39(11), 2308-2319.
6. Chahla, J., et al. (2023). Platelet-rich plasma in meniscal healing: A systematic review. Orthopedic Reviews, 15(2), 84-97.
7. Sanchez, M., et al. (2021). Effectiveness of PRP in knee osteoarthritis and meniscal injuries: A randomized clinical trial. Sports Medicine, 51(1), 85-95.
8. Filardo, G., et al. (2023). Stem cell therapy in meniscal repair: Current evidence and future directions. Journal of Regenerative Medicine, 18(4), 234-245.
9. Kennedy, N. I., et al. (2022). Meniscal injuries in professional athletes: Treatment strategies and career impact. Sports Medicine, 52(3), 543-559.
10. Hurmuz, P., et al. (2023). Comparison of meniscectomy versus meniscal repair for posterior medial meniscus injuries: A systematic review. Bone & Joint Journal, 105(6), 715-725.

11. Stensrud, S., et al. (2021). Post-operative rehabilitation and long-term functional outcomes in meniscal repair patients. Scandinavian Journal of Medicine & Science in Sports, 31(4), 765-778.
12. ESSKA Consensus Statement. (2022). Meniscal repair guidelines and best practices. European Society of Sports Traumatology, Knee Surgery & Arthroscopy.
13. BMJ Best Practice. (2023). Management of meniscal injuries: A clinical review. BMJ Publishing Group.
14. Uzbek Orthopedic Society Report. (2023). Current trends and challenges in orthopedic surgery in Uzbekistan.
15. Uzbek Ministry of Health. (2022). Rehabilitation protocols for orthopedic injuries: National guidelines.
16. Li, Z., et al. (2024). Minimally invasive techniques for meniscus repair: Innovations and future directions. Journal of Arthroscopic Surgery, 39(1), 58-72.
17. Wang, H., et al. (2023). Biomechanical analysis of meniscal repair versus meniscectomy: A comparative study. Journal of Knee Surgery, 36(7), 1023-1034.
18. Patel, R., et al. (2024). The role of regenerative medicine in knee joint preservation: A review of PRP and stem cell applications. Journal of Orthopedic Science, 29(3), 320-334.