FUNCTIONAL OUTCOME IN ADULT PATIENTS WITH INTERTROCHANTERIC FRACTURES WHO WERE TREATED WITH ANGLED BLADE PLATE AT MUHIMBILI ORTHOPAEDIC INSTITUTE

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By

Paulo Nicholaus

A Dissertation Submitted in (Partial) Fulfillment of the Requirements for theDegree of Master of Medicine in Orthopaedic and Traumatology at

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CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **''Functional outcome of the adult patients with intertrochanteric fracture treated with angled blade plate at Muhimbili Orthopaedic Institute'',** in (partial) fulfillment 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, **Paulo Nicholaus**, declare that this dissertation is my own original work and that it hasnot been presented, and will not be presented, to any other University for a similar or any otherdegree award.

Signature……. **Date**…….....

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Last but certainly not least, I extend my heartfelt appreciation to my mother Donata, and My wife Theresia., in particular, never faltered in her support, consistently uplifting me with wordsof encouragement when fatigue threatened to dampen my spirits.

DEDICATION

I dedicate this dissertation to my patients (research participants) for placing their deepest trustin me and make this work completed without difficult.

I also dedicate the dissertation to my Mother Donata Masoi, my wife Theresia Thomas and mychildren, Addebright, Abbrielle, Alverna and Arryelle.

ABSTRACT

Background Intertrochanteric fractures include the extracapsular fractures extending in the region with dense trabecular bone between greater to lesser trochanter of femur (1).

It is estimated that by 2050, sub-Saharan Africa will have a big population of elderly people and as a result an increase in intertrochanteric fracture rates. At Muhimbili Orthopedic Institute (MOI), most of the patients with intertrochanteric fractures are managed by open reduction and internal fixation using angled blade plate.

Objective: - To determine the functional outcomes of patients with intertrochanteric fractures who were treated with angled blade plate at MOI for period of 6 months.

Methods A descriptive prospective hospital-based study was conducted from 1st June 2023 to 31st June 2024 at MOI. A total of 45 adult patients with intertrochanteric fractures treated with angled blade plate were included in the study.

A structured questionnaire was used to collect data from study subjects. All eligible participants were systematically examined for following variables: age, sex, pattern of fracture classification, and functional outcome from Harris Hip Score. Data from the questionnaire was entered into a computer software SPSS version 23 template for compilation and analysis and data interpretation.

Results: A total of 45 adult patients with Intertrochanteric fractures met inclusion criteria and enrolled in this study at MOI during this study period (October 2023 to March 2024). Therefore, 45 patients completed at least 18 weeks follow and were evaluated in this study. Of the 45 patients, 57.4% (27/45) were male. The age ranged from 18 to 100 years with a mean age of 62.26 ± 19.19 years.

In this study majority of the patients belonged to the age of 58 years and above, occupied more than 60% and male are predominating more than 57% of the study populations.

The leading causes of injury was due to simple falls 21 (46.7%), followed by Motor traffic crush 20 (44.4%). The intertrochanteric fractures were classified according to AO classification found more cases 13 (28.9%) were in AO31A2.2 Classification.

In this study, 45 participants treated with ABP functionally assessed using Harris Hip Score Where 80.0% of the Participants had better outcome in which 25(55.6%) scored Excellent.

Conclusion: Treatment of Intertrochanteric fractures using angled blade plate results in restoring hip function and improving quality of life. Angled blade plates provide stable fixation and excellent Harris hip scores postoperatively

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LIST OF ABBREVIATIONS

ABP	Angled Blade Plate
AO	Arbeitsgemeinschaftfür Osteosynthesefragen
KCMC	Kilimanjaro Christian Medical Centre
MOI	Muhimbili Orthopaedic Institute
HHS	Harris Hip Score
MUHAS	Muhimbili University of Health and Allied Sciences
O.T OTA	Orthopaedic and Traumatology
	Orthopaedic Trauma Association
ORIF	Open Reduction Internal Fixation
PFLP	Proximal Femoral Locking Plate
SPSS	Statistical Package for the Social Sciences
MTC	Motor traffic crush

DEFINITION OF KEY TERMS

Intertrochanteric fractures are fractures involving the thick, trabecular bone which extends between regions of greater trochanter and lesser trochanter of femur. (2)

Angled blade plate is a form of orthopedic hardware, plate with angle varying (95^0, 120^0 and 135^0) for different orthopaedic use.(3)

The Harries Hip Score, a hip assessment instrument, is made up of each score given for various elements of the hip joint motion. It covers the categories of pain, function, functional activities, deformity, and hip range of motion. Scores reflect the severity of the problem. The higher the score, the better.(4)

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Intertrochanteric fractures include the extracapsular fractures extending in the region withdense trabecular bone between greater to lesser trochanter of femur (1).

There are two types of intertrochanteric fractures: stable and unstable. The reverse oblique fractures stand out among the other forms, as they are extremely unstable. Unstable fracture occurs when the fracture is unable to resist displacement after reduction. The fracture has dorsal angulation, shortening and dorsal comminution (5).

Intertrochanteric fractures are among factors contributing to disability in older people, particularly in women. These fractures strike roughly 3:1 ratio between women to men worldwide at some point in their lives(6). Only 60% of patients who have intertrochanteric fractures recover their pre-injury level of mobility, making them a more significant source of long-term disability in older persons than mortality. Due to the level of dependence imposed, this has a negative impact on daily life quality and activities and has societal, and personal repercussions(6).

Risk factors for intertrochanteric fractures include osteoporosis, heavy alcohol use, physical inactivity, visual impairment, aging, sex, living in rural or urban areas, race, and climatic changes. Mechanisms of injury for Intertrochanteric fractures includes motor traffic crush (MTC), gunshot wounds, height falls, and many other events have all been linked to these fractures in various parts of the world(7).

Recent studies shown increase research in patients with intertrochanteric fractures, for the past 20 years 2,632 studies has been done (8)

Management of intertrochanteric fractures by using Angled Blade Plate is very common in Tanzania, but studies on fixation of these fractures by using ABP are extremely rare in Tanzania. Hence, raising challenge to study the outcomes of patients treated by this implant

In a study done by Kilwale et al at Kilimanjaro Christian Medical Centre (KCMC) on the pattern of hip fractures showed that out of 50 elderly patients with hip fractures, 28 (56%) were men; theaverage age of the patients was 78 years, with the majority of them lying between the ages of 60 and 80. About 30 patients (60%) had been offered both conservative and surgical treatment modalities, 14 patients (28%) had only received conservative treatment, and 6 patients (12%) had only received surgical treatment. The patients' clinical presentation was discomfort in the afflicted hip.(9)

The study done in MOI by Hamza et al conducted study on causes and patterns of hip fractures among adult patients treated at MOI shows that male to female ratio is 1.5 to 1 according to the study's conclusions. Patients who are 50 years and older make up the bulk of those who suffer hip fractures. This suggests that urbanization (a sedentary lifestyle), getting older, and weaker bone due to aging all raise the likelihood of suffering a hip fracture (10).

Early medical optimization and surgical stabilization are the main goals of treatment for intertrochanteric fractures in facilitating earlier mobilization and recovery(11–13).

The approaches intertrochanteric fractures, including proximal femoral nail, dynamic hip screws, sliding hip screw and Angled Blade Plate and gamma nail. Despite the fact that each has unique benefits and drawbacks, fracture reduction and preventing varus alignment are crucial. (14)

Angled blade plate is the device that has been used since its development in the1960s. Despite has a reliable history, it’s currently not commonly used for acute fractures (14)

The angled blade plate is a reliable device for the treatment of appropriately selected intertrochanteric fractures. Fractures should have sufficient contact between the fracture fragments so that the construct can tolerate compression.

Fractures with comminution, subtrochanteric extension, an unreconstructed medial calcar, and bone quality that cannot support a blade plate are relative contraindications. (14)

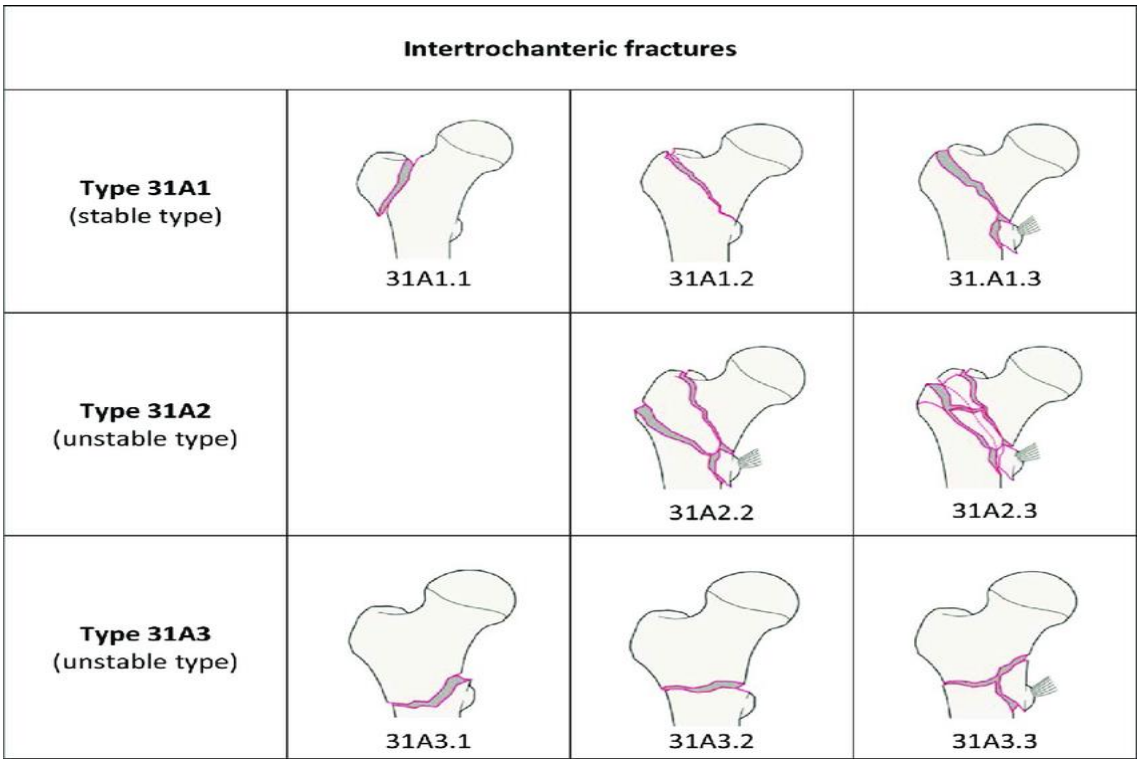
The study done at MOI by Karama et al about pattern of trochanteric fractures concluded that most of the trochanteric fractures were treated surgically had good outcomes after assessed by using Harris Hip Score (15)

1.2 Literature Review

There is an increasing incidences of intertrochanteric fractures due to increase aging population and high energy trauma in young adult.(10)

In a study done by Berkes out of 45 patients who sustained intertrochanteric fracture OTA/AO 31A1, 31A2, 31A3. The mean age was 43.8 (range 20–87) years, and 81% (21/26) were men. Average clinical follow-up was 19.2 (range 7–40) months. 24 out of 26 patients (92%) achieved osseous union after the index procedure (16).

Figure 1: AO classification of Intertrochanteric Fractures (2018 version)



The most common cause of trochanteric fractures was found to be MTC in young population and simple fall in elderly population. Surgical management of intertrochanteric fractures had better outcomes compared to conservative treatment. (15,17)

The study done at MOI by Karama et al about pattern of trochanteric fractures concluded that most of the trochanteric fractures were treated surgically (15)

Study done in Europe by Amorosa shows that the rate of healing with one surgery was 77.5% in the patients who were followed up until failure or completion of follow-up (55 of 71). In eight out of sixteen failures, the nonunion was eventually healed after a second operation was required because it persisted. In patients with a known infected nonunion, 11 of the 16 failures occurred (18).

Study done in Turkey by Ibrahim shows that in the proximal femoral locking plate group and Angled blade plate group, respectively, the mean time until union was 17 weeks (range 14-28) and 18 weeks (range 16-32). In the Proximal Femoral Locking Plate group, two patients (10%) experienced implant failure and/or nonunion, compared to three patients (12%) in the Angled Blade Plate group. Regarding the time to union, necessity for a second surgery due to mechanical issues, and complication rates, there was no statistically significant difference between the groups (19).

Study done by Varghese et all in USA, shows the mean traumatic hip rating score at the time of follow-up of the patient with Hip fractures treated with Angled blade plate was 50.0 with 4, 14, and 2 patients having excellent, good, and failed outcomes, respectively. All 26 patients had primary surgery. At final review, 2 patients had died, 2 had revision of the fixation with the angled blade plate, and one had mal-reduction and implant failure. (20)

Amorosa's study for proximal and femoral nonunion reported an overall 76.1% healing rate with just one operation when the 95-degree-angled blade plate was used. Eight of the 16 patients who required another surgery after their initial operation failed to recover eventually recovered. The healing rate of the blade plate following a single operation was 91.2% (18).

In a comparative study done in Turkey by Ibrahim et all study of angled plate and proximal femoral locking plate on treatment of reverse intertrochanteric fracture. Out of 40 patients, 24 patients were treated with Angled blade plate and were followed up. Harris Hip score results were similar, However, researcher contend that ABP is still a sensible and affordable option for these fractures (19).

In a study done by Varghese in USA showed that the results of blade plate fixation for 31A3 fractures are superior to sliding hip screw fixation and are comparable to nail fixation (results vary from 5% to 12%) in terms of low rates of failure (15%), revision surgery (15%), and infection (15%). This extensive series shows that the angled blade plate is effective for treating these complicated fractures and that it ought to be included in the treatment options for such wounds. (20).

In addition, in situations where the greater trochanter has been reduced, problems such as secondary trochanteric or femoral shaft fractures, malrotation, instability, Varus deformity, delayed union, and nonunion have been noted. But Angled blade plate shows the better outcome in these situations (19).

1.3 Problem Statement

There is an increasing incidences of intertrochanteric fractures due to increase aging population and high energy trauma in young adult.(10)

Out of 71 cases followed to assess failure or complete healing, 55 of 71 (77.7%) healed after treatment with angled blade plate(18)

There was no significant difference in failure rate (2 cases in 20 cases 10% Proximal Femoral nail and 2 cases in 24 cases 8.3% angled blade plate) intertrochanteric fractures treatment between proximal femoral nail and angled blade plate (19)

From pilot study conducted at MOI, there were 15 patients with intertrochanteric who were treated with angled blade plate from Oct to Dec 2022.

However, data on outcomes of angled blade plate on the management of intertrochanteric fractures in our setting is scarce. This scarcity posed a challenge to determine whether the patient had acceptable functional outcomes after treated by angled blade plate.

1.4 Conceptual Frame

Figure 2:

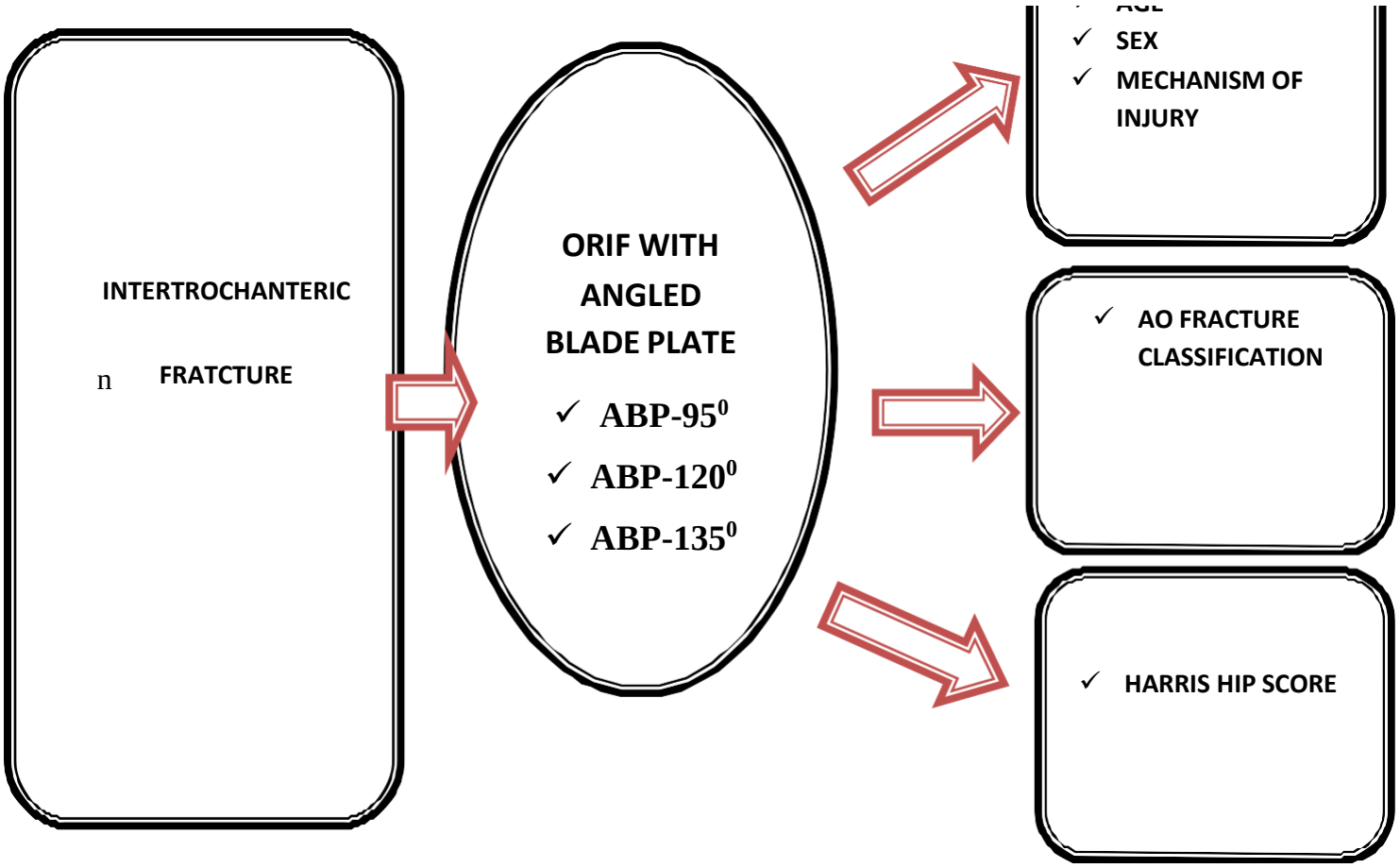


Figure 2: Conceptual framework to determining the functional outcome of the patients with intertrochanteric fractures treated with Angled blade plate at MOI

Description of conceptual frame-Outcome is measured using dependent variables functional outcome (Harris Hip Score). This dependent variable is influenced by fracture type such as intertrochanteric fracture, it affects the ORIF with Angled blade plate outcomes. These fractures are common high energy trauma in young adult and low energy trauma in elderly patients

1.5 Rationale

The results of this study will add to the body of knowledge on the functional outcome of adult patients with intertrochanteric fracture treated with angled blade plate at Muhimbili Orthopaedic Institute. This may be used to predict and prevent most of the bad outcomes from open reduction internal fixation with angled blade plate in our settings. Also, will help improving quality of life of the patients with intertrochanteric fracture treated with angled blade plate and decrease the cost burden to the society.

Furthermore, this study may be used as the baseline data for further research among this group of patients, and alert the Institution to plan ways to lower the number of bad outcomes from the patients with intertrochanteric fracture treated with angled blade plate

1.6 Research Question

Do adult patients with intertrochanteric fractures treated with angled blade at MOI achieve acceptable functional outcomes?

1.7 Objectives

1.7.1 General objective

To determine functional outcomes of the adult patients with intertrochanteric fracture treated with angled blade plate at MOI from 1st June 2023 to 31st December 2023.

1.7.2 Specific objectives

1. To determine socio-demographic characteristics of patient with intertrochanteric fracture treated with ABP at MOI
2. To determine the cause of intertrochanteric fractures among patients treated with ABPat MOI
3. To determine the pattern of intertrochanteric fractures among patients treated with ABP treated at MOI.
4. To determine functional outcome using Harris hip score among patients with intertrochanteric fractures treated with ABP at MOI.

CHAPTER TWO

2.0 MATERIAL AND METHODS

2.1 Study design

Descriptive prospective study

2.2 Study area

This study was conducted at MOI, located in Ilala Municipal in Dar es Salaam region Tanzania. Dar es Salaam is located in the eastern part of Tanzania between these coordinates 6° 48' 8.4708" S and 39° 16' 46.4016" E covers an area of 1590km^2 on a natural harbour on the coast of East Africa. There are five Municipalities in the Dar es Salaam region, namely Kinondoni, Temeke, Ilala, Ubungo, and Kigamboni. The region has a 6,702,000 million population accounting for 10% of the total Tanzania mainland population (21).

Muhimbili Orthopaedic Institute (MOI) is the largest Orthopaedic and trauma referral centre in Tanzania, which offers both Orthopaedic and Neurosurgery services, with capacity of 362 beds. In the department of Orthopaedic and Traumatology, there are three firms (Athroplasty and Trauma), and Paediatrics Orthopaedic firm which carry out clinical activities. The hospital is suitable for this research since it is estimated to receive more than 500 trauma patients per month.

2.3 Study population

The study involved all adult patients with intertrochanteric fracture who underwent open reductionand internal fixation with Angled blade plate at MOI from 1st June 2023 to 31st Dec, 2023.

2.4 Inclusion and Exclusion Criteria

2.4.1 Inclusion Criteria

i. Patients aged over 18 years with isolated intertrochanteric fracture treated withAngled Blade Plate

2.6 Exclusion criteria

i. Pathological fracture
ii. Patient with open intertrochanteric fracture.
iii. Patients with previous non-union, mal-union fracture of femur
iv. Contracture of lower limb joint
v. Patient with limb deformities
vi. Polytrauma patients

2.7 Sample Size Calculation

Sample size is computed from the following formula:

$n = Z^2 P (1-P) / e^2$

Where.

n = Minimum sample size

Z = Standard deviation corresponding to two-sided specified significant level.This is 1.96 (at 95% confidence interval).

e = Margin of tolerable error 0.05Prevalence rate = n/N

n – total number of patients with intertrochanteric fracture treated with ABP admitted at MOI from Oct to Dec 2022 (15 cases)

N - total patients with intertrochanteric fractures admitted in MOI from Oct to Dec 2022 (35 cases)

p = 15/35 = 0.429

p = 0.429

Proportion of patient with intertrochanteric Fractures treated with Angled Blade Plate (prevalence of 42.9%**)**

n = 1.96 x 1.96 x 0.429 (1-0.429) / (0.05x0.05)

n = 376

Adjusted sample size $n_{o./\ 1+(}\ n_o$-1)/NAdjusted sample = 376/ (1+375/35)

Adjusted sample size = 34 +10% (loss follow up) 34+3.4 =38Sample size was be 38

2.8 Study Variables

2.8.1 Dependent Variables

The main outcome variable for this study was Harris Hip Score

2.8.2 Independent variable

Measured as categorical variable in this study, they include the following intertrochanteric fractures treated with ABP, age and sex

2.9 Data collection method

Data collection tool was pre-tested for conducted by a researcher in order to prove if the needed information can be obtained. Changes were made accordingly so that the required information can be obtained.

One experienced research assistant was recruited and trained. He was trained about this study objectives and being oriented to data collection tool, questionnaire and research ethics.

The researcher and researcher assistant provided the necessary information about this study to participants and obtained consent from the participants who willingly accepted to participate. The participants in this study were interviewed by using the pretested structured questionnaire. Patients were evaluated on admission day, post operation day, sixth week and 18^{th} week post operation day. 18^{th} week the participants were assessed by using Harris Hip Score was used in to assess pain, function (limping, support, distance walked) and Activities (stairs, shoes and socks wearing, sitting and use of public transport) were assessed.

All patients who attended at Muhimbili Orthopedic Institute, Emergency department with hip fractures were assessed, radiological imaging was interpreted by assistance of radiologist. Patient with isolated intertrochanteric fractures were followed up and assessed for inclusion and exclusion criteria.

The images of patient who qualified for inclusion criteria were assessed and classified according to AO/OTA by researcher and confirmed by radiologist. Operating surgeon prepared list of patients for operation and was followed up, to identify patients who were planned for surgery, ORIF with ABP. Post operation x - ray images were assessed by researcher.

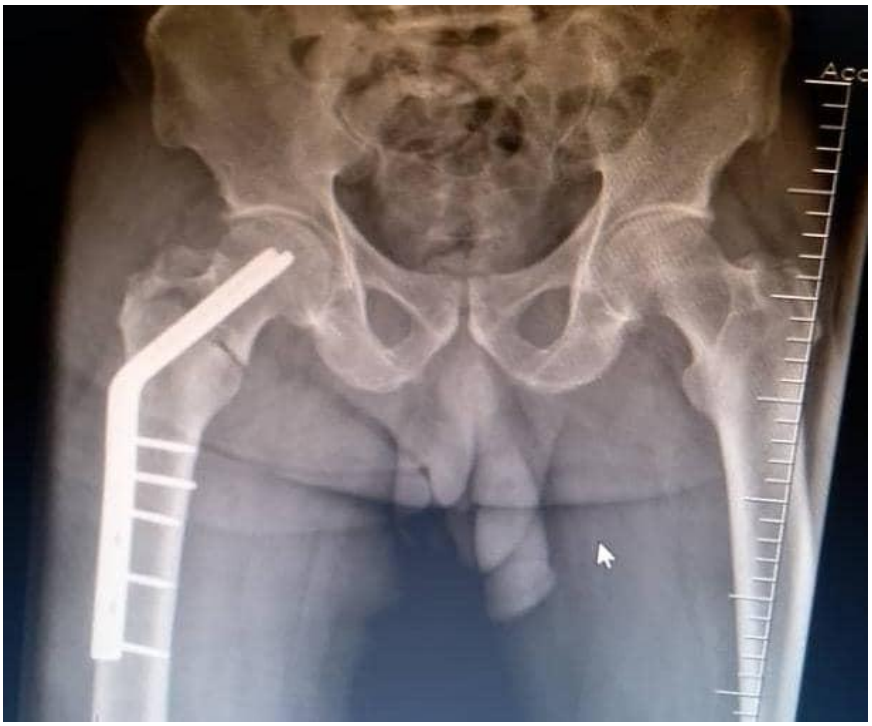
2.10 Patient Enrolment and Follow up

Those participants who consent to participate in the study were enrolled
Two days post – surgery of open reduction and internal fixation by using ABP for adult patients, the images were obtained. The images were evaluated by the researcher and confirmed by radiologist for quality of reduction, proper alignment confirmed after treatment with ABP.

Participants were followed up in sixth week for control x-ray to assess the reduction and progress of the patient, unrestricted ranges of motion and restricted weight bearing.

Assessment by using Haris Hip score to each participant was done on the 18th week. It involved scoring by level of pain, ability to perform functions like walking, function, limping, support and distance walked. Also, assessment included scoring by the ability of participant in activities such as climbing the stairs, wearing shoes and socks, sitting and use of public transport.

Figure 3: An Xray image showing intertrochanteric fracture fixed with ABP



Surgical Technique

Patient was positioned in supine on a standard radiolucent operating table, which can enable the use of image intensifier. C-arm positioned to obtain AP, L and other needed images intra operatively. Aseptic protocol was observed in prepping the patient limb. Standard lateral approach to the hip was done. Fracture site was identified, soft tissue cleared withing fracture site. The fracture reduced and reduction is held in position by reduction clump. Cuttings was done on the proximal fragment through neck to the head, by cutting chisel under guiding angles, for settlement of the blade of the plate. The angles depend on the fracture pattern. Then the blade was hammered to the neck and head. Reduction of the fracture is maintained.Acceptable reduction AP view continuous medial cortical line and no varus angulation and Lateral view anteversion approximately 15 degree and continuous anterior cortical line. Shaftof the blade plate was fixed on both cortices of the proximal femur.

2.11 Data Management and analysis

The data collected was analyzed on a daily basis to guarantee accuracy and completeness. For statistical analysis, SPSS version 23 was utilized. To produce summaries for socio-demographiccategorical variables such as occupation and gender, descriptive data analysis was performed using proportions, percentages, and frequencies. The mean (standard deviation) and median wasused to describe continuous data like age. Tables, bars charts, and/or pie charts was used to illustrate the results.

2.12 Ethical Issues

Ethical clearance and study approval was sought from MUHAS Institutional Review Board. Permission to collect data obtained from the Teaching, Research, and Consultancy Coordination Unit of MOI. Confidentiality of subject data observed by using study number and not patient's names

2.13 Study Limitations

1. This study was done in one hospital and data were collected over a period of 6 months so the findings may fail to reflect the true picture of functional outcome of patient treatedwith angled blade plate.
2. The study used convenient sampling so there could have been volunteer bias of participant selection.

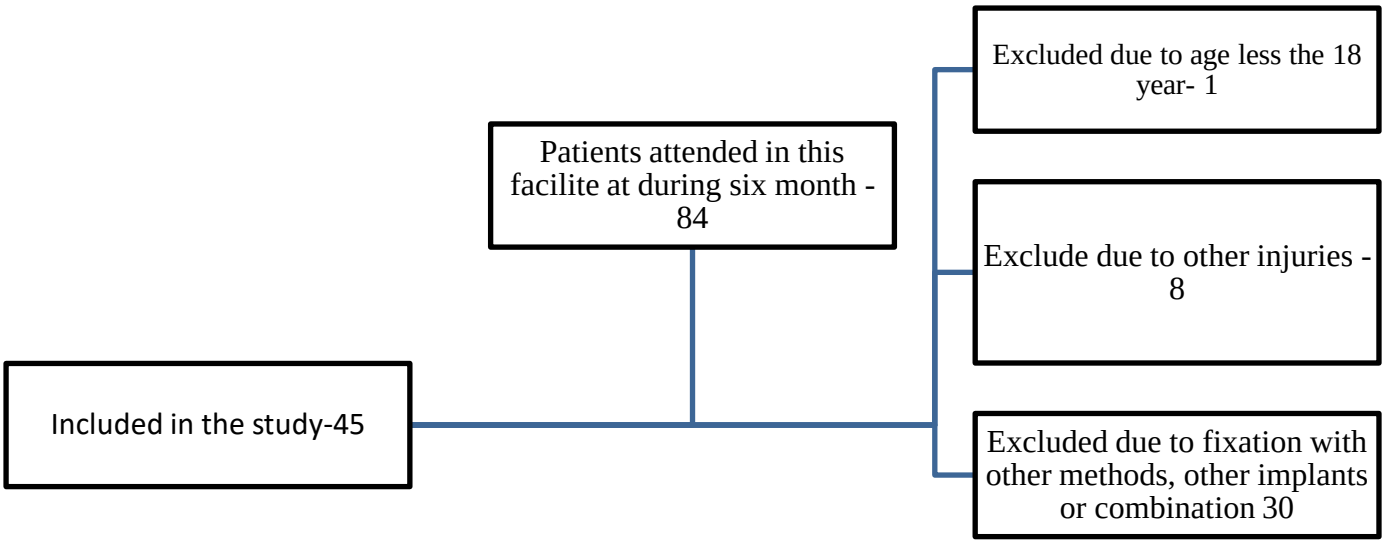
CHAPTER THREE

3.0 RESULTS

3.1 Characteristics of the study participants

A total of 84 follow up patient was found in to have intertrochanteric fractures for six months of this study. Of these 39 were excluded from the study based on inclusion and exclusion criteria.

Figure 4: Patient Flow Diagram



A total of 45 adult patients with Intertrochanteric fractures met inclusion criteria and enrolled inthis study at MOI during this study period (October 2023 to March 2024). All of the 45 participants completed at least 18 weeks follow up and were evaluated. Of the 45 patients, 57.4% (27/45) were male. The age ranged from 18 to 100 years with a mean age of 62.26 ± 19.19 years.

In this study majority of the patients belonged to the age of 58 years and above, occupied morethan 60% and male are predominating more than 57% of the study populations.

Table 1 Distribution of social-demographic characteristics (N=45);

	Frequency, n	**Percentage, %**
Age (years)		
18-27	3	6.7
28-37	4	8.9
38-47	4	8.9
48-57	6	13.3
58-67	12	26.7
68-77	6	13.3
78-87	7	15.6
88 and above	3	6.6
Total	**45**	**100.0**
Sex		
Male	26	57.8
Female	19	42.2
Total	**45**	**100.0**

Of the 45 participants, the leading cause of injury were due to simple falls 21(46.7%),followed by MTC 20 (44.4%).

Table 2 Distribution of participants by the cause of injury (n=45).

Causes of injury	Frequency	Percent %
Simple Fall	21	46.7
Fall from Height	4	8.9
MTC	20	44.4
Total	45	100.0

The intertrochanteric fractures were classified according to AO classification. This study foundmore cases 13 (28.9%) were in AO31A2.2 Classification.

Table 3 Fracture classification by AO Classification (n=45).

AO Classification	Frequency	Percent %
31A1.1	8	17.8
31A1.2	3	6.7
31A1.3	2	4.4
31A2.1	2	4.4
31A2.2	13	28.9
31A2.3	7	15.6
31A3.1	1	2.2
31A3.2	2	4.4
31A3.3	7	15.6
Total	**45**	**100.0**

In this study, 45 participants treated with ABP functionally assessed using Harris Hip ScoreWhere 80.0% of the Participants had better outcome in which 25(55.6%) scored Excellent

Table 4: Distribution of the participants by Harris Hip Score (n =45)

Harris Hip Score	Frequency	Percent %
Excellent	25	55.6
Good	5	11.1
Fair	6	13.3
Poor	9	20.0
Total	**45**	**100.0**

CHAPTER FOUR

4.0 DISCUSSION

Demographic Characteristics:Age

In this study the mean age of patients with intertrochanteric fractures was 62.26 years, indicating that this injury predominantly affects the elderly population. This aligns with global trends where advancing age is a significant risk factor for hip fractures (22). Also is similar to the study done in in Dar es Salaam, by Karama (15).

The findings of this study are contrary to the results of the study done in China, which showed 66% intertrochanteric fractures occurred in patients under 40 years old (average age 33.0 years; range 17–40 years). In contrast to the typical intertrochanteric fracture population. (23)

The findings in this study differ because the majority of participants are from the elderly population, in contrast to the study done in China were involves a working group, whose more active lifestyle increases their susceptibility to injuries. The majority of patients in this study sustained injuries during work (23).

Other studies report slightly different mean ages for patients with intertrochanteric fractures. Variations in mean age could be influenced by factors such as differences in study populations, infrastructure, geographic locations, healthcare systems, and methodologies for patient selectionand data analysis. (17)

Sex

The male-to-female ratio in this study was found to be around 2:1.

The findings of this study revealed a notable preponderance of males among the participants. Similar results reported by study conducted in China, where male predominance was noted.(23) This trend, however, stands in contrast to the findings of several other research studies, which have consistently reported a majority of females affected by similar injuries (24–26) and (27,28).

CAUSES OF INJURY

This study showed simple falls were the leading cause of intertrochanteric fractures, accounting for almost half of all cases at 46.7%. This finding is similar to the study in Dar es Salaam and Kilimanjaro. This can be explained by the fact that the study participants had closely related characteristics and were all recruited from within the country. (10,15).

This is different from the study done in China, which stated that intertrochanteric fractures can also manifest in younger individuals, predominantly in males following high-energy traumas. (23)

Globally, other studies report slightly different mechanisms for intertrochanteric fractures. Variations could be influenced by factors such as differences in study populations, geographic locations, healthcare systems, socio – economic activities involvement, different personal protection training in different social groups, and methodologies for patient selection and data analysis. (20)(29)

FRACTURE PATTERN

The fracture pattern according to AO classification system was used to categorize intertrochanteric fractures, with the majority falling under the AO31A2.2 subtype (28.9%). Fracture pattern provides valuable information for treatment planning. (20,30).

Similar findings was reported by study conducted in America, where the most common fracture in the AO classification was AO31A2. (14,20)(31)

Findings of this study differ from the study done by Newey et al., which revealed that the AO classification system, specifically tailored for intertrochanteric fractures. The variation in findings can be attributed to the fact that Newey's study focused on evaluating the inter- and intra-observer reliability of the AO classification of intertrochanteric fractures. Evaluation of the Inter- and Intra-Observer.(33)(34)

FUNCTIONAL OUTCOME

This study reveals a distribution of HHS outcomes, where 80.0% of the Participants had better outcome in which 25(55.6%) scored Excellent.

Different results were reported by study conducted at a hospital in Nairobi, Kenya, reported a lower proportion of patients with excellent outcomes (45%), indicating compared to Muhimbili Orthopedic Institute. This indicates potentially better outcomes compared to Nairobi. However, the proportion of patients with poor outcomes was also higher (25%) in the Nairobi study, suggesting variability in outcomes within the region. (35) The variability is caused by variation in accessing specialized health care services between the two cities, adherence to treatment and variation in surgical skills.

Studies across Africa have shown variations in functional outcomes following intertrochanteric fracture treatment with an angled blade plate. A multicenter study across several orthopedic centers in Sub-Saharan Africa reported HHS outcomes with 30% excellent, 15% good, 28% fair, and 27% poor, 10%. These findings suggest that outcomes in this study align more closely with regional averages, with a slightly lower proportion of excellent outcomes. (7) The difference is explained by variation in surgical skills, differences in health care infrastructures, rehabilitation protocols, adherence to treatment protocol and time of first hospital visit after injury.

Research from South Africa, a country with a more developed healthcare infrastructure, often demonstrates better outcomes, with higher proportions of patients categorized as excellent or good on the HHS compared to studies from other African regions.(17)

Globally, Meta-analyses and systematic reviews encompassing studies from various countries indicate that while angled blade plates generally yield favorable outcomes, the distribution of HHS categories can differ significantly. (20)(34)

Compared to local and regional studies, this study shows a mix of functional outcomes, with a relatively higher proportion of patients categorized as excellent and a lower proportion in poor outcome. Variability in outcomes within the East African region suggests the influence of factors beyond surgical technique, such as access to postoperative care, rehabilitation services, and socioeconomic factors.(12,17,36)

When compared globally, the distribution of HHS categories in this study aligns with trends observed in other regions, indicating both commonalities and unique aspects of intertrochanteric fracture management at Muhimbili Orthopaedic Institute

CHAPTER FIVE

5.0 STUDY LIMITATIONS, STUDY MITIGATIONS, CONCLUSION AND RECOMMENDATION

5.1 Study Limitations

Since it was hospital based retrospective study, it was limited by the number of patients available within the hospital. This results smaller sample size which impact statistical power of the study.

This study was done in one hospital and data were collected over a period of 6 months so the findings may fail to reflect the true picture short term outcomes of patients with intertrochanteric fractures treated with an angled blade plate.

5.2 Study Mitigations

Doctors who perform ORIF with ABP were requested to document all necessary information including Mechanism of injury, Classification of the fracture types, other associated injuries, types of implants used in fixing the intertrochanteric fracture, as regular follow up records on patient's case note.

5.3 Conclusion

Treatment of Intertrochanteric fractures using angled blade plate results in restoring hip function and improving quality of life. Angled blade plates provide stable fixation and excellent Harris hip scores postoperatively

5.4 Recommendation

1. Angled blade plate is a good implant in treating intertrochanteric fracture in adult patients at MOI.
2. Randomized Control Trial study for comparison between fixation of Intertrochanteric Fractures by using Angled Blade Plate in comparison to other implants used at MOI
3. The long – term follow up; while the study provided insight into short-term outcomes, further research with extended follow up periods is important to evaluate efficacy, durability of angled plate fixation and assess risk factors for poor outcomes. Longitudinal studies to assess implant related complication and functional outcomes over time

REFERENCES

1. Rahme DM, Harris IA. Intramedullary nailing versus fixed angle blade plating for subtrochanteric femoral fractures: a prospective randomised controlled trial. J OrthopSurg (Hong Kong). 2007;15(3):278–81.

2. Daniel K, Bolhofner R, Mast J, Honeycutt M. Hip fractures: Current review ofttreatment and management. Curr Orthop Pract. 2019;30(4):385–94.

3. Taljanovic MS, Hunter TB, Miller MD, Sheppard JE. Gallery of medical devices: Part1: Orthopedic devices for the extremities and pelvis. Radiographics. 2005;25(3):859– 70.

4. Vishwanathan K, Akbari K, Patel AJ. Is the modified Harris hip score valid andresponsive instrument for outcome assessment in the Indian population with pertrochanteric fractures? J Orthop. 2018;15(1):40–6.

5. George Haidukewych. Fractures with reverse obliquity of the intertrochanteric region of the femur Reverse obliquity fractures of the intertrochanteric region of the femur. J Bone Joint Surg Am. 2001;5–5.

6. Barry ML, Maday KR. Reviewing acute hip fractures in adults. JAAPA. 2021;34(9).

7. Anyanwu G, Nwaiwu C, Agu A, Onwukamuche C, Ekezie J. Mechanisms of hip fracture in Owerri, Nigeria, and its associated variables. Ann Med Health Sci Res.2013;3(2):229.

8. Zhang Z, Qiu Y, Zhang Y, Zhu Y, Sun F, Liu J, et al. Global Trends in Intertrochanteric Hip Fracture Research From 2001 to 2020: A Bibliometric and Visualized Study. Front Surg. 2021;8(October).

9. Kilwale Heri. Prevalence and treatment of hip fractures in elderly people admitted at Kilimanjaro Christian Medical Centre orthopedic department in 2015. Costech. 2016;14:2015–7.

10. Hamza Said et all. Causes and Patterns of Hip Fractures Among Adult. MUHAS; 2021.

11. Bhandari M, Swiontkowski M. Management of Acute Hip Fracture. N Engl J Med.2017

Nov 23;377(21):2053–62.

12. Timothy Brox W, Roberts KC, Taksali S, Wright DG, Wixted JJ, Tubb CC, et al. The American Academy of Orthopaedic Surgeons 2014 Clinical Practice Guideline on the Management of Hip Fractures in the Elderly. 2019;

13. LeBlanc KE, Muncie HL, LeBlanc LL. Hip fracture: Diagnosis, treatment, andsecondary prevention. Am Fam Physician. 2014 Jun 15;89(12):945–51.

14. Hartline BE, Achor TS. Use of the 95-degree Angled Blade Plate to Treat a ProximalFemur Fracture. J Orthop Trauma. 2018;32(8):S26–7.

15. Karama Mankaga Kenyunko. Profile of trochanteric fractures at moi: treatment andshort-term outcome 2012. Karama. 2013;

16. Berkes MB, Schottel PC, Weldon M, Hansen DH, Achor TS. Ninety-Five DegreeAngled Blade Plate Fixation of High-Energy Unstable Proximal Femur Fractures Results in High Rates of Union and Minimal Complications. J Orthop Trauma. 2019;33(7).

17. Dhanwal DK, Dennison EM, Harvey NC, Cooper C. Epidemiology of hip fracture: Worldwide geographic variation. Indian J Orthop. 2011;45(1):15–22.

18. Amorosa LF, Jayaram PR, Wellman DS, Lorich DG, Helfet DL. The use of the 95- degree-angled blade plate in femoral nonunion surgery. Eur J Orthop Surg Traumatol. 2014;24(6):953–60.

19. Azboy I, Demirtaş A, Gem M, Çakir IA, Tutak Y. A comparison of proximal femoral locking plate versus 95-degree angled blade plate in the treatment of reverse intertrochanteric fractures. Eklem Hast ve Cerrahisi. 2014;25(1):15–20.

20. Varghese VD, Bhowmick K, Ramasamy B, Karuppusami R, Jepegnanam TS. Use of an Angled Blade Plate for 31A3 Intertrochanteric Fractures. J Bone Joint Surg Am. 2021;103(21):2006–13.

21. National Beural of statistics. Population Distribution by Administrative Areas, 2012

Population and Housing Census,. Conn Med. 2013;264.

22. Hussein Al-Algawy AA, Baiee HA, Hasan S, Jassim I, Razaq M, Kamel F, et al. Risk factors associated with hip fractures among adult people in Babylon City, Iraq. Open Access Maced J Med Sci. 2019;7(21):3608–14.

23. Hwang LC, Lo WH, Chen WM, Lin CF, Huang CK, Chen CM. Intertrochantericfractures in adults younger than 40 years of age. Arch Orthop Trauma Surg. 2001;121(3):123–6.

24. Marks R. Hip fracture epidemiological trends, outcomes, and risk factors Backgroundto the problem. Int J Gen Med. 2010;3:1–17.

25. Davis TRC, Sher JL, Checketts RG, Porter BB. Intertrochanteric fractures of the femur:a prospective study comparing the use of the Küntscher-Y nail and a sliding hip screw. Injury. 1988;19(6):421–6.

26. Kumar KP. Study of Dynamic Hip Screw Fixation for Intertrochanteric Fractures of Femur in Adults. J Med Sci Clin Res. 2017;5(12):31252–71.

27. Tirkey R, Gupta S. 1350 Angle blade plate fixation in elderly and osteoporotic inter-trochanteric fracture. Int J Orthop Sci. 2016;2(4d):240–3.

28. Cheng CH, Chen LR, Chen KH. Osteoporosis Due to Hormone Imbalance: An Overview of the Effects of Estrogen Deficiency and Glucocorticoid Overuse on BoneTurnover. Int J Mol Sci. 2022;23(3).

29. Crist BD, Khalafi A, Hazelwood SJ, Lee MA. A biomechanical comparison of lockedplate fixation with percutaneous insertion capability versus the angled blade plate in a subtrochanteric fracture gap model. J Orthop Trauma. 2009;23(9):622–7.

30. Cho JW, Kent WT, Yoon YC, Kim Y, Kim H, Jha A, et al. Fracture morphology of AO/OTA 31-A trochanteric fractures: A 3D CT study with an emphasis on coronal fragments. Injury. 2017;48(2):277–84.

31. Vashisht D, Sreen S, Daroch MS, Alawadhi K. Dynamic condylar screws versus 95^{o}angle blade plate fixation of subtrochantric fractures of femur. Int J Res Med Sci. 2017;5(5):2040.

32. Li S, Su Z hao, Zhu J min, Sun W ju, Zhu YC, Wang J, et al. The importance of the thickness of femoral lateral wall for treating intertrochanteric fractures: a finite elements analysis. Sci Rep [Internet]. 2023;13(1):1–10. Available from: https://doi.org/10.1038/s41598-023-39879-9

33. Zarie M, Mohamoud MF, Farhoud AR, Bagheri N, Khan FMY, Heshmatifar M, et al. Evaluation of the Inter and Intra-Observer Reliability of the AO Classification of Intertrochanteric Fractures and the Device Choice (DHS, PFNA, and DCS) of Fixations. Ethiop J Health Sci. 2020;30(5):755–60.

34. Aggarwal HO, Bakshi AS, Chawla HKS, Jain A, Singh J. Role of Valgus Osteotomyand Fixation with Double Angle Blade Plate in the Management of Neglected and Ununited Femoral Neck Fracture. J Clin Diagnostic Res. 2021;15(i):8–11.

35. Mwiti M. Functional outcomes of distal femur fractures treated operatively at moi teaching and referral hospital , eldoret , by munene mwiti thesis submitted in partial fulfillment of requirements for the award of master of medicine degree in orthopaedic surgery ,. Nairob,. MOI University.; 2019.

36. Jensen TM, Pedersen JK, Waldorff FB, Søndergaard J, Overgaard S, Christensen K. Trends in Incidence of Hip Fracture and Hip Replacement in Denmark, 1996 to 2018. JAMA Netw open. 2024;7(5):e249186.

APPENDICES

Appendix 1: Questionnaire

FUNCTIONAL OUTCOME AMONG PATIENT WITH INTERTROCHANTERIC FRACTURES TREATED WITH ANGLED BLADE PLATE AT MUHIMBILI ORTHOPAEDIC INSTITUTE

Questionnaire

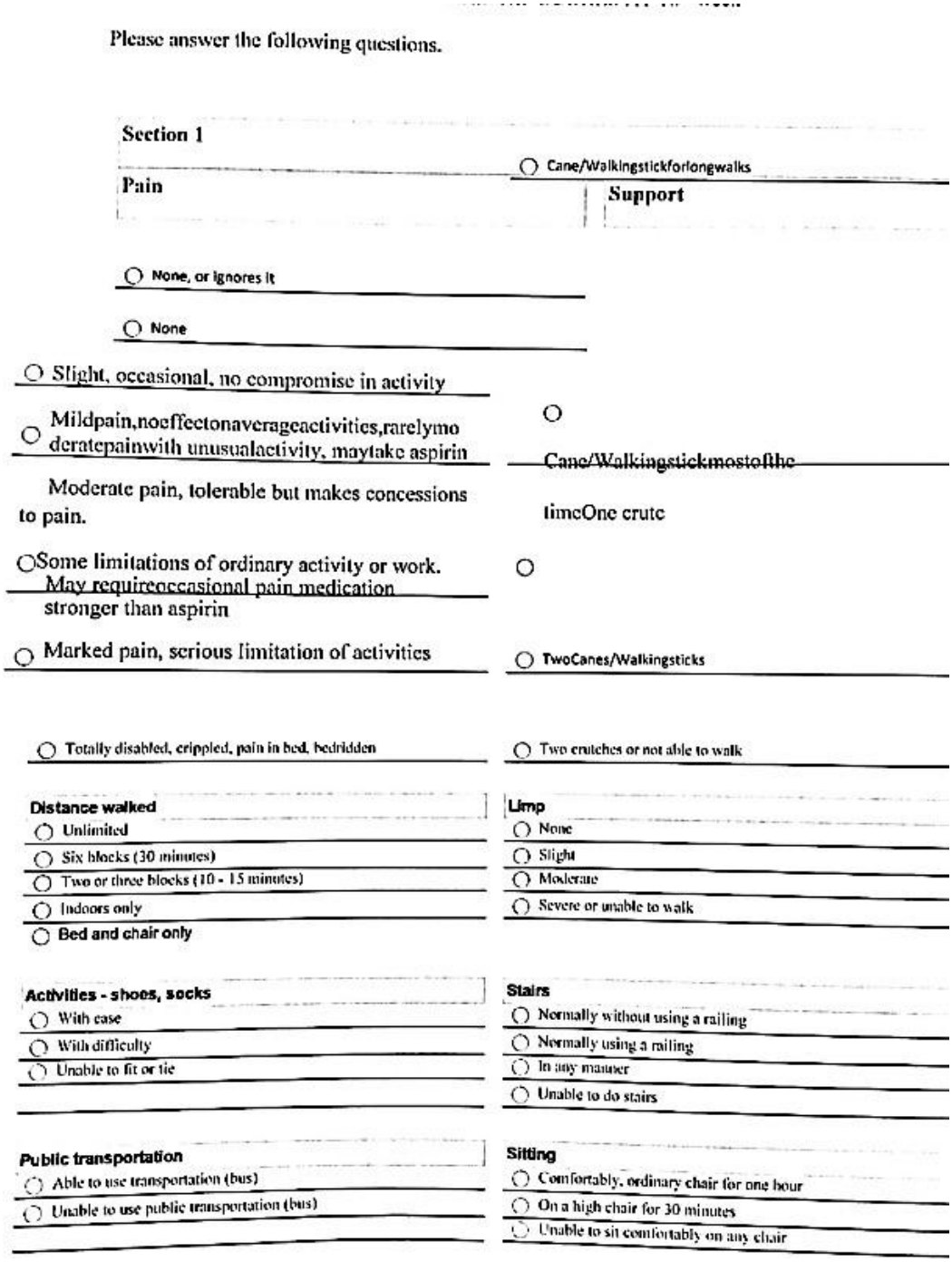
PATIENT'S PROFILE

1. Patient assigned code NO. ……..…
2. Age: ……..…
3. Sex: a) Male…….
   b) Female …….
4. Occupation…….
5. Residency
   a. Urban
   b. rural

6. Causes of Injury
   a. Simple fall
   b. Falling from height
   c. MTC
7. Associated injury
   a) Yes
   b) No
8. Side Affected
   a. Right
   b. Left
9. Radiological AO/OTA Classification of Intertrochanteric
   a. Simple (31A-A1/2/3)
   b. Separate posteromedial fragment (31A-A2.1/2/3)
   c. Extends through lateral and medial (31A-A3.1/2/3)
10. Stability of fracture
    a. Stable
    b. Unstable
11. Injury duration on arrival at MOI
    a. less than 48hours
    b. above 48 hours

12. Hospital stay duration before operation
    a. Less than 48 hours
    b. Above 48 hours
13. Reduction post op cortex aligned
    a. all cortices four aligned
    b. two cortices aligned
    c. no reduction
14. Clinical outcomes at 6 weeks
    a. Surgical site discharge
    b. Symptomatic implant
    c. Revised surgery
    d. None of above
15. Sixth week images
    a. Reduction in position with soft callus formation
    b. No reduction no soft callus
    c. Revised surgery
16. Type of ABP
    a. Patient restricted from ambulation
    b. Patient allowed to start ambulation
17. Blade type
    a. 130 degree ABP
    b. 120 degrees ABP
    c. 95 degree ABP

18. FUNCTIONAL OUTCOMES BY HARRIS HIP SCORES AT 18th week



Please answer the following questions.

Section 1

Pain

- ○ None, or ignores it
- ○ None
- ○ Slight, occasional, no compromise in activity
- ○ Mildpain,noeffectonaverageactivities,rarelymoderatepainwith unusualactivity, maytake aspirin
- Moderate pain, tolerable but makes concessions to pain.
- ○ Some limitations of ordinary activity or work. May requireoccasional pain medication stronger than aspirin
- ○ Marked pain, serious limitation of activities
- ○ Totally disabled, crippled, pain in bed, bedridden

Support

- ○ Cane/Walkingstickforlongwalks
- ○ Cane/Walkingstickmostofthe timeOne crute
- ○ TwoCanes/Walkingsticks
- ○ Two crutches or not able to walk

Distance walked

- ○ Unlimited
- ○ Six blocks (30 minutes)
- ○ Two or three blocks (10 - 15 minutes)
- ○ Indoors only
- ○ Bed and chair only

Limp

- ○ None
- ○ Slight
- ○ Moderate
- ○ Severe or unable to walk

Activities - shoes, socks

- ○ With ease
- ○ With difficulty
- ○ Unable to fit or tie

Stairs

- ○ Normally without using a railing
- ○ Normally using a railing
- ○ In any manner
- ○ Unable to do stairs

Public transportation

- ○ Able to use transportation (bus)
- ○ Unable to use public transportation (bus)

Sitting

- ○ Comfortably, ordinary chair for one hour
- ○ On a high chair for 30 minutes
- ○ Unable to sit comfortably on any chair

Title: FUNCTIONAL OUTCOME AMONG PATIENT WITH INTERTROCHANTERICFRACTURES WHO WERE TREATED WITH ANGLED BLADE PLATE AT MUHIMBILI ORTHOPAEDIC INSTITUTE

Greetings; My name is Dr Paulo Nicholaus, a resident in the department of Orthopedics and Traumatology at Muhimbili University of Health and Allied Sciences. I would like to conductthe study above as a necessary requirement for fulfillment of my postgraduate studies.

Purpose Functional outcomes among patient with intertrochanteric fractures who were treated with angled blade plate at Muhimbili Orthopaedic Institute.

this study requires you to participate so that important information can be obtained from you regarding

Functional outcomes among patient with intertrochanteric fractures who were treated with angled blade plate at Muhimbili Orthopaedic Institute.

Confidentiality: All information collected on questionnaires will be entered into computer withidentification number. The questionnaires will be handled with greater secrecy in order to maintain confidentiality.

Risk: There will be no risk associated with this study.

Participation Your participation in this study is voluntary and therefore any decision you makewill be respected. If you agree to participate in the study, you will be interviewed. If you choosenot to participate in the study, you will continue to receive all services that are normally providedin our institute.

If you have any question about the study, you can contact Dr Paulo Nicholaus 0753934752 and Dr Antony Assey0754377767, Department of Orthopedics and Traumatology, MUHAS. Ifyou have questions about your rights as a participant, you may contact Director of MUHAS

Research and Publications Committee. P.O.BOX 65001 telephone number

+255222152489Dar es Salaam.

Do you agree?

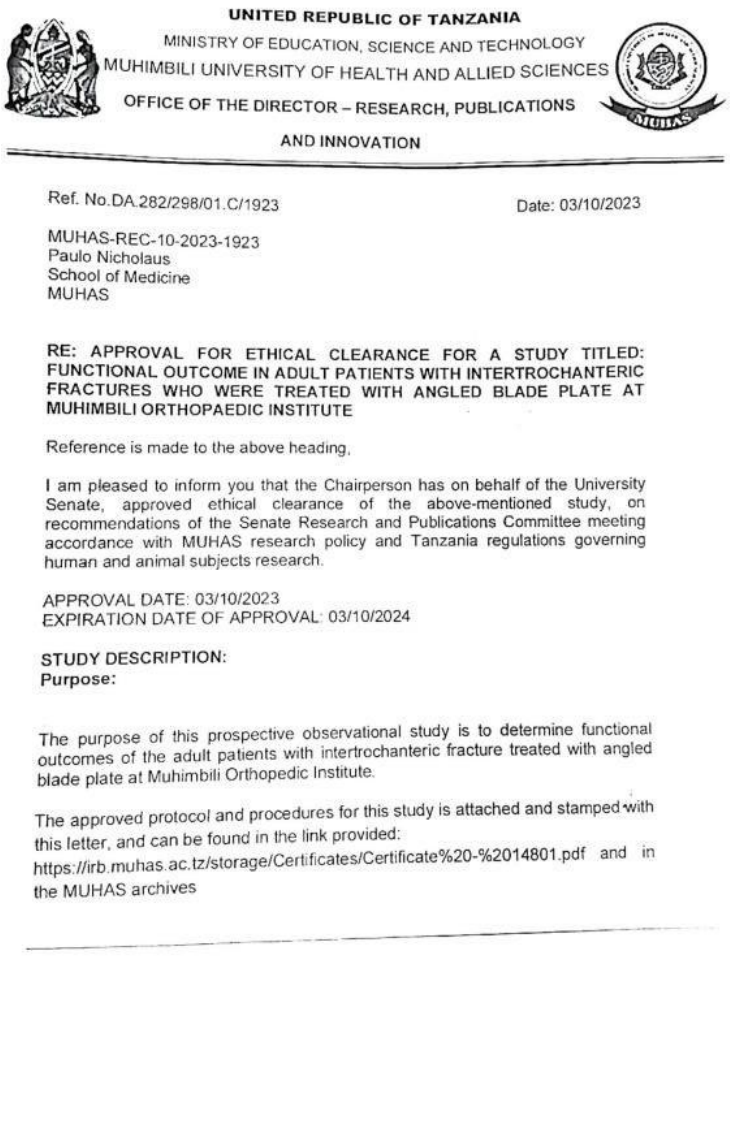
Participant agrees…….. Participant does NOT agree……

I,_____have read/been told of the contents of this formand understood its meaning; hence, I do agree to participate in this study.

Signature_____(Participant), Date_____

Signature_____(Researcher), Date_____

Appendix 3: Ethical Clearances



UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/1923 Date: 03/10/2023

MUHAS-REC-10-2023-1923
Paulo Nicholaus
School of Medicine
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: FUNCTIONAL OUTCOME IN ADULT PATIENTS WITH INTERTROCHANTERIC FRACTURES WHO WERE TREATED WITH ANGLED BLADE PLATE AT MUHIMBILI ORTHOPAEDIC INSTITUTE

Reference is made to the above heading.

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 03/10/2023
EXPIRATION DATE OF APPROVAL: 03/10/2024

STUDY DESCRIPTION:
Purpose:

The purpose of this prospective observational study is to determine functional outcomes of the adult patients with intertrochanteric fracture treated with angled blade plate at Muhimbili Orthopedic Institute.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014801.pdf and in the MUHAS archives

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://rdi.muhas.ac.tz/.

Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research, Publications & Innovations
Box 65001

Appendix 4: Introduction Letter

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.164/2021 **24th October, 2023**

The Executive Director,
Muhimbili Orthopaedics Institute,
P.O. Box 65474,
DAR ES SALAAM

Re: INTRODUCTION LETTER

We would like to inform you that the bearer of this letter is **Paulo Nicholaus** with Reg. No. **HD/MUH/T.164/2021** is a student at Muhimbili University of Health and Allied Sciences (MUHAS) "pursuing **MMed. Orthopaedics/Traumatology.**

As part of his studies, he will be doing an elective research titled: **"Functional Outcome in Adult Patients with Intertrochanteric Fractures who were Treated with Angled Blade Plate at Muhimbili Orthopaedic Institute."** he is being supervised by Dr. Felix Mrita from MUHAS and Dr. Athony Assey from MOI.

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Mr. Sebe Mohamed
For: DIRECTOR, POSTGRADUATE STUDIES

c.c **Paulo Nicholaus**

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix 5: Permission Letter

UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH

MUHIMBILI ORTHOPAEDIC INSTITUTE (MOI)

Ref.PA. 290/338/01 **24th October, 2023**

Muhimbili University of Health and Allied Sciences

Dar -es Salaam

Tanzania.

RE: APPROVAL FOR CONDUCTING RESEARCH STUDY

Reference is made to your letter with reference number HD/MUH/T.1923/2023 dated on the 3rd October 2023 for conducting research study about. **''Functional Outcomes in Adult Patients Intertrochanteric fractures who were Treated with Angled Blade Plate at Muhimbili Orthopaedic Institute (MOI)''.**

On behalf of the Management I would like to officially inform you that, your permission has been granted for your student **Paulo Nicholaus** to conduct study at Muhimbili Orthopaedic Institute (MOI).

It's my hope that your stay at MOI will be fruitful. For any clarification contact CRTM +255713764522.

Dr. Joel J Bwemelo, CRTM
For: MOI Executive Director
Cc: Director of Post Graduate studies
Cc: Supervisor

MUHIMBILI ORTHOPAEDIC INSTITUTE
P. O. Box 65474
DAR-ES-SALAAM

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