

**SHORT-TERM FUNCTIONAL OUTCOME AFTER ARTHROSCOPIC  
PARTIAL MENISCECTOMY IN MIDDLE-AGED PATIENTS WITH  
MENISCAL TEAR TREATED AT MUHIMBILI ORTHOPAEDIC  
INSTITUTE**

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**Short-Term Functional Outcome after Arthroscopic Partial Meniscectomy in Middle-Aged Patients with Meniscal Tear Treated at Muhimbili Orthopaedic Institute**

**By**

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**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Master of Medicine in Orthopaedic and Traumatology of the Muhimbili University of Health and Allied Sciences**

**October, 2021**

## **CERTIFICATION**

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: “**Short-term functional outcome after arthroscopic partial meniscectomy in middle-aged patients with meniscal tear treated at Muhimbili Orthopaedic Institute**’’, in (partial) fulfilment of the requirements for the Degree of Master of Medicine in Orthopaedic and Traumatology of Muhimbili University of Health and Allied Sciences.

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**DECLARATION AND COPYRIGHT**

I, **Adam Bakari Hussein**, declare that this **dissertation** is my original work and that it has not been presented, and will not be presented, to any other university for a similar or any other degree award.

**Signature**.....

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**DEDICATION**

I would like to dedicate this dissertation to my beloved Family: my wife Zainab I Mteza and my sons Aaryan A. Hussein and Azmeer A. Hussein.

## ABSTRACT

**Background:** Arthroscopic partial meniscectomy for middle-aged patients with meniscal tear is an effective procedure in relieving knee pain and improving functional outcome, however, the functional outcome has been shown to depend on gender, BMI and type of meniscal tear. The data of this study provides baseline information on the short term functional outcome after APM on middle-aged patients at MOI.

**Objective:** The objective of the current study was to assess the short term functional outcome among middle-aged patients with meniscal tear after arthroscopic partial meniscectomy treated at MOI from May 2020 to December 2020.

**Methodology:** A hospital-based descriptive cross-sectional study was conducted at Muhimbili Orthopaedic Institute from May 2020 to April 2021. 53 patients who met the inclusion and exclusion criteria were enrolled on the study and data was collected using a structured standard questionnaire. VAS score was used to assess pain and Lysholm Knee Functional Score was used to assess the functional outcome of the patients three months after APM.

The data collected were analyzed using SPSS version 20 computer software. Categorical variables were summarized by using frequency tables in percentage and comparisons were done by using Fisher's exact test. Numerical variables were summarized by using means and standard deviation. Ethical clearance was obtained from the Institutional Review Board, the Muhimbili University of Health and Allied Sciences (IRB-MUHAS) and permission to carry out the study was sought from the MOI administration.

**Results;** A total of 53 middle-aged patients with meniscal tear were enrolled in the study from May 2020 to December 2020 and 3 patients were lost to follow-up, only 50 patients were analysed at 12th-week post APM. Among 50 patients 16 (32%) were male and 34(68%) were female with a male to female ratio of 1:2, Majority of the patients were obese 22(44%) followed by overweight 16(32%) and normal weight 12(24%) and also the majority of the patients had degenerative meniscal tear 43 (86%) while 7 (14%) had a traumatic tear. There was a significant improvement in terms of pain between preoperative (VAS Score  $7.26 \pm 1.17$ )

and 12<sup>th</sup> week postoperative (VAS score  $2.32 \pm 1.34$ ) with P value  $< 0.001$  and also there was a significant improvement in functional outcome between preoperative (Lysholm knee scoring scale  $48.88 \pm 11.08$ ) and 12<sup>th</sup> week postoperative ( $80.04 \pm 11.63$ ) with P value  $< 0.001$ . The functional outcome score at 12<sup>th</sup> week was graded as 31 (62%) observed as excellent to good, 14 (28%) fair and 5 (10%) poor Lysholm knee functional score. Male had significantly improved better than female in terms of functional outcome (P value = 0.008), but BMI groups (P value = 0.205) and types of meniscal tear (P value = 0.084) had no significant difference in terms of functional outcome at 12<sup>th</sup> week postoperative.

**Conclusion;** Meniscal tear in middle-aged patients affects women more than men. The degenerative meniscal tear was the most common aetiology of meniscal tear in middle-aged patients than a traumatic meniscal tear. Arthroscopic partial meniscectomy showed to have improved knee pain and functional outcome in the short term postoperative period. Male showed to have better improvement in terms of postoperative functional outcome than females while BMI groups and types of meniscal tear had no significant difference in postoperative functional outcome.

**Recommendations;** Arthroscopic partial meniscectomy is an evolving procedure in our environment, so this procedure can be done in middle-aged patients with meniscal tears due to excellent to good results in the majority of patients as shown in this study. Long term outcome study or a comparative study with other treatment modalities is needed to know the long term effectiveness of APM in middle-aged patients with a meniscal tear.



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**ABBREVIATIONS****Acronym Definition of Abbreviations**

ACL	Anterior Cruciate Ligament
APM	Arthroscopic Partial Meniscectomy
BMI	Body Mass Index
IRB	Institutional Review Board
LFKSS	Lysholm Function Knee Score
MMED	Master of Medicine
MRI	Magnetic Resonance Imaging
MOI	Muhimbili Orthopedic Institute
MTC	Motor Traffic Crash
MUHAS	Muhimbili University of Health and Allied Sciences
PCL	Posterior Cruciate Ligament
PLC	Posterolateral Corner
ROM	Range of Motion
SPSS	Statistical Package for Social Science
TKR	Total Knee Replacement
UK	United Kingdom
VAS	Visual Analogue Scale

## **OPERATIONAL DEFINITIONS AND KEY CONCEPTS**

**Functional outcome:** Is measured from the recovery of pain, early return to regular activities, knee stability and range of knee motion following surgery.

**Short term outcome:** Twelve weeks period of follow up of treatment functional outcome

**Middle-aged:** Is defined by WHO as age group ranging from 40 years up to 65 years

**Elderly:** Is defined by WHO as age group above 65 years

**Arthroscopy:** This is an examination of the interior of a joint using an endoscope that is inserted into the joint through a small incision

## CHAPTER ONE

### 1. INTRODUCTION

#### 1.1 Background

Meniscal tear is the most common injury of the knee, with an annual incidence of up to 172 injuries per 100,000 persons in Sweden (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 diagnosis and 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 advantages of arthroscopic meniscectomy surgery over traditional open surgery, include less trauma to the patient, less postoperative pain, less blood loss and recovery of the patient is faster(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. Also, the loose fragments may be the cause of knee pain. (7) The treatment outcome after arthroscopic partial meniscectomy many patients report improvement referring to 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, subgroups of patients in these age groups may benefit from arthroscopic partial meniscectomy and this helps to improve knee pain and function, also

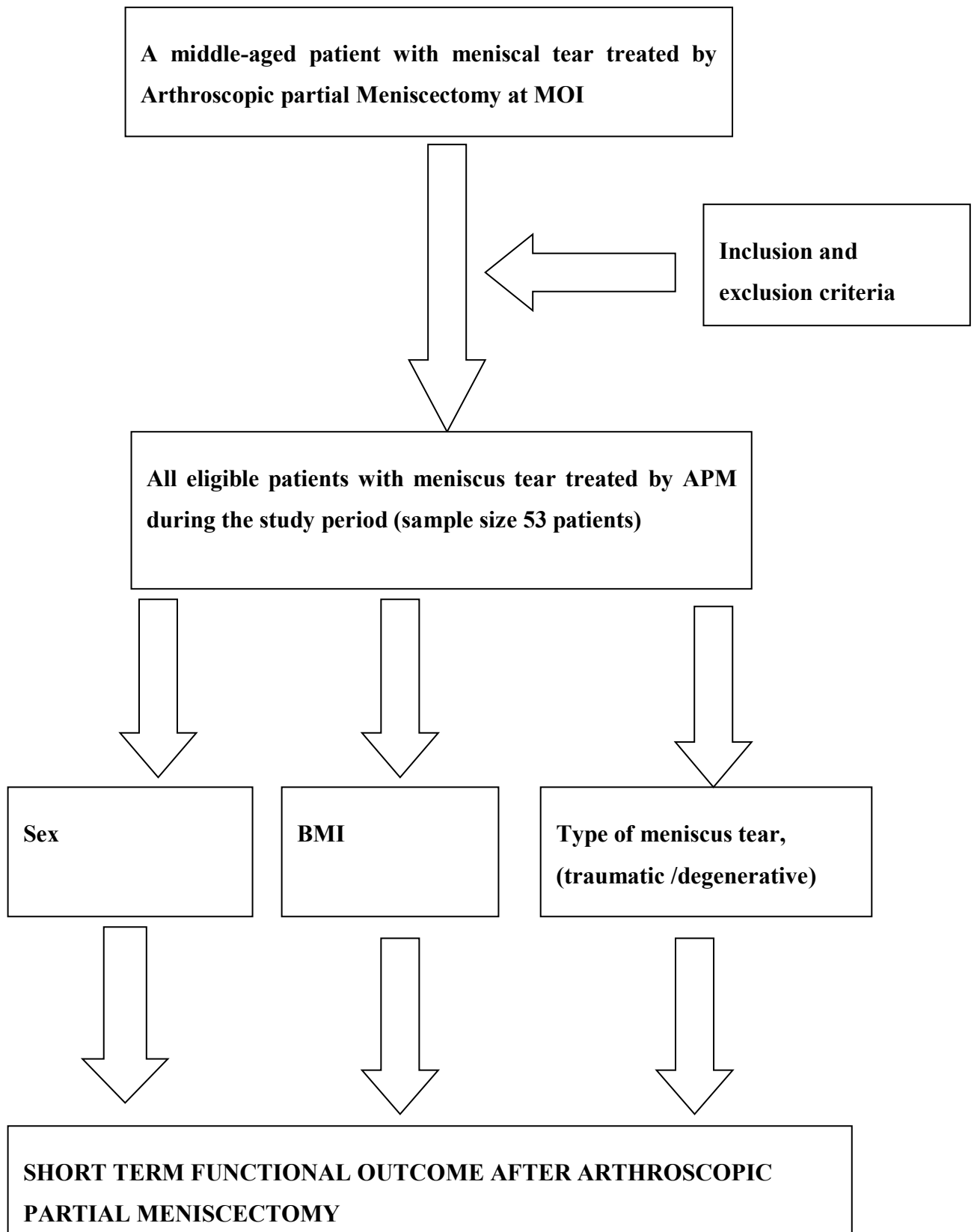
preserve native knee and avoid total knee replacement (TKR) as a primary option.(9). Meniscus tears in some selected cases in middle-aged patients will benefit from non-operative management, so it is, therefore, important to evaluate the effectiveness of APM.(10) Factors such as age, sex, body mass index and type of meniscal tears have been documented to influence the postoperative outcome following arthroscopic partial meniscectomy(11). Factors such as the presence of osteoarthritis (OA), degenerative type tear, older age, female gender, higher body mass index (BMI), worse preoperative functional status score are associated with inferior outcomes after APM. Although other studies have shown no association between the above factors and the outcome after arthroscopic partial meniscectomy in middle-aged patients.(11)



## 1.2 PROBLEM STATEMENTS

Arthroscopic Partial Meniscectomy is among the most frequently performed procedure in orthopaedic surgery nowadays and is the standard treatment for meniscal tear in middle-aged patients. A study done by Meredith et al in North America 2005 showed that APM in middle-aged patients had no benefits on the meniscal tear symptoms and functional outcome than before surgery (11). The other study done by Gauffin et al in Sweden 2014 showed that APM provided benefits (good to excellent short term functional outcome) to middle-aged patients with meniscal tear after surgery with a large reduction of pain from baseline to three months and one year(12). From the above studies despite the APM being used as a standard procedure in our setup, there is a divided opinion on the outcome after APM in middle-aged patients. In a pilot study done at MOI theatre registry from January 2019 to June 2019 an average of 8-10 middle-aged patients with meniscal tear underwent APM per month. However, the short term outcome of these patients after APM has not been evaluated at MOI and Tanzania as a whole. No published study has been done in our institute to assess the short term functional outcome after Arthroscopic Partial Meniscectomy in middle-aged patients with a meniscal tear, so we have a paucity of data in our environment.

### 1.3 CONCEPTUAL FRAMEWORK



#### **1.4 RATIONALE OF THE STUDY**

At MOI and Tanzania as a whole, no published research has been done in the past to look into the short term functional outcome of Arthroscopic Partial Meniscectomy in middle-aged patients with meniscus tears. Currently at MOI APM is used as a treatment of choice in middle-aged patients with a meniscal tear. So, this study aimed to fill the knowledge gap related to the short term functional outcome and get the baseline information on the short term functional outcome after Arthroscopic Partial Meniscectomy to whether this treatment has a benefit or not to these age group patients comparing pre and postoperative period. Also, the results of this study will be used as a baseline for further studies and improving the quality of care of patients.

#### **1.5 RESEARCH QUESTIONS**

- Does knee joint pain improve following arthroscopic partial meniscectomy in middle-aged patients with a meniscus tear?
- Do middle-aged patients with meniscus tears experience short term benefits from undergoing arthroscopic partial meniscectomy at MOI?
- What are factors affecting early functional outcome after arthroscopic partial meniscectomy among middle-aged patients with a meniscus tear?

## **1.6 OBJECTIVES**

### **1.6.1 BROAD OBJECTIVE**

To assess short term functional outcomes in middle-aged patients with meniscal tear after arthroscopic partial meniscectomy treated at MOI from May 2020 to April 2021.

### **1.6.2 SPECIFIC OBJECTIVES**

- I. To determine socio-demographic features among patients with meniscus tear treated by arthroscopic partial meniscectomy at MOI from May 2020 to April 2021
- II. To assess the level of knee pain by using VAS Score pre and post-surgery among patients with meniscus tear treated by arthroscopic partial meniscectomy at MOI from May 2020 to April 2021
- III. To assess short term functional outcome pre and post-surgery by using Lysholm knee scoring scale among middle-aged patients with meniscus tear treated by arthroscopic partial meniscectomy at MOI from May 2020 to April 2021
- IV. To determine factors that are associated with early functional outcomes among middle-aged patients with meniscus tear treated by arthroscopic partial meniscectomy at MOI from May 2020 to April 2021

## 1.7 LITERATURE REVIEWS

### **Social Demographic features of patients with meniscal injury:**

Meniscus injuries had a bimodal distribution in their occurrence, which occurs in younger and in elderly patients, whereby young patients mostly present with traumatic meniscal tear while in elderly patients they present with a degenerative meniscal tear. A retrospective analysis reported from 65 patients older than 40 years who underwent an arthroscopic partial meniscectomy, was carried out with a male to female ratio of 3:1 and mean age of 49.7 years (range, 40 to 74) (13). In a study done on 150 patients, arthroscopic partial meniscectomies were analysed in which 110 men and 40 women (4:1) were involved, with an average age of 48 years (14). Also reported that men had better results than the women, with 62% of the men and 48% of the women having excellent to good results ( $p < 0.1$ ), but the difference was not significant (14). A retrospective study was done to evaluate patients more than 60 years of age (109 females and 19 males with a median age of 63) who underwent arthroscopic partial meniscectomy (15). Fabricant et al in his study reported that female gender and preoperative osteoarthritis are associated with the worse short-term outcome from arthroscopic partial meniscectomy whereas age, obesity, and amount of meniscal tear/resection showed no association with rate of recovery throughout the first year postoperatively (16). A review paper has been done to assess factors affecting the functional outcome after Arthroscopic partial meniscectomy was found that, there is an association between age greater than 40 years and poor Lysholm functional score. Also found that sex and BMI had no significant difference in the functional outcome. (11)

### **Knee Pain pre and post-Arthroscopic partial meniscectomy:**

The use of APM for middle-aged patients with knee pain due to meniscal tears is one of the common procedures performed. Removal of the loose meniscal fragments within the joint is an important step in achieving relief of knee pain after APM. (17) A study was done to evaluate 20 patients who underwent Arthroscopic Partial Meniscectomy due to meniscal tears, the mean VAS score before APM was  $7.4 \pm 1.1$  improved significantly to  $1.9 \pm 0.93$  after surgery (gradual improvement in pain, swelling and knee range of motion) (17). In another study done to evaluate 154 knee on patients with more than 60 years, the mean VAS score improved from  $5.6 \pm 1.4$  points preoperatively to  $2.3 \pm 1.5$  points at the follow up (15). A

retrospective study evaluated 100 knees with a meniscal tear; there was a significant improvement in pain after APM by using VAS score compared to preoperative values. 85 knee (85%) were free of pain and they went back to their daily activities while 15 knees (15%) had persistent pain in their daily activities (18) knees (15%) had persistent pain in their daily activities (18). On the other hand, several studies conducted in evaluating the efficacy of Arthroscopic partial meniscectomy in middle-aged patients with a meniscal tear showed that there was no decrease in pain after surgery due to the pre-existing joint osteoarthritis.(10)(19)(20)

### **Functional outcome after arthroscopic partial meniscectomy**

For decades arthroscopic partial meniscectomy has been administered to middle-aged patients with symptomatic traumatic or degenerative meniscus tear after a failed attempt at conservative treatment. Arthroscopic partial meniscectomy has been suggested as the gold standard for patients with a meniscal tear. There is a vast amount of evidence on the good outcomes of arthroscopic treatment for middle-aged patients with a meniscal tear, however, an increasing controversy regarding the efficacy of arthroscopic partial meniscectomy has emerged nowadays.(9)

In a study done to evaluate the functional outcome in middle-aged patients with menisci injury, the average Lysholm score was  $63.95 \pm 5.45$  before surgery, the results post arthroscopic partial meniscectomy was average Lysholm score of  $87.84 \pm 5.16$  and therefore there is a statistically significant difference between a preoperative score and postoperative outcome score. The operative indication is crucial and the excellent surgical technique is also critical for a good clinical outcome. (21)

A retrospective study conducted on 68 patients over forty years of age who had undergone partial meniscectomy, 17 were women and 51 men, out of these 42 men (82%) had excellent to good results and 15 women (88%) had excellent to good results (P value=0.829) with no statistically significant difference on knee Lysholm outcome score between men and women after APM. Out of 68 patients who underwent APM 35 patients had traumatic tears while 33 patients had a degenerative tear, the Lysholm Knee outcome score after APM for traumatic tear was 88% excellent to good while for degenerative tear was 79% excellent to good

results, so there was no statistically significant difference between the two groups, while traumatic tear tended to have better results than a degenerative tear.(13).

A study conducted to assess the knee functional outcome after APM using the Lysholm Knee Scoring Scale reported results on patients older than 40 years, who underwent APM were 58% excellent to good, 28% fair and 14% poor (14). This buttressed the fact that arthroscopic partial meniscectomy has a role in the management of meniscal tears in a middle-aged patient in the short term period.

Hamberg et al in their study to assess the functional outcome of arthroscopic meniscectomy, 28 middle-aged patients (mean age 48 years) were studied. In all 28 patients, there was a significant improvement in Lysholm score at follow-up (preoperative 62 to postoperative 88) (P value< 0.001). (22)

A study to assess gender effect on the outcome of partial meniscectomy, compared groups of 86 men and 49 women who were followed prospectively using the Lysholm Knee Scoring Scale, improved from 69 preoperatively to 82.1 postoperatively (P<0.001) in the male group and from 64.2 preoperatively to 73.5 postoperatively (P value=0.04) in the female group. This study showed no significant difference between men and women in terms of clinical improvement following arthroscopic partial meniscectomy, however, female gender was correlated to worse postoperative function and longer rehabilitation time (23).

A reported study on 68 patients aged over 40, all of whom were shown arthroscopically to have meniscal tears and who were felt to be suitable candidates for meniscectomy. Many of these patients had typical traumatic meniscal tears, 95 per cent of them had good to excellent results an average of two years later. In those with degenerative tears produced 80 per cent of good to excellent results over the same period (24).

A study was done on 86 middle-aged patients who had arthroscopic partial meniscectomy were divided into a study group of 43 patients with the traumatic group and a control group of 43 degenerative groups, matched by age, sex and body mass index. The postoperative clinical finding scores were compared between the two groups. There were no statistical differences in surgical outcomes of the two groups. The median Lysholm score improved from  $65.9 \pm 17.4$  to  $77.4 \pm 21.2$  points (P < 0.001) in the traumatic group and from  $65.3 \pm 17$

to  $82.4 \pm 17.7$  in the degenerative group ( $P < 0.0001$ ). Therefore arthroscopic partial meniscectomy in the middle-aged group improved pain and function outcome regardless of the type of meniscal tear (25).

A follow-up study on 117 patients, reported there were 60(51.28%) patients in the traumatic meniscal tear and 57(48.71%) in the degenerative meniscal tear. The mean value of Lysholm scores at one year were respectively  $85.25 \pm 8.78$  for the traumatic group and  $86.38 \pm 12.14$  for the degenerative group. Therefore there were no significant differences between the groups at one year follow up ( $P$ -value = 0.7726). (26)

A systematic review was conducted in 2010 on the clinical outcome in patients undergoing arthroscopic partial meniscectomy. One of their findings was that degenerative meniscal tears were statistically significantly associated with a poor postoperative outcome compared to traumatic meniscal tears (27). This is a very relevant finding, as most APMs are performed in middle-aged patients, who typically have degenerative meniscal tears.(27)

A study conducted to evaluate the impact of BMI on early functional outcome after APM found that, in a group of patients with normal BMI, the immediate pre-operative and one year control Lysholm scores were  $54.8 \pm 310.07$  and  $91.42 \pm 4.34$ , respectively ( $p < 0.001$ ). Inpatient with overweight BMI the mean scale increased from  $54.83 \pm 8.39$  to  $87.39 \pm 4.10$  ( $p < 0.001$ ). Inpatient with obesity, the mean Lysholm score increased from  $47.95 \pm 6.64$  to  $86.88 \pm 3.26$  ( $p < 0.001$ ). There was a statistically significant difference in improvement rates among these three groups (28). This means that post-operative outcomes improved significantly regardless of the BMI among those three groups. BMI did not affect postoperative outcome score. However, according to this study, patients with higher BMI ( $BMI > 26$ ) had inferior short-term treatment outcomes compared with those with normal BMI.(28)



## **CHAPTER TWO**

### **2 METHODOLOGY OF THE STUDY**

#### **2.1 Study design;**

This is a hospital-based descriptive cross-sectional study

#### **2.2 Study duration**

The study was conducted from May 2020 to April 2021

#### **2.3 Study area**

The study was conducted at Muhimbili Orthopaedic Institute (MOI), which provides tertiary services in orthopaedics, traumatology and neurosurgery. It is located within the Muhimbili complex in Dar es Salaam, Tanzania. It attends most of the patients referred from Dar es Salaam city and other regions and nearby Countries. It is the training centre for students from MUHAS. MOI has a bed capacity of 360. In the department of Orthopaedic and Traumatology, there are three firms (A and B), and Paediatric Orthopaedic firm that carry out clinical activities. Knee arthroscopic surgeries are done in firm A and firm B whereby four orthopaedic surgeons are operating on knee arthroscopic surgeries (two surgeons in each firm) at MOI. There are days in the operating theatre that were dedicated for arthroscopic surgeries, whereby one operating table was given to a specific firm to operate those patients listed for surgery. Patients are diagnosed from the outpatient department (OPD) clinics and emergency department then admitted to the wards for surgery. Enrolment of the patients to the study was done when the patient are admitted and listed for surgery.

#### **2.4 Study population**

All middle-aged patients with meniscal tears admitted during the study period and treated with arthroscopic partial meniscectomy at MOI.

##### **2.4.1 Inclusion criteria**

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

### 2.4.2 Exclusion criteria

- Previous surgery on the affected knee
- Fracture of the proximal tibia or distal femur in the previous year
- An ipsilateral ligamentous injury such as ACL, PCL and PLC tear
- Infective conditions in or around the knee joint
- Patients who were scheduled for surgery and not operated
- Patients who were refused to consent for the study.

### 2.5 Sampling procedures

The study employed a convenience sampling technique whereby all eligible patients with meniscal tear admitted at MOI were included.

### 2.6 Sample size estimation

The sample size was calculated by using the average occurrence through MOI medical records.

A pilot study was done for patients treated for knee arthroscopic surgery in the past period from January 2019 to June 2019 revealed the p-value of 3.2%

The minimum sample size of this study was calculated using Kish and Lisle formula (1965)

$$n = \frac{Z^2 p(1 - p)}{e^2}$$

- n = Minimum sample size
- Z = point on normal standard distribution (1.96)
- e = Margin of tolerable error 5%
- p = 3.2% (from the pilot study done at MOI)

Therefore;  $n = \frac{1.96^2 \times 0.032(1 - 0.032)}{(0.05)^2} = 48$

$$(0.05)^2$$

A minimum number of sample size (n) was 48 plus 10% loss to follow up sum up to 53 patients

## **2.7 Recruitment of the participants**

### **2.7.1 Preoperative**

All eligible patients diagnosed to have a meniscal tear from the outpatient department (OPD) then admitted and listed for Arthroscopic Partial meniscectomy from May 2020 to December 2020 were evaluated on the day of admission. The researcher provided information about the study to participants and obtained written consent from those willing to participate. The researcher interviewed the participants using a pretested structured questionnaire. Social demographic data (i.e age and sex) was collected and recorded in a questionnaire. The patient history on the aetiology of meniscal tear was obtained, physical examinations of the knee were done and an MRI of the knee was assessed to confirm the diagnosis of a meniscus tear. This MRI was reviewed by the researcher with the assistance of a radiologist at MOI. Body mass index (BMI) was calculated by taking the body weight (kg) of the patient divided by height (meter squared). Body mass index was considered normal at  $<26 \text{ kg/m}^2$ , overweight at  $26\text{-}30 \text{ kg/m}^2$  and obese if  $>30 \text{ kg/m}^2$  values, according to the US national institute of health. The level of knee pain was assessed by using the Visual analogue scale. The 10-point Visual Analogue Scale (VAS) was used to measure the amount of possible knee pain before surgery and then after surgery during follow up visits. Pain rating at zero means no pain, while 10 means maximal pain. Lysholm knee scoring scale was used to assess the patients preoperatively to know their functional knee status. Lysholm score and VAS score were assessed before surgery and then assessed for the outcome three months after APM.

### **2.7.2 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 MOI theatre protocol. After giving anaesthesia, the tourniquet was applied on the thigh with a pressure of 250 mm of Hg. The affected knee was scrubbed and draped. Antero-lateral (viewing portal) and anteromedial (working portal) portals were made respectively. Initially an inflow cannular through the anterolateral portal is inserted and then an arthroscope is inserted at 30 degrees. The camera and light source was 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 is examined while the leg is kept in a figure of four positions and the integrity of the lateral meniscus is 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 kept insitu.

### **2.7.3 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 requested to attend the outpatient clinic on the 2<sup>nd</sup>, 6<sup>th</sup>, and 12<sup>th</sup> weeks postoperatively for follow up.

#### **The second week Follow up**

During this visit, the researcher assessed the surgical wound for stitch removal and if infected debridement were done and antibiotics are given. Patients were assessed for Instability, locking, swelling, pain, stair climbing, Limp, 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 as done in the 2<sup>nd</sup> week and then recorded. 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 last 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.

**2.8 Data collection process**

A pre-test for data collection tools was conducted by a researcher to find out if it provides the required information. Necessary changes were made to obtain the required information. After obtaining informed consent, data were collected by using a data collection tool which was a structured questionnaire (demographic characteristics such as age and sex, associated clinical factors such as types of meniscal tear such as traumatic or degenerative tear, Body Mass Index, Lysholm knee score and VAS Score included). 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. For those with traumatic meniscal tear they were reported preceding history of knee trauma before but those with degenerative tear have an insidious onset of symptoms with no traumatic history. BMI was calculated by dividing body weight (kg) and the height of the patient (in metre square) then recorded. BMI of <26 was regarded as normal BMI, BMI of 26-30 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. Lysholm score and VAS score were measured before surgery and then after surgical intervention and was assessed for the outcome three months after APM.

## 2.9 Validity and Reliability of Investigation Tools

Lysholm Functional Knee Scoring Scale was used in the assessment of the patient functional outcomes which is acceptable in assessing outcomes of meniscal injury of the knee. The Lysholm scale is a validated functional score designed for knee injuries. A questionnaire where each possible response to each of the 8 items such as instability (25), pain (25), locking (15), swelling (10), stair climbing (10), limp (5), support (5) and squatting (5) has been 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).(29)

The visual analogue scale was used in the assessment of the level of knee pain. Reliability - Test-retest reliability was shown to be good, but higher among literate ( $r = 0.94$ ,  $P < 0.001$ ) than illiterate patients ( $r = 0.71$ ,  $P < 0.001$ ).(30) Validity - In the absence of a gold standard for pain, the pain VAS is highly correlated with a 5-point verbal descriptive scale ("nil," "mild," "moderate," "severe," and "very severe") and a numeric rating scale (with response options from "no pain" to "unbearable pain"), with correlations ranging from 0.71– 0.78 and 0.62– 0.91, respectively).(31) Visual analogue scale also is validated as pain scale for use in Kiswahili speaking patients presenting to the Emergency Department at KCMC Tanzania. (32)

## 2.10 Data Management and Analysis

Data obtained was managed by statistical software (SPSS version 20). Continuous variables like age of the patients, level of knee pain (VAS score) and Lysholm knee functional outcome score were summarized by using mean & standard deviation. Categorical variables such as sex, BMI and type of meniscus tear (traumatic or degenerative tear) were summarized by using frequency tables and comparisons were done by using Fisher's exact test.

In specific objective number one, variables were age, sex and BMI. Age is a numerical variable that was summarized by using mean and standard deviation while sex, BMI and types of meniscal tear were categorical variables which were summarized by using a

frequency table (In percentage). In specifics objective number two and three, the variables were level of knee pain (VAS) and functional outcome (Lysholm knee score scale) respectively. These were the numerical variables that were summarized by using means and standard deviation.

In specific objective number four, factors associated with functional outcome were sex, BMI and types of a meniscal tear. Sex, BMI and type of meniscal tear were categorical variables which were summarized by frequency table in percentage 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.

### **2.11 Study variables**

The dependent variables for this study were level of knee pain and knee functional outcome score and the independent variables were sex, BMI and the type of meniscus tear (traumatic or degenerative tear).

### **2.12 Ethical Consideration**

Ethical clearance was obtained from the ethical clearance committee of MUHAS. Permission to carry out the study was obtained from MOI management. The aim of the study was explained to the participants and allowed them to ask questions about the study. The participants were informed about their autonomy to participate and confidentiality was maintained during and after the study. The procedures followed were observed the principles as described by MUHAS Research and Publication Board. These included telling the patients the right and freedom to participate or withdraw from the study at any time during the study and refusal to be enrolled in the study was not affected patient treatment quality and follow up clinic and the protection of the patient's data and privacy. All of the information given was not shared in the third part, but for research and publication purposes only. Participants were explained that information gathered was also used for future development of health follow up services and there were no risks on them by providing such information. No harm was expected to happen to the participants during this study and was benefited on the close followed-up and was assessed on the progress of their condition by the investigating doctor. The participants in our study were signed the written consent after agreeing to participate.

### CHAPTER THREE

#### 3 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 and met inclusion and exclusion criteria were followed for a minimum of 12 weeks. Three patients were lost to follow up and only 50 patients were analysed in 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	Per cent (%)
<b>Gender</b>		
Male	16	32
Female	34	68
<b>BMI group</b>		
Normal	12	24
Overweight	16	32
Obese	22	44
<b>Type of Meniscus tear</b>		
Traumatic	7	14
Degenerative	43	86

The majority of the patients were female 34 (68%) with a male to female ratio of 1:2

The majority of the patients have a high BMI of 38 (76%) as shown in table 1 above.

The majority of the patients with meniscal tear were due to degenerative meniscal tear 43 (86%).

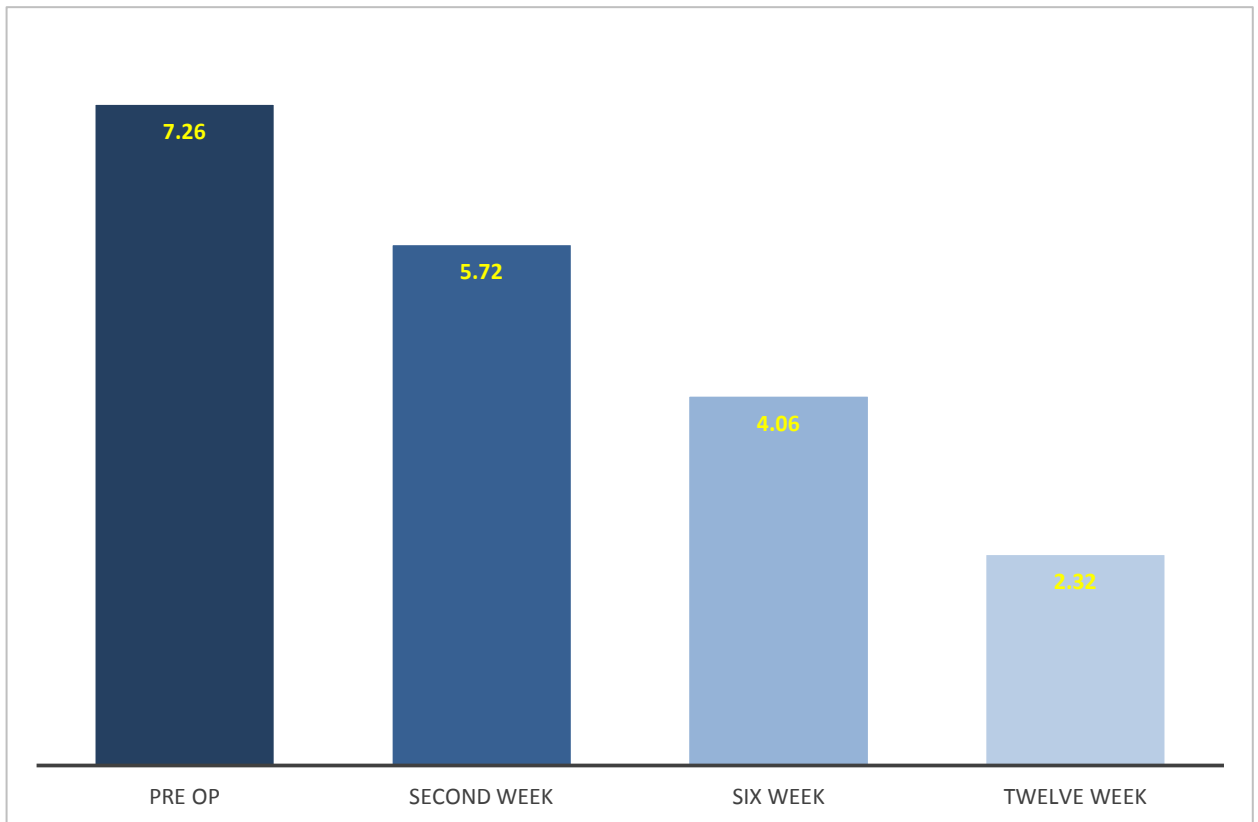


**Table 2: Distribution of BMI groups and types of meniscal tear by patient sex**

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

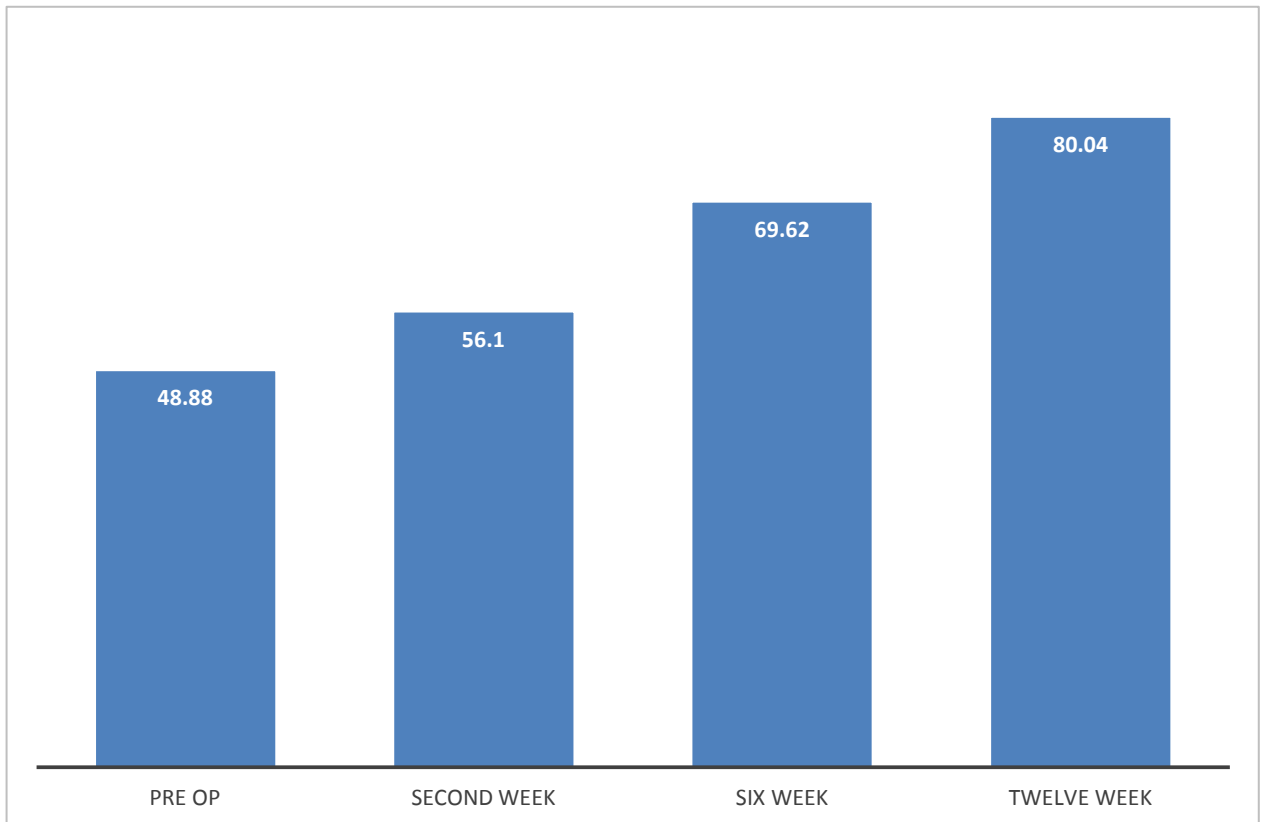
The majority of the female patients had higher BMI (overweight and obese) and degenerative meniscal tear

**Figure 1: The mean VAS score preoperative, 2nd, 6th and 12th week postoperative**



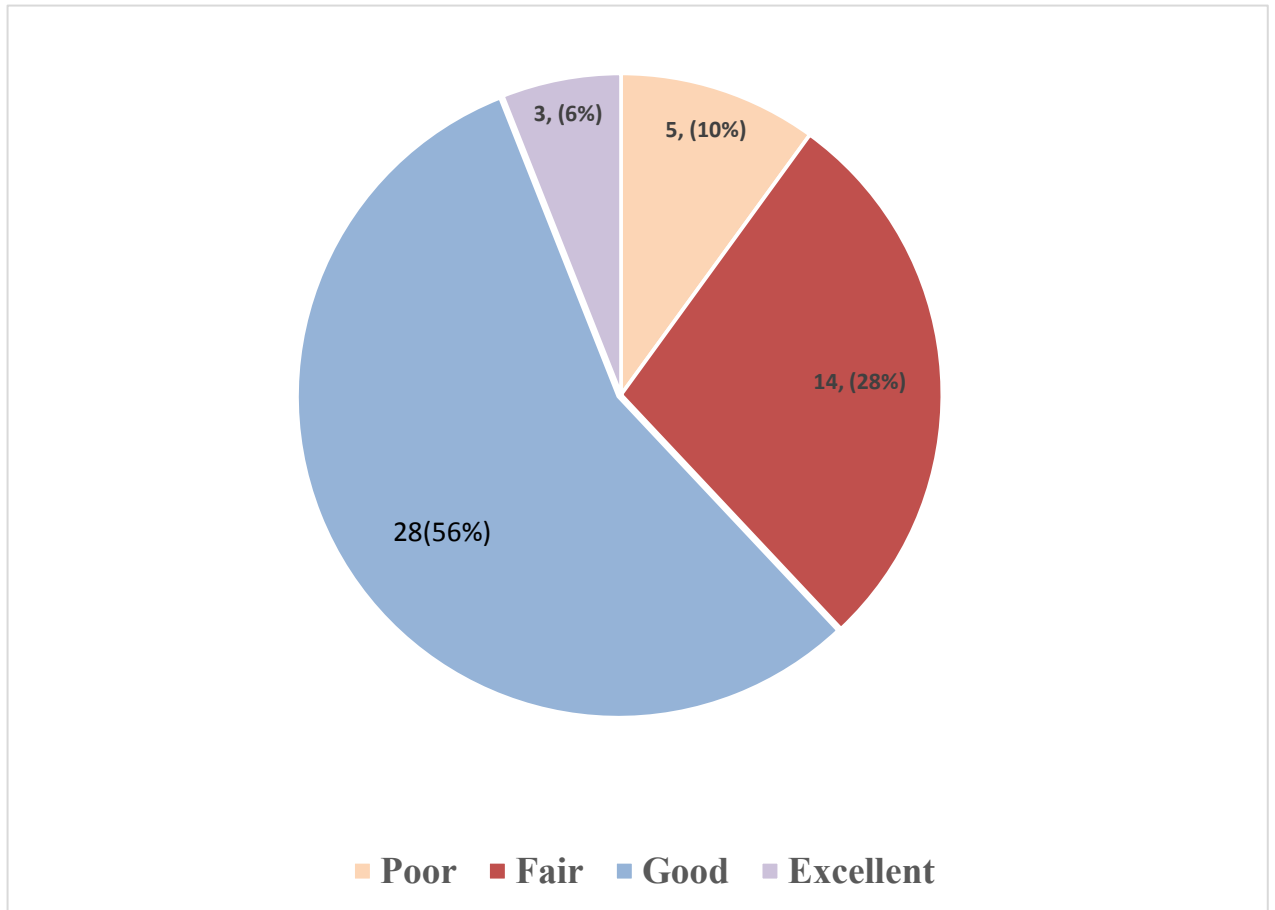
The mean VAS score was significantly decreased from preoperative ( $7.26 \pm 1.17$ ) to ( $2.32 \pm 1.34$ ) 12<sup>th</sup> week postoperatively, showing that there was a statistically significant improvement in the level of knee pain. (P-value < 0.001)

**Figure 2: The mean Lysholm Knee Score preoperative, 2<sup>nd</sup> week, 6<sup>th</sup> week and 12<sup>th</sup>-week postoperative follow-up.**



The mean Lysholm knee scoring scale was increased from preoperative ( $48.88 \pm 11.08$ ) to ( $80.04 \pm 11.63$ ) 12<sup>th</sup> week postoperative, showing that there was a statistically significant improvement in knee functional outcome. (P-value < **0.001**)

**Figure 3: Lysholm knee functional outcome grades at 12th week postoperative (%)**



The majority of the patients, 31 (62%) were graded as Excellent to Good Lysholm knee functional outcome score.

**Table 3: Relationship between sex, BMI and types of meniscal tear on the knee functional outcome (Lysholm score) at 12th week postoperative**

Variable	Lysholm knee score at 12 <sup>th</sup> week post-operative				P-value
	Poor	Fair	Good	Excellent	
	N (%)	N (%)	N (%)	N (%)	
<b>Sex</b>					
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)	
<b>BMI group</b>					
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)	
<b>Types of meniscal tear</b>					
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**

Men were improved better than women, therefore male gender had statistical significance better improvement than female in terms of knee functional outcome at 12<sup>th</sup> week postoperatively (P-value=0.008). BMI and type of meniscal tear had no statistical significance difference with knee functional outcome score at 12<sup>th</sup> weeks postoperatively, (P value=0.372 and 0.084 respectively).

## CHAPTER FOUR

### 4 DISCUSSION, STUDY LIMITATION AND MITIGATION

#### 4.1 Discussion

Meniscal tears in middle-aged patients are among the commonest knee injuries and APM is the widely used method of managing these lesions.(3) APM is a successive procedure in relieving knee pain and improving functional outcomes in middle-aged patients with a meniscal tear, however, the success rate of APM in these age groups is less predictable because of the higher prevalence of concomitant joint degeneration.(33)

The results of this study showed more than half of the patients 34(68%) were female, with a male to female ratio of 1:2. The female preponderance was similar to the findings by Sofu H et al, whose study had a male to female ratio of 1:5. These results were contrary to what was found by Metsusue et al, Ferkel et al and Haviv B et al which showed male preponderance (13)(14)(23). The observed difference might be because, the female population with the middle-aged group showed to have increased degenerative meniscal tear with higher BMI score, therefore this explains why they are affected more than men. The majority of the patients 22(44%) had obesity, 16(32%) had overweight and 12(24%) had normal weight. These results were similar to the study done by Meredith et al and Fabricant et al with the majority of the patient had obesity, and correlated higher BMI (obesity and overweight) as a predictor of poor postoperative outcome (11)(16). The majority of the patients in this study 43(86%) had degenerative meniscal tear while 7(14%) patients had a traumatic type, which is contrary to what found by Matsusue et al and Ghislain NA et al with 51% of patients had a traumatic tear and 49% of patients had a degenerative tear.(13)(26). The observed findings might be because female gender and higher BMI are risk factors for the degenerative meniscal tear (34) as shown in this study.

In the current study, there was a significant decrease in the level of knee pain at 1<sup>st</sup> week postoperative (VAS score  $2.32 \pm 1.34$ ) compared with preoperative pain score (VAS score  $7.26 \pm 1.17$ ) with a p-value  $<0.05$ , showing patient improvement in terms of decreased level of pain with time and satisfaction with the procedure. This result was similar to what is found by Sofu H et al, El-ghazaly et al and Kim et al, which found a significant decrease in the level of pain after APM by using VAS score compared to the preoperative value

(15)(17)(18). The observed results might be because removal of the mobile meniscal fragments is an important factor in achieving relief of pain after arthroscopic partial meniscectomy (17). But the results found in other studies done by Herlin et al, Sihvonen et al, Osteras et al were contrary to the current study, showing that there was no decrease in pain after arthroscopic partial meniscectomy in middle-aged patients. Failure of improvement in terms of knee pain was probably due to pre-existing osteoarthritis in some patients which made knee pain persist even after APM. (10)(19)(20)

Regarding functional outcome, in this study the average Lysholm knee scoring scale increased from preoperative ( $48.88 \pm 11.08$ ) to ( $80.04 \pm 11.63$ ) 12<sup>th</sup> week postoperative, showing that there was a statistically significant improvement in knee functional outcome ( $P < 0.001$ ). These findings were similar to what was obtained by Liu JS et al, with the average Lysholm score of  $63.95 \pm 5.45$  before surgery to  $87.84 \pm 5.16$  post arthroscopic partial meniscectomy and the difference is statistically significant on the improvement of knee function (21). Also, these results concurred with what was obtained by Hamberg et al in which there was a significant improvement in the functional outcome at follow-up (preoperative Lysholm score 62 to postoperative Lysholm score 88) with a p-value  $< 0.001$  (22). Therefore the observed results might be due to excellent surgical techniques to remove the free meniscal fragments particularly in patients with no or mild knee joint degeneration as a critical step for a good treatment outcome (21).

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, which found 58% excellent to good, 28% fair, and 14% poor (14). Also study conducted by Gauffin et al had similar results with the majority of the middle-aged patients scoring excellent to good short term functional outcomes after APM with a large reduction of pain from baseline to three months and one year (12). This result was contrary to the study done by Meredith et al, which showed that APM in middle-aged patients had no benefit with the majority of the patients scoring unsatisfactory results (fair-poor) (11). The observed difference in other studies with unsatisfactory results after APM might be due to worse preoperative functional status, higher BMI, female gender, presence of

pre-existing osteoarthritis, the greater size of meniscal resection, location of the tear in the lateral meniscus, valgus knee mal-alignment, and ligamentous instability (11). Although other factors were not investigated in this study, might have contributed to poor results in the current results.

The relationship between the sex of the patients and the early functional outcome post arthroscopic partial meniscectomy. In the current study, the male gender showed to have significant improvement in functional outcomes with the majority of the men (87%) having excellent to good results compared to women ( $p < 0.005$ ). The current results are similar to the study done by Meredith et al and Fabricant et al which showed that women had significance poor outcomes post arthroscopic partial meniscectomy (11)(16). The observed findings might be because, majority of the women in this study had higher BMI (overweight and obese) and degenerative meniscal tear, therefore showed to have inferior postoperative short term functional outcome scores. This result was contrary to what is found by Matsusue et al, Ferkel et al and Haviv B et al which showed that there was no statistically significant difference between men and women on the functional outcome postoperative with a p-value  $> 0.005$ , although men tended to have a better functional outcome and women correlated with inferior postoperative function and longer rehabilitation time. (13)(14)(23)

The Body Mass Index (BMI) in this study showed that there was no significant difference with functional outcome post-arthroscopic partial meniscectomy ( $P=0.372$ ). This result is similar to the study done by Meredith et al, Fabricant et al and Erdil et al which showed that body mass index (normal, overweight and obese) had no statistical significance difference in functional outcome postoperative (11)(16)(28). Regardless of the BMI group, there was a significant improvement in functional outcome preoperative to postoperatively.

Type of meniscal tear whether is traumatic or degenerative type in this study showed that there was no significant difference in the functional outcome after Arthroscopic Partial Meniscectomy ( $p=0.084$ ). These results concurred with what obtained by Matsusue et al, Jackson RW et al, Haviv B and Ghislain et in which there was no statistically significant difference in the functional outcome between the two groups, although traumatic tear tended to have a better outcome score than degenerative tear ( $p\text{-value} > 0.05$ ). (13)(24)(25)(26). The above results showed that arthroscopic partial meniscectomy in middle-aged patients



improved functional outcomes after surgery regardless of their type of meniscal tear. But contrary results were obtained by Salata et al which revealed that there was a statistically significant difference in the functional outcome after arthroscopic partial meniscectomy between the aetiological types of meniscal tear. According to Salata et al, the traumatic meniscal tear is shown to have better functional outcomes than degenerative meniscal tear (27). The obtained difference may be because most APMs 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.(27)

#### **4.2 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 centre, so the findings from this study cannot be generalized.
- Some patients were lost to follow up due to poor clinic attendance.
- Few associated factors were assessed in this study because of the extensive exclusion criteria of the participants and other factors need more investigations while the study had limited funds and time frame.

## CHAPTER FIVE

### 5 CONCLUSION AND RECOMMENDATIONS

#### 5.1 Conclusion

Meniscal tear in middle-aged patients affects women more than men and the degenerative meniscal tear was the most common aetiology of meniscal tear in middle-aged patients than a traumatic meniscal tear.

The majority of the patients improved knee pain after arthroscopic partial meniscectomy.

More than half of the patients were observed to have improved short term functional outcomes after arthroscopic partial meniscectomy.

Male gender improved better than female in terms of postoperative functional outcome while BMI groups and types of meniscal tear showed to have no effect in postoperative functional outcomes after arthroscopic partial meniscectomy.

#### 5.2 Recommendations

- Arthroscopic partial meniscectomy is an evolving procedure in our environment, as this study showed a majority of the patients had excellent to good results after APM 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, as in the current study, APM showed excellent to good short term outcomes in the majority of middle-aged patients with a meniscal tear.
- Also since our study had no control group for other treatment modalities, a comparative study is needed to compare the effectiveness of APM in middle-aged patients with other treatment modalities.

**REFERENCES**

1. Skou ST, Pihl K, Nissen N, Jørgensen U, Thorlund JB. Patient-reported symptoms and changes up to 1 year after meniscal surgery: An observational cohort study of 641 adult patients with a meniscal tear. *Acta Orthop*. 2018;89(3):336–44.
2. Mcdermott ID, Amis AA, Biomechanics O, Engineering M. The consequences of meniscectomy. *J Bone Jt Surg [Br]*. 2006;88(12):1549–56.
3. Azam M, Shenoy R. The Role of Arthroscopic Partial Meniscectomy in the Management of Degenerative Meniscus Tears: A Review of the Recent Literature. *Open Orthop J*. 2017;10(1):797–804.
4. Makris E a., Hadidi P, Athanasiou K a. The knee meniscus: Structure-function, pathophysiology, current repair techniques, and prospects for regeneration. *Biomaterials*. 2011;32(30):7411–31.
5. Okanu FO, Onuoha KM, Itakpe S. Evaluation of the Early Functional Outcome Following Arthroscopic Partial Meniscectomy for Meniscal Tears. *J Biosci Med*. 2020;08(12):32–42.
6. Onyema C, Oragui E, White J, Khan WS. Evidence-based practice in arthroscopic knee surgery. *J Perioper Pract*. 2011;21(4):128–34.
7. Hede a., Larsen E, Sandberg H. The long term outcome of open total and partial meniscectomy related to the quantity and site of the meniscus removed. *Int Orthop*. 1992;16(2):122–5.
8. Mezhov V, Teichtahl AJ, Strasser R, Wluka AE, Cicuttini FM. Meniscal pathology - the evidence for treatment. *Arthritis Res Ther*. 2014;16(2):206.
9. Sihvonen R, Englund M, Turkiewicz A, Järvinen TLN. Mechanical symptoms and arthroscopic partial meniscectomy in patients with degenerative meniscus tear: A secondary analysis of a randomized trial. *Ann Intern Med*. 2016;164(7):449–55.

10. Herrlin S, Hållander M, Wange P, Weidenhielm L, Werner S. Arthroscopic or conservative treatment of degenerative medial meniscal tears: A prospective randomised trial. *Knee Surgery, Sport Traumatol Arthrosc.* 2007;15(4):393–401.
11. Meredith DS, Losina E, Mahomed NN, Wright J, Katz JN. Factors predicting functional and radiographic outcomes after arthroscopic partial meniscectomy: A review of the literature. *Arthrosc - J Arthrosc Relat Surg.* 2005;21(2):211–23.
12. Gauffin H, Tagesson S, Meunier A, Magnusson H, Kvist J. Knee arthroscopic surgery is beneficial to middle-aged patients with meniscal symptoms: a prospective, randomised, single-blinded study. *J Osteoarthr Cartil.* 2014;22(11):1808–16.
13. Matsusue Y, Thomson NL. Arthroscopic partial medial meniscectomy in patients over 40 years old: A 5- to 11-year follow-up study. *Arthrosc - J Arthrosc Relat Surg.* 1996;12(1):39–44.
14. Ferkel RD, Davis JR, Friedman MJ, Fox JM, Pizzo W Del, Snyder SJ, et al. Arthroscopic partial medial meniscectomy: An analysis of unsatisfactory results. *Arthrosc - J Arthrosc Relat Surg.* 2010;26(11):1528–9.
15. Sofu H, Oner A, Camurcu Y, Gursu S, Ucpunar H, Sahin V. 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. *Arthrosc - J Arthrosc Relat Surg.* 2016;32(6):1125–32.
16. Fabricant PD, Rosenberger PH, Jokl P IJ. Predictors of Short-term Recovery Differ From Those of Long-term Outcome After Arthroscopic Partial Meniscectomy. *J Arthrosc Relat Surg.* 2008;24(7):769–78.
17. El Ghazaly S a., Rahman AAA, Yusry AH, Fathalla MM. Arthroscopic partial meniscectomy is superior to physical rehabilitation in the management of symptomatic unstable meniscal tears. *Int Orthop.* 2015;39(4):769–75.

18. Kim JG, Lee S-Y, Chay S, Lim HC, Bae J-H. Arthroscopic Meniscectomy for Medial Meniscus Horizontal Cleavage Tears in Patients under Age 45. *Knee Surg Relat Res.* 2016;28(3):225–32.
19. Sihvonen R, Paavola M, Malmivaara A, Itälä A, Joukainen A, Nurmi H, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *N Engl J Med.* 2013;369(26):2515–24.
20. Østerås H, Østerås B, Torstensen TA. Medical exercise therapy, and not arthroscopic surgery, resulted in decreased depression and anxiety in patients with degenerative meniscus injury. *J Bodyw Mov Ther.* 2012;16(4):456–63.
21. JS L, ZY L. Arthroscopic partial meniscectomy for medial meniscal tear in late middle-aged adults. *Zhongguo gu Shang China J Orthop Traumatol.* 2014;27(8):631–4.
22. Gillquist PH& J. Knee Function after Arthroscopic Meniscectomy. *Acta Orthop Scand.* 1984;55(2):172–5.
23. Haviv B, Bronak S, Kosashvili Y, Thein R. Gender Effect on the Outcome of Partial Medial Meniscectomy. *Orthopaedics.* 2015;38(10):2015.
24. Jackson RW, Rouse DW. The results of partial arthroscopic meniscectomy in patients over 40 years of age. *J Bone Jt Surg - Ser B.* 1982;64(4):481–5.
25. Haviv B, Bronak S, Kosashvili Y, Thein R. Arthroscopic meniscectomy of traumatic versus atraumatic tears in middle aged patients: is there a difference? Vol. 136, *Archives of Orthopaedic and Trauma Surgery.* Springer Berlin Heidelberg; 2016. 1297-1301.
26. 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 Diagnostic Res.* 2016;10(4):RC01–4.

27. Salata MJ, Gibbs AE, Sekiya JK. A Systematic Review of Clinical Outcomes in Patients Undergoing Meniscectomy. *Am J Sports Med.* 2010;38(9):1907–16.
28. Erdil M, M.D., Bilsel K, MD., Sungur M, M.D., Dikmen G, M.D., Tuncer N, M.D., Polat G MD. Does Obesity Negatively Affect the Functional Results of Arthroscopic Partial Meniscectomy? A Retrospective Cohort Study. *J Arthrosc Relat Surg.* 2013;29(2):232–7.
29. BRIGGS KK, KOCHER MS RWASJ. Responsiveness of the Lysholm Knee Score and Tegner Activity Scale for Patients with Meniscal Injury of the Knee. *J BONE Jt Surg.* 2014;88(4):698–705.
30. Ferraz MB, Quaresma MR, Aquino LR, Atra E, Tugwell P GC. Reliability of pain scales in the assessment of literate and illiterate patients with rheumatoid arthritis. *J Rheumatol.* 1990;17(8):1022–4.
31. Downie, WW, Leatham, PA, Rhind PM, Wright V, Branco JA AJ. Studies with pain rating scales. *Ann Rheum Dis.* 1978;37(4):378–81.
32. Meier BJ. Development and Validation of a Culturally-Relevant Pain Scale for Kiswahili-Speaking Patients in a Tanzanian Emergency Department. 2017.
33. Lizaur-utrilla A, Miralles-mun FA, Gonzalez-parren S. Outcomes and Patient Satisfaction With Arthroscopic Partial Meniscectomy for Degenerative and Traumatic Tears in Middle-Aged Patients With No or Mild Osteoarthritis. *Am J Sports Med.* 2019;47(10):2412–9.
34. Hwang BY, Kim SJ, Lee SW, Lee HE, Lee CK, Hunter DJ, et al. Risk factors for medial meniscus posterior root tear. *Am J Sports Med.* 2012;40(7):1606–10.



**PART B: DOMAINS FOR LYSHOLM KNEE FUNCTIONAL SCORE**

<b>LYSHOLM KNEE SCORING SCALE DOMAINS</b>	<b>PRE- OPERATIVE SCORES</b>	<b>POST-OPERATIVE SCORES</b>		
		<b>2<sup>nd</sup> week follow up</b>	<b>6<sup>th</sup> week follow up</b>	<b>12<sup>th</sup> week follow up</b>
<b>LIMP (5 POINTS)</b>				
None (5)				
Slight or Periodical (3)				
Severe or constant (0)				
<b>SUPPORT (5 POINTS)</b>				
None (5)				
Stick or crutch (2)				
Weight-bearing impossible (0)				
<b>LOCKING (15 POINTS)</b>				
No locking and no catching sensation (15)				
Catching sensation but no locking (10)				
Locking occasionally (6)				
Locking frequently (2)				
Locked joint on examination (0)				
<b>INSTABILITY (25 POINTS)</b>				
Never giving way (25)				
Rarely during athletics or other severe exertion (15)				
Occasionally in daily activities (10)				
Often in daily activities (5)				
Every Step (0)				



<b>PAIN (25 POINTS)</b>				
None (25)				
Inconsistent and slight during severe exertion (20)				
Marked during severe exertion (15)				
Marked on or after walking more than 2 km (10)				
Marked on or after walking less than 2 km (5)				
Constant (0)				
<b>SWELLING (10 POINTS)</b>				
None (10)				
On Severe exertion (6)				
On ordinary exertion (2)				
Constant (0)				
<b>STAIR CLIMBING (10 POINTS)</b>				
No Problem (10)				
Slight impaired (6)				
One step at a time (2)				
Impossible (0)				
<b>SQUATTING (5 POINTS)</b>				
No problem (5)				
Slight impaired (4)				
Not beyond 90 degrees (2)				
Impossible (0)				
<b>TOTAL SCORES (-----/100)</b>				

**Appendix II: INFORMED CONSENT FORM – ENGLISH VERSION.**

Consent to participate in the study titled “Short term functional outcome after arthroscopic partial meniscectomy in middle-aged patients with meniscal tear treated at MOI

**Greetings:** I am **Dr Adam B Hussein**, a postgraduate student researching short term functional outcomes after arthroscopic partial meniscectomy in middle-aged patients with meniscal tear treated at MOI.

**Purpose of the Study:** To determine the Short term functional outcome among middle-aged patients with meniscal tear treated by arthroscopic partial meniscectomy at MOI

**What participation involves:** If you agree to participate in this study, you will be asked questions and examined before and be followed up after the operation.

**Confidentiality:** All information collected will be entered into a computer with only an identification number; no name included.

**Risk:** We expect no harm to happen to you during this study.

**Rights to withdraw:** Taking part in this study is completely voluntary and refusal to participate or withdrawal will not involve penalty or loss of any benefits to which you are entitled. You will be treated and followed up as per the usual treatment protocol of the Institute for all patients with a meniscus tear.

**Benefits:** If you agree to participate in this study, you will be followed up closely and be assessed on the progress of your condition by the investigating doctor. We hope that the obtained information from this study will benefit others.

**Who to contact:** If you have any other questions regarding this study, feel free to contact me, the investigator, **Dr Adam B Hussein**, MUHAS, P.O. Box 65001, MUHAS, Tel no;+255713228480, Dar es Salaam.

If you have any questions concerning your rights as a participant, you may contact Dr Bruno Sunguya, Chairman of the university senate research and publication committee, P.O. Box 65001, Dar es Salaam. Telephone: (+255) 222-152-489.

**Signature**

Do you agree to participate .....

Participant does not agree to participate.....

I, .....have read the consent form and my questions have been answered and I agree to participate in this study.

Signature of Participant.....

Signature of Investigator.....

Date of signed consent.....

**Appendix II: INFORMED CONSENT FORM – KISWAHILI VERSION**

**Ruhusa ya kushiriki utafiti kuhusu kuangalia matokeo ya awali ya matibabu ya upasuaji wa goti kwa njia ya matundu kwa wagonjwa wenye umri Zaidi ya miaka 40 wenye tatizo la meniscus katika taasisi ya mifupa MOI**

**Salaam!**

Mimi naitwa **Dr Adam B Hussein** ni mwanafunzi wa udhamili chuo kikuu cha tiba Muhimbili. Nachunguza matokeo ya awali ya matibabu ya upasuaji wa goti kwa njia ya matundu kwa wagonjwa wenye umri Zaidi ya miaka 40 wenye tatizo la meniscus katika taasisi ya mifupa MOI

**Dhumuni la utafiti huu** ni kupata taarifa muhimu kuhusu matokeo ya awali ya upasuaji wa goti kwa njia ya matundu kwa wagonjwa wenye Zaidi ya umri wa miaka 40 wenye tatizo la meniscus katika taasisi ya mifupa MOI ili kutoa mapendekezo ya uboreshaji.

**Ushiriki;** Kama unakubali kushiriki kwenye utafiti huu utaulizwa maswali na utachunguzwa kwa kina na utafuatiliwa hata baada ya upasuaji katika kliniki yetu.

**Usiri;** Taarifa zote za uchunguzi zitaingizwa kwenye kompyuta kwa nambari ya utambulisho, jina halitanukuliwa.

**Madhara;** Tunategemea kwamba hakuna madhara yoyote yatokanayo na utafiti huu.

**Haki ya kujitoa kwenye utafiti;** Kushiriki katika utafiti huu ni hiari, na kutokubali kushiriki au kujitoa hautaadhibiwa au kupoteza haki yako ya matibabu. Utatibiwa na kuendelea kufuatiliwa kama taratibu za hospitali zinavyoelekeza kwa mtu mwenye matatizo ya goti kama yako.

**Kutokea kwa madhara;** Tunategemea kwamba hakuna madhara yoyote yatokanayo na utafiti huu. Hata hivyo kama madhara ya mwili yatatokea kutokana na utafiti huu, utatibiwa kulingana na kanuni na taratibu za matibabu ya Tanzania.

**Faida za kushiriki kwenye utafiti;** Kama utakubali kushiriki kwenye utafiti huu, faida utakazopata ni pamoja na kuonwa na kufuatiliwa kwa ukaribu na daktari anaefanya utafiti. Tunatumaini kwamba taarifa zitakazopatikana zitawanufaisha wengine pia.

**Kwa mawasiliano zaidi:** Kama una maswali au maelezo kuhusu utafiti huu, uwe tayari kuwasiliana na mtafiti, **Dr. Adam B Hussein** , P.O. Box 65001, MUHAS, Simu: +255713228480

Kama una maswali kuhusu haki yako kama mshiriki wasiliana na Dr. Bruno Sunguya, Mwenyekiti wa kamati ya utafiti, P.O. Box 65001, DSM. Simu (+255) 222-152-489.

Je, umekubali kushiriki? .....

Mimi.....Nimesoma maelezo na kuyaelewa vizuri, na nimekubali kushiriki kwenye utafiti huu.

Sahihi ya mshiriki.....

Sahihi ya mtafiti.....

Tarehe .....