

SHORT-TERM FUNCTIONAL OUTCOMES OF PARTIAL MENISCECTOMY AMONG MIDDLE-AGED PATIENTS IN TANZANIA

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ABSTRACT

Background: Arthroscopic partial meniscectomy for middle-aged patients with meniscal tear is an effective procedure in relieving knee pain and improving functional outcome. The functional outcome depends on gender, body size and type of meniscal tear.

Objective: The aim of this study was to assess the short-term functional outcome after arthroscopic partial meniscectomy in middle-aged patients with a meniscal tear treated at Muhimbili Orthopaedic Institute.

Methods: This descriptive cross-sectional study was conducted at Muhimbili Orthopaedic Institute. A total 53 patients were enrolled. Visual Analogue Scale score was used to assess pain and Lysholm Knee Functional Score was used to assess the functional outcome of the patients three months after arthroscopic partial meniscectomy. Data were analyzed using descriptive statistical methods to determine the short-term functional outcomes.

Results: There was a significant pain reduction between preoperative (VAS Score 7.26 ± 1.17) and 12th week postoperative (VAS score 2.32 ± 1.34). Functional outcomes improved at the 12th week postoperative (Lysholm knee scoring scale 80.04 ± 11.63) compared to preoperative period (Lysholm knee scoring scale 48.88 ± 11.08). The functional outcome score at 12th week was graded as excellent to good (62%), fair (28%) and poor (10%). Male had significant improvement than female in terms of functional outcome ($P=0.008$) at the 12th week postoperative.

Conclusion: Arthroscopic partial meniscectomy improved knee pain and functional outcome in the short-term postoperative period. Males showed to have better improvement in functional outcome compared to females.

Key words: Arthroscopic partial meniscectomy, Meniscal tear, Middle-aged patients

INTRODUCTION

Meniscal tear is the most common injury of the knee, with an annual incidence of up to 172 injuries per 100,000 persons (1). Approximately 61 in 100,000 meniscal injury patients undergo arthroscopic meniscectomy in the UK (2). Arthroscopic partial meniscectomy for middle-aged patients with meniscus tear is one of the most common surgical procedures with approximately 150,000 knee arthroscopies being done in the United Kingdom each year, and about five times that number (700,000) in the United States (3). Meniscal tear in middle-aged patients can occur as an acute traumatic knee injury or as part of a degenerative

process while in young patients mostly occurs in acute traumatic knee injuries (4).

The use of arthroscopy in the treatment of knee pathologies has evolved all over the world and its use is currently on the rise in sub-Saharan Africa, and a few studies have been done to assess the effectiveness of these procedures in our environment (5). Arthroscopic meniscectomy delivers a minimally invasive approach to the knee that previously necessitated open surgery (6). The principal goal of meniscus surgery is to preserve as much normal meniscus as possible and remove the non-viable edges of the meniscus to produce a stable meniscus and decrease damage to articular cartilage (7).

The treatment outcome of arthroscopic partial meniscectomy includes reduced knee pain, better knee functional outcome and improved quality of life (8). However, recent evidence has questioned this treatment modality because knee arthroscopy has been reported to have no advantage on the improvement of knee pain and functional outcome after surgery for middle-aged patients due to the high prevalence of concomitant joint degeneration (9). Despite these findings, sub-groups of patients in these age groups may benefit from arthroscopic partial meniscectomy and this helps to improve knee pain and function, also preserve native knee and avoid Total Knee Replacement (TKR) as a primary option (9). Meniscus tears in some selected cases in middle-aged patients will benefit from non-operative management, so it is, therefore, important to evaluate the effectiveness of arthroscopic partial meniscectomy (10). Factors such as age, sex, body mass index and type of meniscal tears have been documented to influence the postoperative outcome following arthroscopic partial meniscectomy (11). The aim of this study is to assess the short-term functional outcome after arthroscopic partial meniscectomy in middle-aged patients with a meniscal tear treated at Muhimbili Orthopaedic Institute.

MATERIALS AND METHODS

The study was a descriptive cross-sectional study conducted at Muhimbili Orthopaedic Institute (MOI), which provides tertiary services in orthopaedics, traumatology and neurosurgery, from May 2020 to April 2021. Enrolment of the patients to the study was done when the patients were admitted and listed for surgery. All cases were evaluated and selected according to the inclusion and exclusion criteria set up for current study as below.

Inclusion criteria

All patients aged 40-65 years with meniscal tear treated by arthroscopic partial meniscectomy during the study period.

Exclusion criteria

Includes all patients with previous surgery on the affected knee, fracture of the proximal tibia or distal femur in the previous year, an ipsilateral ligamentous injury such as Anterior Cruciate Ligament (ACL), Posterior Cruciate Ligament (PCL)

and Postero Lateral Corner (PLC) tear, infective conditions in or around the knee joint, patients who were scheduled for surgery and not operated and those who were refused to consent for the study.

Data collection process

During the study period a total of 53 patients with meniscal tear who met inclusion criteria and then underwent partial meniscectomy were evaluated. The researcher provided information about the study to participants and obtained written consent from those willing to participate. After obtaining informed consent, data was collected by using a structured questionnaire. Participants were interviewed in the ward by the researcher on the day of admission before surgery. Information regarding demographic characteristics including age and sex were recorded, associated clinical factors such as type of meniscal tear were obtained from the patient history and physical examination. Body Mass Index (BMI) was calculated, then recorded. BMI of < 25 was regarded as normal BMI, BMI of >25-30 as overweight and BMI of >30 as obesity. The level of knee pain was assessed by using a Visual Analogue Scale (VAS) such as ranging from 0-10, whereby zero was representing no pain while ten was representing maximum pain and functional outcome was assessed by using Lysholm knee score and then recorded. The Lysholm scale is a validated functional score designed for knee injuries. A questionnaire where each possible response to the 8 items, instability (25 cases), pain (25 cases), locking (15 cases), swelling (10 cases), stair climbing (10 cases), limp (5 cases), support (5 cases) and squatting (5 cases), was assigned an arbitrary score on an increasing scale. The total score was the sum of each response to the 8 items. A score of 100 means no symptoms or disability. There were 4 levels of outcome measure using the Lysholm functional knee scoring scale. The total score of 95-100 was considered excellent (level 1), 84-94 good (level 2), 65-83 fair (level 3) and those who were below 65 were considered poor (level 4). Lysholm score and VAS score were measured before surgery and then after surgical intervention during the outpatient visit at 2 weeks and 6 weeks post-surgery and was assessed for the outcome three months after arthroscopic partial meniscectomy. Ethical clearance was taken from Institutional Review Board of Muhimbili University of Health and Allied Sciences and written informed consent was obtained from each patient.

Operative procedure

Arthroscopic partial meniscectomy was performed on all enrolled patients with a meniscal tear and consented to the study. All surgical procedures were followed according to Muhimbili Orthopaedic Institute theatre protocol. After administering anaesthesia, the tourniquet was applied on the thigh with a pressure of 250 mm of Hg. The affected knee was scrubbed and draped. Anterolateral (viewing portal) and anteromedial (working portal) portals were made respectively. Initially an inflow cannula through the anterolateral portal is inserted and then an arthroscope is inserted at 30 degrees. The camera and light source were connected to the scope and knee joint visualized methodically. Diagnostic arthroscopy begins in a supra-patellar pouch, the medial gutter, lateral gutter, medial compartment, lateral compartment, inter-condylar notch, and posteromedial and posterolateral compartment. Meniscus tear patterns/ stability were examined using the probe. The probe was also passed through an anteromedial portal and ACL and PCL was palpated with the probe and looked for any laxity or tear. The lateral compartment was examined while the leg was kept in a figure of four positions and the integrity of the lateral meniscus was checked by the probe. Then depending on the type of meniscal pattern appropriate technique was chosen and treatment performed in the same sitting. Arthroscopic partial meniscectomy was performed until a stable peripheral rim was archived. The remaining peripheral rim was carefully probed to assure that there were no additional tears. Once a contoured balanced stable peripheral rim was obtained, the joint was thoroughly irrigated to remove all small meniscal fragments or debris, then drainage was left *in situ*.

Postoperative care and follow up

Postoperatively patients were given analgesics and antibiotics. Closed chain exercises, alphabetical exercises and full weight-bearing as tolerated after 24 hours post-surgery were initiated. Patients attended the outpatient clinic on the 2nd, 6th, and 12th weeks postoperatively for follow up.

The second week follow up

During this visit, the researcher assessed the surgical wound for stitch removal. Patients were assessed for instability, locking, swelling, pain, stair climbing, limping, walking with support and squatting using the Lysholm knee scoring

scale, and the level of knee pain using the visual analogue scale. Patients were advised to perform active knee flexion and extension at home. Those patients with a limited range of motion were sent for assisted physiotherapy.

The sixth week follow up

Patient functional outcome was assessed using Lysholm functional knee scoring scale and knee pain was assessed using visual analogue scale. Also, the patient range of motion was assessed and encouraged to continue with active knee flexion and extension at home to improve knee range of motion.

Twelve-week follow up

During this visit, the assessment was done as in previous visits and is the one that was able to determine the functional outcomes. Participants were required to complete the questionnaire on Lysholm score and overall recovery from previous symptoms was assessed. Lysholm outcome grading was classified whether is excellent [100-95], good [94-84], fair [83-65] and poor [<65]. Also, the level of knee pain was assessed by using the visual analogue scale (zero means no pain and 10 means unbearable pain). These results were the ones analysed in this study and compared with the literature.

Data management and analysis

Data obtained was managed by statistical software (SPSS version 20). Continuous variables were summarized by using mean and standard deviation. Categorical variables were summarized by using frequency tables and comparisons were done by using Fisher's exact test. The level of significance was set at 0.05, whereby a variable with a P-value of equal or less than 0.05 was considered to be statistically significant.

RESULTS

A total of 53 middle-aged patients with meniscal tear who were treated by arthroscopic partial meniscectomy at Muhimbili Orthopaedic Institute from May 2020 to December 2020 met the inclusion and exclusion criteria were followed for a minimum of 12 weeks. Three patients were lost to follow up and only 50 patients were analyzed on the 12th week. The age ranged from 40 to 64 years with a mean age of 49.2 and a standard deviation of 6.05 years.

Table 1
Baseline social demographic characteristics

Variable	Frequency	(%)
Gender		
Male	16	32
Female	34	68
BMI group		
Normal	12	24
Overweight	16	32
Obese	22	44
Type of meniscus tear		
Traumatic	7	14
Degenerative	43	86

Around two-thirds (68%) of the patients were female, with a male to female ratio of 1:2. Three quarter of the patients (76%) were overweight or

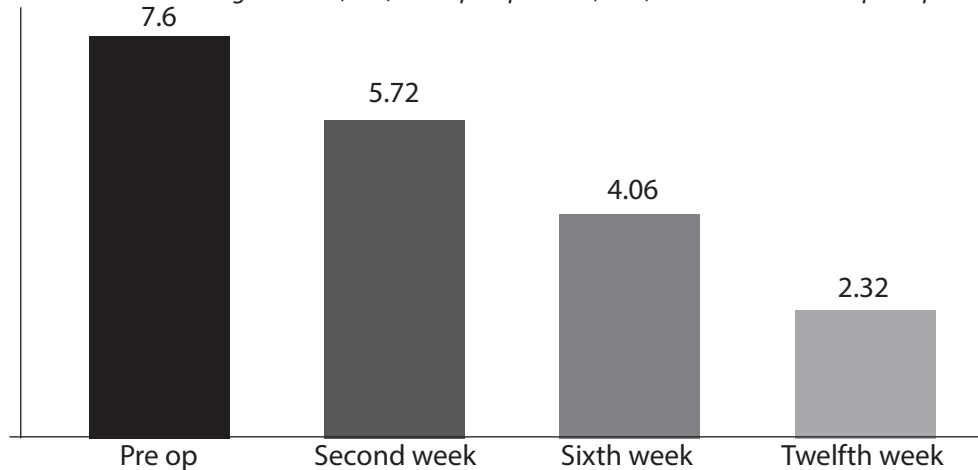
obese as shown in Table 1 above. The majority (43) of the patients had a degenerative meniscal tear.

Table 2
Distribution of Body Mass Index (BMI) groups and types of meniscal tear by patient sex

Variable	Male	Female	N
BMI Groups	N (%)	N (%)	
Normal	5 (41.67)	7 (58.33)	12
Overweight	9 (56.25)	7 (43.75)	16
Obese	2 (9.09)	20 (90.91)	22
Types of meniscal tear			
Traumatic	6 (85.71)	1 (14.29)	7
Degenerative	10 (23.26)	33 (76.74)	43

Figure 1

The mean Visual Analogue Scale (VAS) score preoperative, 2nd, 6th and 12th week postoperative

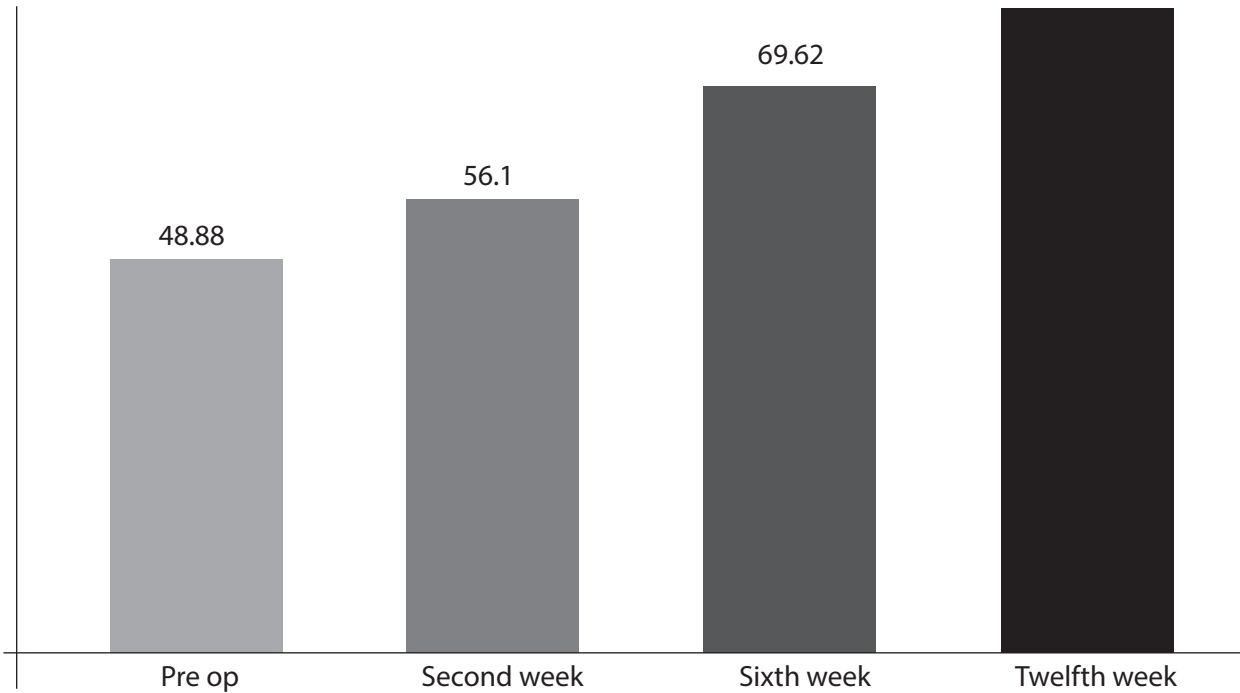


Only 7 out of the 34 female patients had normal BMI as compared to 5 of 16 males. Traumatic tear was more common in males whilst degenerative was found in almost all females.

The mean VAS score significantly decreased from preoperative (7.26 ± 1.17) to (2.32 ± 1.34) 12th week postoperatively, and this was statistically significant (P -value < 0.001).

Figure 2

The mean Lysholm Knee Score preoperative, 2nd week, 6th week and 12th- week postoperative follow-up



The mean Lysholm knee scoring scale increased from 48.88 ± 11.08 (preoperative) to 80.04 ± 11.63 as 12 weeks postoperative, and this was shown to be statistically significant as well (P -value < 0.001).

More than half of the patients (62%) were graded as Excellent to Good Lysholm knee functional outcome score.

Figure 3

Lysholm knee functional outcome grades at 12th week postoperative (%)

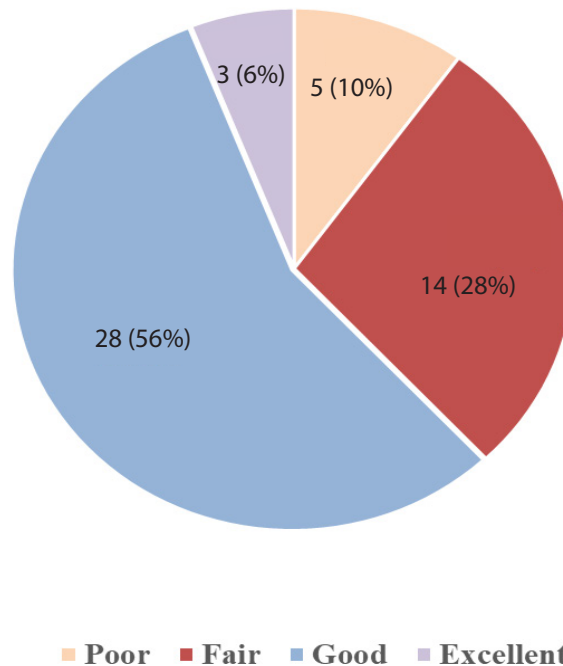


Table 3

Relationship between sex, Body Mass Index (BMI) and types of meniscal tear on the knee functional outcome (Lysholm score) at 12th week postoperative

Variable	Lysholm knee score at 12 th week post-operative				P-value
	Poor N (%)	Fair N (%)	Good N (%)	Excellent N (%)	
Sex					
Male	1 (6.25)	1 (6.25)	11 (68.75)	3 (18.75)	0.008*
Female	4 (11.76)	13 (38.24)	17 (50.00)	0 (0.00)	
BMI group					
Normal	1 (8.33)	3 (25.00)	6 (50.00)	2 (16.67)	0.372*
Overweight and obese	4 (10.53)	11 (28.95)	22 (57.89)	1 (2.63)	
Types of meniscal tear					
Traumatic	0 (0.00)	1 (14.29)	4 (57.14)	2 (28.57)	0.084*
Degenerative	5 (11.63)	13 (30.23)	24 (55.81)	1 (2.33)	

*= fisher exact test p-value

Majority of the males had good to excellent functional knee score at 12 weeks post operatively and this was shown to be statistically significant as compared to females (P=0.008). Although more patients who had poor to fair results were overweight or obese this was not shown to be statistically significant. The type of tear also did not show any significant difference in functional knee scores.

DISCUSSION

Approximately two thirds of the patients (68%) in this study were female. The female predominance was also seen by Sofu *et al.* (13) who had a male to female ratio of 1:5. On the other hand some studies (17,20,21) showed male preponderance. The observed difference can be explained that generally males tend to have more high-level contact injury which results in mixed injuries including ligaments which were excluded from the study.

The majority of the patients 38 (76%) had BMI score >25 (obesity and overweight). These results were similar to the study done by Meredith *et al.* (11) and Fabricant *et al.* (19). Also 43 (86%) of patients in this study had degenerative meniscal tear while 7 (14%) of patients had a traumatic type, which is contrary to what was found by Matsusue *et al.* (20) and Ghislain *et al.* (23) with 1:1 of patients had a traumatic tear and a degenerative tear.

In this study, there was a significant decrease in the level of knee pain at 12th week postoperative (VAS score 2.32±1.34) compared with preoperative pain score (VAS score 7.26 ± 1.17) with a P<0.05, showing patient improvement. This result was similar to what is found by Sofu *et al.* (13) and El-g hazaly *et al.* (14). The observed results show that this procedure reduces pain of these patients.

Regarding functional outcome, in this study the average LKSS increased from 48.88 ± 11.08 to 80.04 ± 11.63 12th week postoperative, which was statistically significant (P<0.001). These findings were similar to what was obtained by Liu *et al.* (16), with the average LKSS of 63.95±5.45 before surgery to 87.84±5.16 post partial meniscectomy. The patients who undergo the procedure also tend to have better function at 12 weeks post operatively which shows the efficacy of this procedure.

Functional outcome grade in this study showed more than half of the patients 31 (62%) were observed as an excellent to good Lysholm knee functional outcome score, 14 (28%) were fair and only 5 (10%) patients had poor Lysholm knee functional score. This result is similar to what was obtained by Ferkel *et al.* (17), which found 58% excellent to good, 28% fair, and 14% poor. Also a study conducted by Gauffin *et al.* (18) had similar results. On the flip side, Meredith *et al.* (11), showed that partial meniscectomy in middle-aged patients had no benefit with the majority of the patients scoring unsatisfactory results. The observed

difference with unsatisfactory results might be due to worse preoperative functional status, higher BMI, female gender and presence of pre-existing osteoarthritis (11).

In this study, males showed to have significant improvement in functional outcomes with the majority (87%) having excellent to good results in contrast to women ($P < 0.005$). This result was also shown by other authors (11,19). Other studies done (17,20,21) showed that there was no statistically significant difference between men and women on the functional outcome postoperative with $P > 0.005$, although men tended to have a better functional outcome and women correlated with inferior postoperative function and longer rehabilitation time. This can be explained by the increased muscle mass of males which give better relief of pain and increased function.

There was no significant difference between the body mass index and functional outcome post-operative ($P=0.372$) although there was improvement in functional outcome of patients from all sub-groups of body mass index. This result is similar to other studies done by other authors (11,19,22).

Also, there was no significant difference between types of meniscal tear and functional outcome post-operatively ($P=0.084$). These results concurred with what was obtained by Matsusue *et al.* (20) and Ghislain *et al.* (23). However, Salata *et al.* (24) revealed that there was a statistical significant difference in the functional outcome with traumatic meniscal tear as they tend to have better functional outcomes than degenerative meniscal tear. The obtained difference may be because most surgeries were performed in middle-aged patients, who typically have degenerative meniscal tears considered to have pre-existing knee osteoarthritis and the traumatic tear had a good potential for healing (24).

STUDY LIMITATION

The follow-up time was limited to twelve weeks, which was not adequate to fully assess the treatment outcome. The study was done at one center, so the findings from this study cannot be generalized.

CONCLUSION

Meniscal tear in middle-aged patients affects women more than men and they tend to get a degenerative tear rather than a traumatic one. The majority of the patients have less knee pain

12 weeks after arthroscopic partial meniscectomy. More than half of the patients showed to have improved short term functional outcomes after arthroscopic partial meniscectomy at 12 weeks. Males had better postoperative functional outcome, however the body mass index and type of meniscal tear showed no significant effect in the outcome.

RECOMMENDATIONS

Arthroscopic partial meniscectomy is an evolving procedure in our environment, as this study showed a majority of the patients had excellent to good result after surgery, so this procedure can be done in middle-aged patients with a meniscal tear. The long-term outcome results need to be defined with a large prospective study.

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