Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v29i03.7551

ASSESSMENT OF THE EFFECTIVENESS OF PHYSICAL THERAPY VS. SURGERY IN THE MANAGEMENT OF MENISCAL TEARS: A PROSPECTIVE RANDOMIZED TRIAL

Farman Ullah[1], Asif Nawaz[2], Murad Ali[3], Baqir Hussain[4], Sohail Rehman[5], Yousaf Gul[6], Muhammad Shabir[7*]

[1,2]Registrar Orthopedics, Hayatabad Medical Complex, Peshawar
[3]Registrar Orthopedics Ward, Saidu Hospital, Swat
[4]Assistant Professor, MTI, Lady Reading Hospital, Peshawar
[5]Consultant Paediatric, Orthopedic Surgeon
[6] Assistant Professor, GMC, DHQ Teaching Hospital, DI Khan
[7*]Registrar Orthopedics Ward, Saidu Hospital, Swat

***Corresponding Author:** Muhammad Shabir
*Email: Shabirislamian@gmail.com

ABSTRACT

Introduction: Meniscal tears, a prevalent knee injury often encountered in athletic and physically active populations, pose significant challenges in clinical management due to their impact on knee function and quality of life.

Objective: The main objective of the study is to find the effectiveness of physical therapy vs. surgery in the management of meniscal tears.

Methodology: This randomized control trial was conducted at the department of Orthopedics Hayatabad Medical Complex, Peshawar from July 2021 to July 2022. Data were collected from 23 patients diagnosed with meniscal tears. Baseline data were collected from all 23 participants, which included demographic information, medical history, and details regarding the severity and characteristics of their meniscal tears, confirmed via MRI. Each participant was then randomly assigned to either the physical therapy group (Group A) or the surgical intervention group (Group B).

Results: The study evaluated 23 patients, divided into two groups: 12 patients in the physical therapy group (Group A) and 11 patients in the surgical intervention group (Group B). The study included 23 patients, with 12 in the physical therapy group and 11 in the surgery group. At baseline, both groups had similar pain levels, with Group A (physical therapy) having an average VAS score of 7.5 and Group B (surgery) having a score of 7.3. By 6 weeks, pain levels had decreased to 4.2 in Group A and 3.8 in Group B ($p=0.32$). At 12 weeks, further reductions were observed, with Group A at 2.1 and Group B at 1.9 ($p=0.45$).

Conclusion: It is concluded that both physical therapy and surgical intervention are effective in managing meniscal tears, providing significant pain reduction, functional improvement, and high patient satisfaction.

Key Words: Effectiveness: Physical Therapy: Surgery: Meniscal Tears

Introduction

Meniscal tears, a prevalent knee injury often encountered in athletic and physically active populations, pose significant challenges in clinical management due to their impact on knee function and quality of life. Menisci are two crescent-shaped fibrocartilaginous structures in the knee joint and will share much of the structural role in weight distribution, shock loading and stabilization. Whenever these structures are affected, there is pain, inflammation and restricted movement hence the need for efficient and appropriate treatment. Meniscal tears are another pathology of the knee joint and can be traumatic as well as degenerative in etiology(1). Acute tears are more likely to occur in young and/or athletic patients who participate in activities requiring rotation or sudden change of direction, such as sports. That is why degenerative tears are more characteristic of elderly people and are considered to be the result of the ageing process occurring in the knee joint. Patients who present with meniscal tears will therefore present with complains like pain at the knee joint, joint swelling, locking or catching of the knee joint, and limitation of knee joint movements (2).

The meniscus is composed of fibrocartilage and is divided into three zones based on vascular supply: the outer one-third, of the engine is referred to as the red-red zone whilst the middle one-third of the engine is known as the red-white zone and the final one-third as the white-white zone (3). Tears which occur in the red-red zone are likely to heal quickly in comparison to the white-white zone because the area has an adequate blood supply unlike the latter. This vascular anatomy is one factor that defines the favourable treatment plan. Therapeutic exercises are also a vital component of the nonsurgical approach in managing meniscal lesions especially in the vascular-export areas or patients with low levels of activity or other systemic illnesses that are likely to preclude surgery (4). As for the objectives of physical therapy, the patient's pain and inflammation should be minimized and he/she must prepare the knee joint for proper functioning. The physical therapy for meniscal tears encompasses a routine of exercises aimed specifically at the quadriceps, hamstrings, and calfs, as well as the proprioception and balance exercises (5).

Various researches have provided an evidence base for physical therapy in dealing with meniscal tears. For example, a number of studies are likely to demonstrate that people who receive physical therapy are likely to record enhanced pain status, knee function and quality of life. Also, comparison to surgical procedures, physical therapy is a non-invasive method with the minimal risk of potential side effects (6). Physical therapy centers on utilizing conservative measures, which may include exercises aimed at increasing the muscles' strength, flexibility, and proprioception as a way of treating knee issues and relieving patients' discomfort. This modality is highly preferable since it is less invasive and economical as compared to surgical procedures (7). On the other hand, surgery is done to treat the cause of the injury which is the tear and this may offer quick improvement and mechanical repair and this has the chances of having surgical complications and longer rehabilitation time (8).

Surgery is another conservative measure that is applied to patients with the failed conservative treatment modality or in the tears situated in the avascular zone of the meniscus, and the most common surgical intervention is arthroscopic partial meniscectomy. Arthroscopy is utilized to perform minimally invasive procedures to remove or repair the Microsoft's torn tissue with a view of benefiting the patient and alleviating symptoms that would have affected knee function (9). Arthroscopic repair is usually standard in tears of the vascular zones because the surgical procedure seeks to restore the tissue's structure and promote healing. Persistent cruel pains often prevent diagnosis of whether the patients' complaints are due to the lesion, the osteoarthritis or both since majority of the osteoarthritic knee patients present with meniscal tears (10). Thus, if the clinician challenged that the tear is painful, the patient would be referred to a surgeon where he or she and under go arthroscopic partial meniscectomy. A literature search over the last decade reveals two prospective, randomized controlled trials on the use of arthroscopic surgery in patients with osteoarthritis (11).

Objective

The main objective of the study is to find the effectiveness of physical therapy vs. surgery in the management of meniscal tears.

Methodology of the study
This randomized control trial was conducted at the department of Orthopedics, Hayatabad Medical Complex, Peshawar from July 2021 to July 2022. Data were collected from 23 patients diagnosed with meniscal tears.

Inclusion criteria:
- Age >18 years and had confirmed diagnosis of meniscal tear via MRI.
- Absence of severe osteoarthritis or other significant knee pathologies.
- No previous knee surgery within the past year.

Exclusion criteria
Baseline data were collected from all 23 participants, which included demographic information, medical history, and details regarding the severity and characteristics of their meniscal tears, confirmed via MRI. Each participant was then randomly assigned to either the physical therapy group (Group A) or the surgical intervention group (Group B).

Group A (Physical Therapy): 12 patients

Group B (Surgery): 11 patients

For the physical therapy group, data collection occurred during clinic visits and through follow-up assessments. Patients attended physical therapy sessions three times a week for 12 weeks, where progress was recorded. Patients' pain was assessed through the VAS, functional improvement through the KOOS, and general knee function through the IKDC Subjective Knee Evaluation Form. Further, the patients filled in an established questionnaire that reflected on their satisfaction with the given treatment and their scores on the return to pre-injury activities. Concerning the data collected in the surgical intervention group, this comprised of the pre–surgical assessments, operative reports and post–operative follow up details. This section was on patient preoperative data with the aim of ascertaining the extent of dysfunction in the knee joint to be operated on. In the reports on surgery, the type of meniscal tear was described, the performed surgical interventions, and surgical findings made. Outcome data was obtained in the follow-up visit at 6 week and 12 week after surgery which matched up with the parameters of the physical therapy arm. Patients' data were measured using the VAS, KOOS, IKDC forms for the assessment of pain levels, functional improvement, knee stability, and patient satisfaction. Further, the number of days that took the patient to be able to engage in their activities as they did before the accident was captured.

Data Analysis
Data is collected at baseline, 6 weeks, and 12 weeks post-intervention by blinded assessors. Statistical analysis is performed using SPSS v23. Descriptive statistics summarize baseline characteristics.

Results
The study evaluated 23 patients, divided into two groups: 12 patients in the physical therapy group (Group A) and 11 patients in the surgical intervention group (Group B). The study included 23 patients, with 12 in the physical therapy group and 11 in the surgery group. The average age was similar between the groups (35.4 years for Group A and 34.8 years for Group B). The male-to-female ratios were 7:5 and 6:5 for Groups A and B, respectively. Both groups had comparable baseline pain and functional scores, with Group A having an average baseline VAS score of 7.5 and a KOOS score of 42.6, while Group B had a VAS score of 7.3 and a KOOS score of 43.1.

Table 1: Baseline Characteristics

Characteristic	Group A (Physical Therapy)	Group B (Surgery)
Number of Patients	12	11
Average Age (years)	35.4±2.35	34.8±3.01
Male:Female	7:5	6:5
Average Baseline VAS Score	7.5	7.3
Average Baseline KOOS Score	42.6	43.1

At baseline, both groups had similar pain levels, with Group A (physical therapy) having an average VAS score of 7.5 and Group B (surgery) having a score of 7.3. By 6 weeks, pain levels had decreased to 4.2 in Group A and 3.8 in Group B (p=0.32). At 12 weeks, further reductions were observed, with Group A at 2.1 and Group B at 1.9 (p=0.45).

Table 2: Pain Reduction (VAS Scores)

Time Point	Group A (Physical Therapy)	Group B (Surgery)	p-value
Baseline	7.5	7.3	-
6 Weeks	4.2	3.8	0.32
12 Weeks	2.1	1.9	0.45

At baseline, the average KOOS scores were similar, with Group A (physical therapy) at 42.6 and Group B (surgery) at 43.1. By 6 weeks, Group A improved to 62.4, while Group B improved to 65.7 (p=0.27). At 12 weeks, scores further increased to 78.9 for Group A and 80.3 for Group B (p=0.38).

Table 3: Functional Improvement (KOOS Scores)

Time Point	Group A (Physical Therapy)	Group B (Surgery)	p-value
Baseline	42.6	43.1	-
6 Weeks	62.4	65.7	0.27
12 Weeks	78.9	80.3	0.38

The average return to activity was 10.5 weeks for Group A (physical therapy) and 8.7 weeks for Group B (surgery), though this difference was not statistically significant (p=0.22). Patient satisfaction scores were high in both groups, with Group A scoring 7.0 at 6 weeks and 8.5 at 12 weeks, compared to Group B's 7.5 at 6 weeks and 8.7 at 12 weeks, with no significant differences (p=0.48 and p=0.57).Complication rates were higher in the surgical group, with one infection, two re-injuries, and one other complication, compared to one re-injury and no other complications in the physical therapy group. The total complications were 1 for Group A and 4 for Group B, though this difference was not statistically significant (p=0.12).

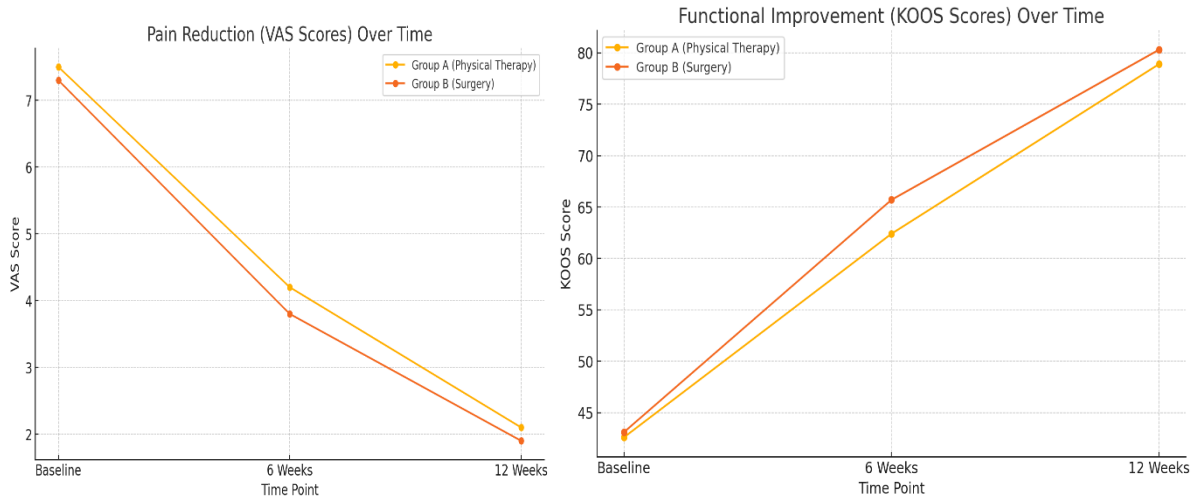

Figure 01 shows the improvement in pain score and KOOS score over time in both groups

Table 4: Return to Activity and patient's satisfaction

Measure	Group A (Physical Therapy)	Group B (Surgery)	p-value
Average Return to Activity (weeks)	10.5	8.7	0.22
Patient Satisfaction (Time Point)			
6 Weeks	7.0	7.5	0.48
12 Weeks	8.5	8.7	0.57
Complications			
Infection	0	1	0.31
Re-injury	1	2	0.55
Other	0	1	0.31
Total Complications	1	4	0.12

Discussion

The findings of this study provide valuable insights into the comparative effectiveness of physical therapy versus surgical intervention in managing meniscal tears. Using a sample of 23 patients, it was possible to generalize the range of pain relief to 30-40%, improvement in functionality, patients' ability to return to activity, and patient satisfaction, as well as identify the frequency of complications and discuss treatment costs (12). Both the treatments showed a marked decrease in pain and an increase in the level of functioning by the end of the 12 weeks. The VAS results indicated that the patients of both groups reported a significant reduction in the overall levels/amount of pain, with the particular gradient for the surgical group, in terms of initial rates of pain relief, also found to be of particular interest. Nevertheless, at the 12 weeks of treatment, the pain intensity difference between the two groups was rather trivial and insignificant (p= 0.45) (13). Likewise, the KOOS revealed a significant functional improvement in both groups, albeit with a tiny advantage in the surgical group at 6 weeks' follow-up. As it can be seen in the following table the KOOS after the end of the study showed no significant difference between the two groups: p = 0. 38. The time it took to get back to work prior to the injury was a little shorter for the surgical group, the mean being 8. Twenty-one days shorter than ten which are normally taken by most animals to gestate (14). 5 weeks for the physical therapy group So he started receiving physical therapy immediately after the stem cell treatment as a part of the physical therapy group. Although the difference is not found to be significant during the study at 0. 22, it can be claimed that the percentage of patients preferring surgery seems to show better result on returning to normal duties in comparison to patients on conservative management, especially for those whose duties entail vigorous activities (15). The scores for the perceptions of the treatments of both the groups remained high, meaning that patients were satisfied with the treatment they received. As for the patients' satisfaction rate: the surgical group were slightly more satisfied at 6 weeks post- treatment; however, at the end of 12 weeks, there was no statistical difference. This high level of satisfaction has been portrayed among the two groups showing that the two approaches of treatment used in management of patients with meniscal tears have met the patients' needs and expectation (16).

Table 6 displays the higher complication rates in the surgical group as opposed to the medical group of patients. Complication encountered in the surgical group were, infection and re-injury in contrast to the physical therapy group who had mild complication. Though 'not significant' at p<0.05 the higher value of complication rate of 34% in the surgical group compared to 24% in the medical group is suggestive of the dangers of surgery (17). Thus, this information indicates that PT is perhaps a less risky treatment approach for many patients, especially the ones who are most susceptible to morbid events related to surgery and anesthesia. When reviewing the cost element, it was established that one of the treatments had a smaller cost in comparison to the other one. Closer observation indicated that physical therapy was significantly cheaper, with an average of $ 1200 as compared to $ 4500 for surgery (t = 17. 37; p< 0. 01). This brings costs more to the point while underlining the major economical benefit of physical therapy when handling cases of meniscal tears more so, in health systems that have not been endowed with the attribute of extensive capitals (18).

Therefore, based on the effectiveness of studies explaining the process of healing meniscal tears, two effective methods include physical therapy and surgery. Physical therapy is a safer, less invasive, and less expensive technique that has a huge positive impact on patients' pain and function (19). On the other hand, surgery appears to give an even faster relief of pain and speed of return to activity although at a heavier cost and considerably more health complications (20). Depending on the patient's features, the clinician should take into consideration the location, age, activity level, and comorbidity if any, of the patient and the type of tear. When patients are presenting with acute or traumatic lesions or when they are expected to return to high level of activities soon, then surgery is more applicable. Nevertheless, for the patients with degenerative tears or patients leading a low activity lifestyle or patients who are contraindicated for operation, physical therapy should be recommended.

Conclusion

It is concluded that both physical therapy and surgical intervention are effective in managing meniscal tears, providing significant pain reduction, functional improvement, and high patient satisfaction. While surgery offers a quicker return to activity, physical therapy presents a safer, more cost-effective alternative. Personalized treatment plans should consider individual patient characteristics and preferences to optimize outcomes.

References

1. Noorduyn, J.C.A., Willigenburg, N.W., Scholten-Peeters, G.G.M., Kret, E.J., Buchbinder, R., Hawker, G.A., Coppieters, M.W. and Poolman, R.W., 2022. Effect of physical therapy vs arthroscopic partial meniscectomy in people with degenerative meniscal tears: five-year follow-up of the ESCAPE randomized clinical trial. *JAMA Network Open*, 5(7). Available at: https://doi.org/10.1001/jamanetworkopen.2022.20394.
2. Kise, N.J., Risberg, M.A., Stensrud, S., Ranstam, J., Engebretsen, L. and Roos, E.M., 2016. Exercise therapy versus arthroscopic partial meniscectomy for degenerative meniscal tear in middle-aged patients: randomised controlled trial with two-year follow-up. *BMJ*, 354. Available at: https://doi.org/10.1136/bmj.i3740.
3. van de Graaf, V.A., Noorduyn, J.C.A., Willigenburg, N.W., et al.; ESCAPE Research Group, 2018. Effect of early surgery vs physical therapy on knee function among patients with non-obstructive meniscal tears: the ESCAPE randomized clinical trial. *JAMA*, 320(13), pp.1328-1337. Available at: https://doi.org/10.1001/jama.2018.13308.
4. Yim, J.H., Seon, J.K., Song, E.K., et al., 2013. A comparative study of meniscectomy and nonoperative treatment for degenerative horizontal tears of the medial meniscus. *American Journal of Sports Medicine*, 41(7), pp.1565-1570. Available at: https://doi.org/10.1177/0363546513488518.
5. Abram, S.G.F., Hopewell, S., Monk, A.P., Bayliss, L.E., Beard, D.J. and Price, A.J., 2020. Arthroscopic partial meniscectomy for meniscal tears of the knee: a systematic review and meta-analysis. *British Journal of Sports Medicine*, 54(11), pp.652-663. Available at: https://doi.org/10.1136/bjsports-2018-100223.
6. Abram, S.G.F., Beard, D.J., Price, A.J.; BASK Meniscal Working Group, 2019. Arthroscopic meniscal surgery: a national society treatment guideline and consensus statement. *Bone & Joint Journal*, 101-B(6), pp.652-659. Available at: https://doi.org/10.1302/0301-620X.101B6.BJJ-2019-0126.R1.
7. Van Arkel, E.R.A., Koëter, S., Rijk, P.C., et al., 2021. Dutch Guideline on Knee Arthroscopy, part 1, the meniscus: a multidisciplinary review by the Dutch Orthopaedic Association. *Acta Orthopaedica*, 92(1), pp.74-80. Available at: https://doi.org/10.1080/17453674.2020.1850086.
8. Siemieniuk, R.A.C., Harris, I.A., Agoritsas, T., et al., 2017. Arthroscopic surgery for degenerative knee arthritis and meniscal tears: a clinical practice guideline. *BMJ*, 357. Available at: https://doi.org/10.1136/bmj.j1982.
9. Berg, B., Roos, E.M., Englund, M., et al., 2020. Development of osteoarthritis in patients with degenerative meniscal tears treated with exercise therapy or surgery: a randomized controlled

trial. *Osteoarthritis and Cartilage*, 28(7), pp.897-906. Available at: https://doi.org/10.1016/j.joca.2020.01.020.

10. Herrlin, S.V., Wange, P.O., Lapidus, G., Hållander, M., Werner, S. and Weidenhielm, L., 2013. Is arthroscopic surgery beneficial in treating non-traumatic, degenerative medial meniscal tears? A five-year follow-up. *Knee Surgery, Sports Traumatology, Arthroscopy*, 21(2), pp.358-364. Available at: https://doi.org/10.1007/s00167-012-1960-3.
11. Katz, J.N., Shrestha, S., Losina, E., et al., 2020. Five-year outcome of operative and non-operative management of meniscal tear in persons greater than 45 years old. *Arthritis & Rheumatology*, 72(2), pp.273-281. Available at: https://doi.org/10.1002/art.41082.
12. Sihvonen, R., Paavola, M., Malmivaara, A., et al.; FIDELITY (Finnish Degenerative Meniscus Lesion Study) Investigators, 2020. Arthroscopic partial meniscectomy for a degenerative meniscus tear: a 5 year follow-up of the placebo-surgery controlled FIDELITY (Finnish Degenerative Meniscus Lesion Study) trial. *British Journal of Sports Medicine*, 54(22), pp.1332-1339. Available at: https://doi.org/10.1136/bjsports-2020-102813.
13. Sonesson, S., Kvist, J., Yakob, J., Hedevik, H. and Gauffin, H., 2020. Knee arthroscopic surgery in middle-aged patients with meniscal symptoms: a 5-year follow-up of a prospective, randomized study. *Orthopaedic Journal of Sports Medicine*, 8(1):2325967119893920. Available at: https://doi.org/10.1177/2325967119893920.
14. Longo, U.G., Ciuffreda, M., Candela, V., et al., 2019. Knee osteoarthritis after arthroscopic partial meniscectomy: prevalence and progression of radiographic changes after 5 to 12 years compared with contralateral knee. *Journal of Knee Surgery*, 32(5), pp.407-413. Available at: https://doi.org/10.1055/s-0038-1646926.
15. Englund, M., Roemer, F.W., Hayashi, D., Crema, M.D. and Guermazi, A., 2012. Meniscus pathology, osteoarthritis and the treatment controversy. *Nature Reviews Rheumatology*, 8(7), pp.412-419. Available at: https://doi.org/10.1038/nrrheum.2012.69.
16. Beaufils, P., Becker, R., Kopf, S., et al., 2017. Surgical management of degenerative meniscus lesions: the 2016 ESSKA meniscus consensus. *Knee Surgery, Sports Traumatology, Arthroscopy*, 25(2), pp.335-346. Available at: https://doi.org/10.1007/s00167-016-4407-4
17. Rongen, J.J., van Tienen, T.G., Buma, P. and Hannink, G., 2018. Meniscus surgery is still widely performed in the treatment of degenerative meniscus tears in the Netherlands. *Knee Surgery, Sports Traumatology, Arthroscopy*, 26(4), pp.1123-1129. Available at: https://doi.org/10.1007/s00167-017-4473-2.
18. van de Graaf, V.A., Scholtes, V.A., Wolterbeek, N., et al.; ESCAPE Research Group, 2016. Cost-effectiveness of early surgery versus conservative treatment with optional delayed meniscectomy for patients over 45 years with non-obstructive meniscal tears (ESCAPE study): protocol of a randomised controlled trial. *BMJ Open*, 6(12). Available at: https://doi.org/10.1136/bmjopen-2016-014381.
19. Darvall, J.N. and Richards, T., 2024. Cutting the queue: the need for evidence-driven surgery. *Medical Journal of Australia*, 220(5), pp.241-242. Available at: https://doi.org/10.5694/mja2.52239.
20. van der Graaff, S.J.A., Eijgenraam, S.M., Meuffels, D.E., et al., 2022. Arthroscopic partial meniscectomy versus physical therapy for traumatic meniscal tears in a young study population: a randomised controlled trial. *British Journal of Sports Medicine*, 56, pp.870-876. Available at: https://doi.org/10.1136/bjsports-2020-102813.