INDICATIONS AND EARLY OUTCOME OF TOTAL HIP ARTHROPLASTY IN YOUNG ADULTS AT MUHIMBILI ORTHOPEDIC INSTITUTE FROM 2015 – 2019

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By

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A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of Master of Medicine (Orthopedics and Traumatology)

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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: **''Indications and early outcome of total hip arthroplasty in young adults at Muhimbili Orthopedic Institute from 2015 – 2019'',** in (partial) fulfillment of the requirements for the Degree of Master of Medicine (Orthopedics and Traumatology) of Muhimbili University of Health and Allied Sciences.

_____

Dr. Billy Thomson Haonga (MD, MMed OT, FCS (COSECSA)

Senior Lecturer MUHAS

Supervisor

_____

Date

DECLARATION AND COPYRIGHT

I, **Deogratias Patrick Ngunyale**, I declare that this **dissertation** is my own 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…….. **Date**…….....

ACKNOWLEDGEMENTS

I would like to thank the almighty God for enabling the completion of this dissertation.

I would like to thank my supervisor Dr Billy Thomson Haonga for his mentorship, guidance and leadership. He dedicated his time providing text edits, fact and literature checks, and moral advice during the writing of this dissertation. I would also like to thank the Muhimbili orthopedic institute management for allowing me to conduct and complete my dissertation at Muhimbili Orthopedics Institute (MOI).

It is not possible to complete a work of this nature without involving one's colleagues. Their critical focus and attention to detail was exactly what was needed to make this a better dissertation, and I thank them for their contributions.

DEDICATION

I dedicate this dissertation to Muhimbili orthopedics institute (MOI) data base system in the Total hip joint registry. Through it patient's information and their clinical outcome could be accessed and analyzed.

I dedicate the dissertation to my daughter Gladness Ngunyale.

ABSTRACT

Introduction: Total hip arthroplasty is an effective surgical procedure in patients with end stage hip diseases, example osteoarthritis (OA) and other degenerative hip diseases(1). In the recent years there is an increase in indication for total hip arthroplasty among young adults(2). The success of total hip arthroplasty with its improvement in techniques and biomaterial has increased demand for the procedure in young adults.

The indications for primary and reoperation THA, early outcome and its associated risk factors for total hip arthroplasty in young adults are not well known at Muhimbili orthopedic institute.

Objectives: To determine the indications, early outcome and associated risk factors for total hip arthroplasty among young adults operated at Muhimbili orthopedic institute from 2015 to 2019.

Patients and methods:

The study design was a hospital based descriptive retrospective cross-sectional study, involving 341 patients who underwent total hip arthroplasty at Muhimbili orthopedic institute (MOI) between 2015 to 2019. The study was set up in accordance with the Muhimbili University of Health and allied sciences standards using a valid structured questionnaire. Data were retrieved from MOI total joint registry, verified from patient's files and hospital management information system (HMIS). Data were analyzed using statistical package for social sciences (SPSS version 20). The approval for the study was granted by Muhimbili University of health and allied Sciences ethical committee. Permission to conduct the study was granted by the executive director of Muhimbili orthopedic institute.

Results

A total of 341 patients were enrolled in the study, with mean age 40± SD 12 years and male predominance of 54.4% and female 46.6%. The leading indication for primary THA was osteoarthritis 48.2%, followed by avascular necrosis (AVN) 27.2%, femoral neck fracture 14.4%, neglected dislocation 4.9%, acetabular fracture 3.3% and DDH 1%. In majority of patients the implant of choice was the uncemented THA 85.6%, Hybrid THA 9.2% and the

cemented THA 4.3%. Among 341 patients 36 (10.6%) showed early complications. Hip dislocation was the leading early complication 5.3% followed by aseptic loosening 2.1%, periprosthetic fracture 1.2%, implant mal position 1.2% and surgical site infection 0.9%. The complications showed male predominance 52.8% and female 47.2% and increased with advancing age, more at age group 46 to 55 years. The reoperation rate for THA within one year was 6.2%.

Conclusion

Total hip arthroplasty is common among young adults with mean age at the fourth decade of life. Osteoarthritis (OA) is the leading indication for primary THA followed by avascular necrosis of femoral head, femoral neck fractures, neglected hip dislocations, acetabular fracture, sequelae of hip infection and sequelae of childhood developmental hip dysplasia (DDH). The predominant implant of choice was the uncemented THA. The early complications after primary THA within one year requiring reoperations were due to hip dislocations followed by aseptic loosening, periprosthetic fractures, implant malposition and surgical site infection. The risk factors for reoperations within one year were associated with advancing age of patients and male gender.

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ABBREVIATIONS

AVN	Avascular necrosis
DDH	Developmental dysplasia of hip
HA	Hydroxyapatite
HMIS	Hospital management information system
IRB	Institution review board.
MD	Medical doctor
MMED	Masters of medicine.
MOI	Muhimbili orthopedic institute
MUHAS	Muhimbili university of health and allied sciences
OA	Osteoarthritis
PAO	Periacetabular osteotomies
SCFE	Slipped capital femoral epiphyses
SD	Standard deviation
SPSS	Student package for social sciences
THA	Total hip arthroplasty

DEFINITION OF TERMS

1. Total hip arthroplasty (THA) is the operation in which the worn ball and socket native hip joint is replaced by the prosthetic acetabular component and femoral stem.

2. Revision Total Hip Arthroplasty is an exchange or repositioning of one or more components of an existing THA.

3. Reoperation after Total hip arthroplasty is any operation done after primary THA with/without exchange or reposition of one or more components of an existing THA

4. Hybrid THA is type of hip replacement with cemented femoral stem and uncemented acetabular component.

5. Reversed Hybrid THA is the type of hip replacement with uncemented femoral stem and cemented acetabular component.

6. Young Adult according to this study was the patient with age category from 18 years to 55 years.

7. Early outcome in this study encompasses all the complications which occurred within one year after primary total hip arthroplasty that required reoperations.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Total hip arthroplasty is an effective surgical procedure in patients with end stage hip diseases, example in patients with osteoarthritis (OA) and other degenerative hip diseases[(1)]. Total hip arthroplasty was the mainstay treatment for osteoarthritis in adults with significant improvement of function and quality of life(3). In the recent years there is an increase in indication of total hip arthroplasty among young adults(2). The success of total hip arthroplasty with its improvement in techniques and biomaterial has increased demand for the procedure in young adults. However the alleviation of pain from early to severe hip arthritis and the improvement of function after total hip replacement in young adults has increased its indication in this population as well[(1)]. The functional disability and debilitating pain from hip diseases has increased in young adults which necessitates total hip arthroplasty(4).

Total hip arthroplasty has been shown to have excellent long term outcome but early reoperations remain risk factors in early outcome(5). The mean 5- and 10-year survival rates among young adults are 98.7% and 94.6%, respectively (6). Among the causes for early reoperations and admissions after THA among young adults are hip dislocations, surgical site infections both deep and superficial, and peri prosthetic fractures(7). The risk factors for early reoperations are age of patient at the time of primary operation, gender of the patient, weight of the patient, surgical approach and surgeons factors including implant choice and fixation techniques(7). In this study main risk factors to be evaluated for early complications are age of the patient, gender, and implant choice. The incidence of reoperation and revision total hip arthroplasty is expected to increase due to high activity level among young(8). Projections suggest that revision THA will at least double between 2005 and 2030. By the year 2030 it is estimated that more than 25% of all THA will be placed in patients under the age of 55years, However, the outcome of THA in these young patients is lower compared to older patients (9).

Surgeons get to a dilemma on what to do with young patients who either have hip osteoarthritis or sustain a fracture of the neck of femur followed by avascular necrosis of the femoral head(10).

The benefit of regaining mobility in young adults has a significant impact on social and psychological wellbeing. This has pushed many orthopedic surgeons to opt for total hip replacement even in young adults due to its excellent results(11). There is increased hip related osteoarthritis in young adults both primary and secondary, example juvenile rheumatoid arthritis, ankylosing spondylitis and avascular necrosis (AVN) of femoral head from various causes which necessitates early intervention for arthroplasty. Sickle cell disease being one of the causes of AVN in young adults.

Total hip arthroplasty aims at replacing the degenerated or worn surface of the acetabulum and the femoral head with the prosthesis which are of different designs. The total hip arthroplasty designs can be uncemented THA, cemented THA, hybrid THA and the reverse hybrid. The femoral component is mainly subjected to mechanical failure leading to aseptic loosening whereas the acetabular component is mainly subjected to biological failure thus the selection of each total hip arthroplasty prosthesis depends on patient factors and choice of the surgeon(12). The choice of implant in young adults put in consideration the activity level of an individual and the risk of future total hip replacement revisions. However in developing countries choice of implant is often guided by what is available in the market.

1.2 Problem Statement

Muhimbili orthopedic institute has been offering total hip arthroplasty for about 20 years with the main indication due to end stage osteoarthritis in adults and elderly patients. There is an increase in number patients undergoing total hip arthroplasty among young adult with the known indications such as osteoarthritis, femoral neck fracture, acetabular fracture, neglected hip dislocations, hip infections and avascular necrosis of femoral head. Due to high activity among young adults there are speculations that THA is associated with early complications such as hip dislocations, periprosthetic fractures and surgical site infection and the risk factors for these complications are age, gender and implant choice. However, the proportion of these indications, early outcome and its associated risk factors for total hip arthroplasty among young adults are not well known at Muhimbili orthopedic institute and Tanzania.

1.3 Conceptual framework

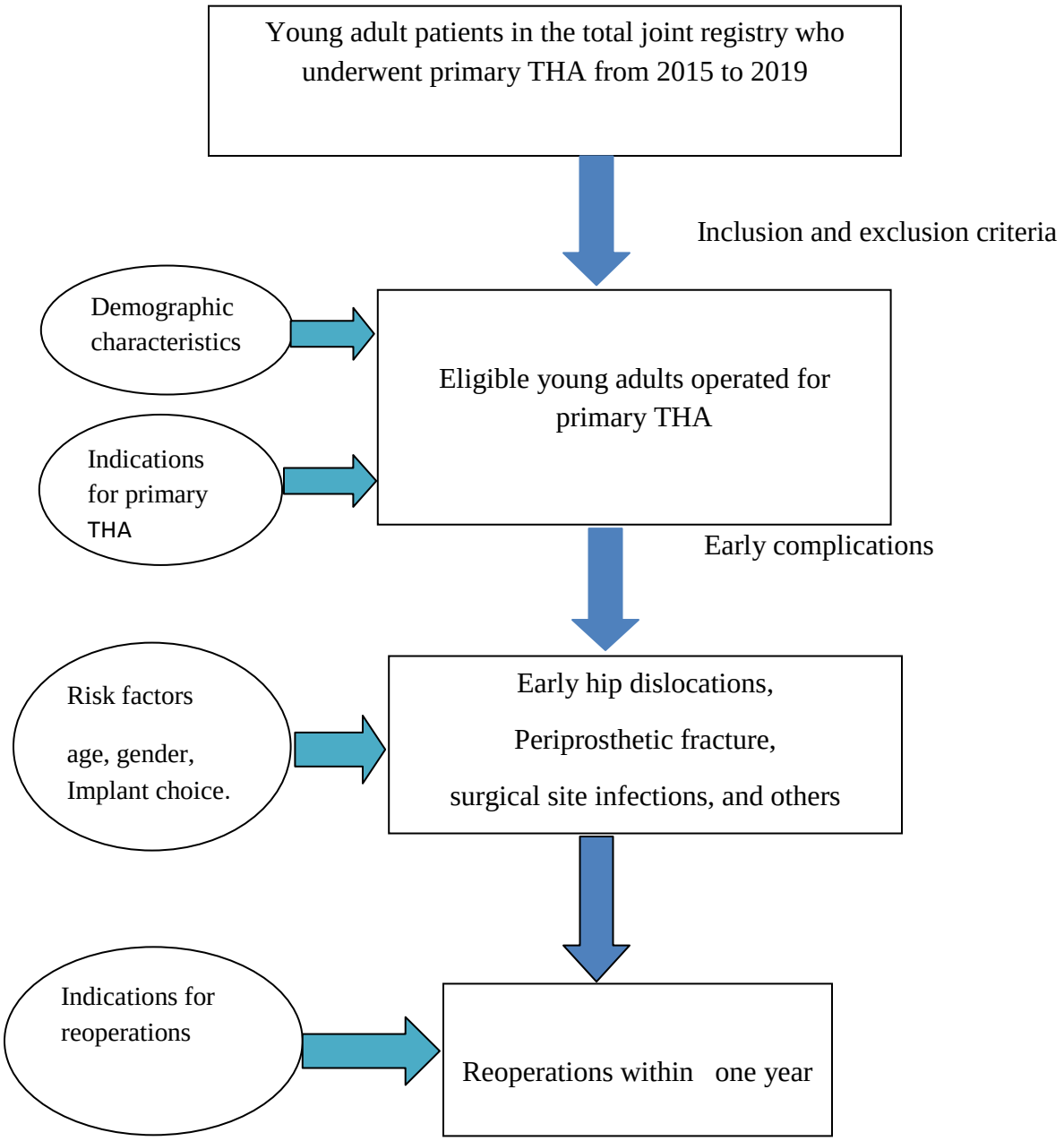

Figure 1: Conceptual frame work showing patient enrollment from study population in the joint registry by the inclusion and exclusion criteria, indications for primary THA to early complications with its associated risk factors and reoperation within one year.

1.4 Rationale

Understanding the indications for THA, its early outcome and associated risk factor in young adults undergoing total hip arthroplasty and its expected complications help in the planning for surgical care and preparedness for future complications in this population. The study will provide knowledge on the indications and early outcome of total hip replacement and its associated risk factors among young adults treated at MOI. Also the study will provide baseline information for further researches.

1.5 Research Question

1. What are the indications for primary total hip arthroplasty, early complications requiring reoperation and the associated risk factors in young adults who underwent total hip arthroplasty at Muhimbili orthopedic institute?

1.6 Objectives

1.6.1 Broad Objective

To determine the indications and early outcome for total hip arthroplasty among young adults at Muhimbili orthopedic institute from 2015 to 2019.

1.6.2 Specific Objectives

1. To describe the social demographic characteristics of young adult patients who underwent total hip arthroplasty at MOI from 2015 to 2019.
2. To determine the indications for primary total hip arthroplasty in young adults operated at MOI from 2015 to 2019.
3. To evaluate the type of implant choice for total hip arthroplasty in young adults operated at MOI from 2015 to 2019.
4. To determine the early complications after total hip arthroplasty and the associated risk factors within one year among young adults operated at MOI from 2015 to 2019.
5. To determine the reoperation rate for primary total hip arthroplasty within one year among young adults operated at MOI from 2015 to 2019.

1.7 Literature Review

Total hip arthroplasty has widely been indicated in young adults.

In the study by Archibeck et al in New Mexico United states of America the mean age at primary THA was 39 years with women predominance 51% in a mean follow up study duration of 9 years(13). In the study by Kuijpers et al from Dutch arthroplasty registry the mean age of arthroplasty is higher compared to Archibeck et al study with 47.1 years with similar predominance of women as well 53%(14). In a study done by Magoumou et al in cassablanca Morocco, showed the mean age at total hip arthroplasty similar to Archibeck et all study of 36 years with females predominance of 60%(15). There is no local study in Tanzania and east Africa on THA in young adults.

The indications for total hip arthroplasty in young adults are predominantly due to aseptic osteonecrosis of femoral head, sequel of trauma on femoral head or acetabular fracture. In the 10 years follow-up study by Archibeck et al the indications for primary THA were osteoarthritis(OA) leading 32.5%, osteonecrosis 24.1% developmental dysplasia15.7%, post traumatic arthritis 7.2% failed hip fusion 4.8% ankylosing spondylitis 3.6% and slipped capitis femoral epiphysis (SCFE) 2.4% with aseptic loosening on acetabular component the main reason for revision THA(13). In the study by Wangen et al the predominant indication was osteoarthritis due to congenital dislocations(57%) with the remaining patients having diagnoses of sequelae of fracture example femoral neck fractures, infection like tuberculosis , Calve-Legg-Perthes disease, avascular necrosis, chondrodystrophy and epiphyseal dysplasia(16). In the study by Kuijpers et all from the Dutch arthroplasty registry showed primary osteoarthritis the leading indication of THA in under 55 years patients and secondary osteoarthritis being 32.8%(14). In the study by Kim et all on the comparison of cemented and uncemented THA in patients under 50 years osteonecrosis was the leading indication for surgery followed by osteoarthritis and fewer patients with ankylosing spondylitis and others(17). In the study by Magoumou et al in cassablanca morocco reported the leading indications for arthroplasty in young adults under the age of 50 years to be aseptic osteonecrosis of femoral head (31.91%) which is mainly contributed by posttraumatic disorders, secondary to corticosteroids use and the majority were idiopathic with no specific

cause. The second leading indication was sequelae of inflammatory disorders (23.4%) contributed mainly by rheumatoid arthritis and ankylosing spondylitis. The third indication was post traumatic coxarthroses (14.89%). The fourth indication was congenital dysplasia as a pediatric hip dysplasia sequelae accounting for (10.64%). Other indications include the sequelae of tuberculosis and primary coxarthroses(15). There is no local study in Tanzania to show the indications of total hip arthroplasty in young adults and in East Africa at large.

The choice of implant for total hip arthroplasty in young adults remains an important parameter in the outcome in terms of pain alleviation, restoration of function with full range of movement and the longevity or survivorship of the prosthetic implants. The implants can be cemented, uncemented, hybrid or reversed hybrid THA design. The cemented THA has shown better results however the hydroxyapatite(HA) coated femoral stem in uncemented THA has also demonstrated good survivorship(18). In the study by Busch et al Cemented Hip Designs are a Reasonable Option in Young Patients, The 10 years survivor was 83% with revisions due to aseptic loosening and dislocations(19) . In the study by Kuijpers et all from the Dutch arthroplasty registry showed predominance uncemented THA 79.8% the leading implant design of choice followed by cemented 9.8%, reversed hybrid 8.2% and hybrid type the least 1.6%(14). In the study by Wangen et al excellent 10 to 16-year follow-up results with a HA-coated stem. The hydroxyapatite coated femoral stem show best survivor. None of the femoral stem had revision at follow up except for acetabular component 49%. All femoral stem were well integrated with no mechanical loosening(16). Also a study by Eun Ho shin and Kyoung Ho Moon et al on Cementless total hip arthroplasty in young patients under the age of 30: a minimum 10-year follow-up showed excellent results with survivor rate at 10 years 83%(20). In the study by Mogoumou et el in Casablanca Morocco 85% of the patients underwent uncemented THA and 15% cemented THA (15). There is no local study on the choice of implant for THA in young adults in Tanzania and East Africa.

Early complications after total hip arthroplasty in young adults includes hip joint dislocation, periprosthetic fractures, surgical site infection, hemorrhage, nerve injury, leg length discrepancy and heterotrophic ossification(21). The second most common complication

following total hip arthroplasty (THA) is dislocation after periprosthetic fracture, the majority of dislocations occur early in the post-operative period and are due to either patient-associated or surgical factors(22). In the study by Murphy et al on early reoperations after total hip arthroplasty; incidence, causes and cost in the US medicare population the rate of hip dislocation was about 3.6%.(23). In another study by Woolsom et al on Risk factors for dislocation during first 3 months after primary total hip replacement the rate of dislocation was 4% with age of the patient, gender , weight and height being the predisposing risk factors for early post operative dislocation(7). In the study by Mei et al on long term outcome of total hip arthroplasty in patients younger than 55 years; a review of systematic contemporary literature the rate of dislocation was 2.4% which was lower compared to the early dislocation rates by Murphy et al and Woolson et al. In the study by Dudda et al on risk factors for early dislocation after total hip arthroplasty; matched case control study the rate of early hip dislocation was found to be 4.8% among patients who underwent primary THA, with main risk factors being age of the patient, gender, underlying pathology for THA, surgical approach, femoral head size and implants mal positioning, The use of larger femoral head sizes improves stability and decreases the risk of dislocation, when other causes (incorrect implant position, tissue tension or osteophytes serving as hypomochlia) have been excluded. The risk of dislocation increases when the head is <26 mm in diameter(24)(25) . However there is no local study on early complications after THA in young adults.

Early reoperations after THA in young adults are due to hip dislocations, infection, periprosthetic fractures and aseptic loosening. In the study by Murphy et al on early reoperations after total hip arthroplasty one year rate of reoperation was 3.4% with periprosthetic fracture and hip dislocations the main causes(23). In the systematic review of contemporary literature study by Mei et al on long term outcome of total hip arthroplasty in patients younger than 55 years the 5 years implant survivor rate was 98.7% and revision rate of 1.3%. The indications for early reoperations being periprosthetic fracture, hip dislocations and surgical site infection.(6).

CHAPTER TWO

2.0 METHODOLOGY

2.1 Study Design

Retrospective cross section hospital based study.

2.2 Study Area

The study was conducted at Muhimbili orthopedic institute (MOI). MOI is located in Dar es Salaam, IIala Municipality Tanzania. The Muhimbili Orthopedic Institute (MOI) is an autonomous institute established under ACT. No 7 of 1996 with the main objective of providing primary, secondary and tertiary care of preventive and curative health services in the field of orthopedics, traumatology and neurosurgery, as well as being role model for efficient hospital management in Tanzania. MOI provides both emergency and non-emergency medical services in the field of orthopedics, traumatology and neurosurgery.

It is the tertiary hospital at the national level in the ministry of health referral system in Tanzania with a capacity of 360 beds and 9 operating tables daily. It started offering services of total hip arthroplasty since 2007 with a recent capacity of operating at least 2 total hip arthroplasty per day for 5 working days a week. It is the main centre for THA in Tanzania. It is well equipped with diagnostic services, THA implants for primary and revision surgeries, specialized and consultant personnel for both primary total hip arthroplasty and revision total hip arthroplasty. Also, well equipped with post operative care and physiotherapy. It has a total hip registry book with 100% documentation of the cases done with patients social demographic information, date of operation, surgical team, indications for THA, type of implants used and its sizes for acetabular shell and its liner, femoral stem component and femoral head size, amount of blood loss and operation time.

2.3 Study Population

Young adults from the age of 18 years to 55 years operated for total hip arthroplasty at MOI.

2.4 Study Duration

Study was conducted for 11 months for the retrospective data of 5 years from January 2015 to December 2019. This included extraction of information from THA registry book, going through all patients file and imaging for confirmation of diagnoses data entry, analysis, defending the thesis and submission of report.

2.5 Sample Size

A retrospective pilot study was conducted at Muhimbili orthopedic institute from the total hip arthroplasty registry book for six months duration from January 2019 to June 2019. There were 41 young adult patients who underwent total hip arthroplasty with osteoarthritis (coxarthrosis) the leading indication for THA 14 patients and total number of patients who underwent total hip replacement was 109. The proportion of total hip among young adults at MOI was calculated to be 34% or 0.34.

Therefore considering the study power of 95%, a random likely error was estimated to be 5%, thus the sample size of this study was calculated using Kish and Lislie the formula (1965);

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

Where;

n=Sample size

p=Proportion 0.34 from a pilot study

e =Margin of tolerable error 0.05

Z=Confidence level 1.96

$$n = \frac{1.96^2\ 0.34(1-\ 0.34)}{0.05^2}$$

n = 345

The study recruited 341 patients who underwent total hip replacement from January 2015 December 2019 including those from a pilot study. These were all patients conveniently who met inclusive criteria within the specified time.

2.5.1 Inclusion Criteria

All patients from the age of 18 years to 55years who underwent primary total hip arthroplasty and revision THA at MOI from 2015 to 2019. Patients who underwent bilateral THA were also included.

2.5.2 Exclusion Criteria

Patients with inadequate information in the total hip arthroplasty registry book, patients file and hospital management information system (HMIS). Information from total hip arthroplasty registry like age of patient, gender, type of operation done, indication for the operation (primary THA or reoperation), type of implant used for THR were mandatory to meet criteria.

2.5.3 Sampling Technique

A convenient type of sampling was used where all young adult patients from the age of 18years to 55years operated for total hip arthroplasty within the period of five years from the year 2015 to 2019 were included in the study.

2.6 Data collection method and tools

Data was collected from hospital based information from patients who underwent total hip arthroplasty from year 2015 to 2019 from the total hip arthroplasty registry book, patients case notes for the clinical presentation and clinical diagnosis and radiological images were retrieved from the hospital health management information system (HMIS) used at Muhimbili orthopedic institute, which are the Medsynapse, Clear canvas and Radiant image viewer for radiological evaluation and confirmatory diagnosis of x rays pre operative and post operative.

Data were recorded from the total hip arthroplasty registry book which is stored in theatre, in the pre tested research questionnaire among the patient who met inclusion criteria. The information captured, from the registry will be the file number of patient, age, gender, diagnosis, type of procedure whether primary THA or revision THA and side of operation and the implants used (the femoral stem, acetabular components and femoral head size whether cemented, uncemented or hybrid type of prosthesis).

Using the file number obtained from the registry, the patients information in the patients hard file were retrieved from the medical records storage room for clinical presentation of the patient and confirmation of diagnosis by accessing the Hospital management information system (HMIS) for radiological review of patients pelvic or hip x rays done pre operative and post operative, through image viewers; Medsynapse, Clear Canvas and Radiant image viewer.

The information obtained was filled in a pre tested structured questionnaire (designed data extraction form) with all the required variables for analysis.
Data was then entered in computer program, Student Package for Social Sciences (SPSS version 20).

2.7 Data Analysis

Data collected was analysed using the statistical software for student package (SPSS software version 20). Categorical data like sex of the patient, type of operation, indication for THA, choice of implant, early complications like dislocation, surgical site infection and periprosthetic fracture and side of THA was summarized using frequency tables and compared using the Chi square, P-value of equal or less than 0.05 was regarded as statistically significant. Continuous variables like age of patients, femoral head size and time interval between primary and revision THA was expressed as mean ± SD (standard deviation) and compared using student t test.

The dependent variable for this study is the indication for primary THA and indication for reoperation THA, and the independent variables are age, gender, type of operation, side of operation, duration of primary THA to reoperation THA number of hips dislocated, and choice of implant;

In objective one the variables are age of the patient and gender. Age is numerical continuous independent variable was summarized in frequency table in age groups in percentages, mean and standard deviation, and gender is categorical data and was summarized in frequency table. Objective two indication for THA is categorical data was summarized in frequency tables and expressed in percentages or proportions.

Objective three the choice of implant is categorical data as well summarized in frequency tables in percentages or proportions and compared using Chi square with P value of equal or less than 0.05 statistically significant. Objective four the independent variable are hip dislocations, surgical site infection, periprosthetic fractures and aseptic loosening which are numerical discrete variable which was summarized in frequency tables, objective five on reoperation rate are numeric variables which was summarized in frequency and cumulative frequency tables as percentages.

2.8 Study Limitations

Improper documentation on the total hip arthroplasty registry book, accuracy of the diagnosis and indication for THA. Minimal information from HMIS and clinical presentation of the patients.

2.9 Ethical consideration and consent

Ethical clearance was sought form MUHAS institution review board (IRB) and the permission to conduct a retrospective study on stored information in the total hip joint registry books, patients file and health management information system (HMIS) through radiant decom viewer and medsynapse was obtained from Muhimbili orthopedic institute management. Confidentiality on patient's information was observed as per MUHAS IRB. There was No direct face to face contact with the patient.

2.10 Dissemination Plan

The results of this research will be compiled into a dissertation to be submitted for the accomplishment of the award masters of medicine in orthopedics and traumatology (MMED orthopedics and traumatology) of the Muhimbili University of Health and allied sciences. A copy of the dissertation will be made available to the department of orthopedics and traumatology and another copy will be stored in MUHAS library for future reference.

The manuscript will be published in the recognized medical journal and the abstract will be submitted to the annual MUHAS conference and other medical conferences.

CHAPTER THREE

3.0 RESULTS

3.1 Social demographic characteristics

A total of 620 patients' records who underwent total hip arthroplasty between January 2015 and December 2019 were reviewed. Among them 341young adult patients from age 18years to 55 years met the inclusion criteria and were eligible for the study. The majority were males 53.4% and 46.6 % were female with a male: female ratio approximately 1:1. The most common age group was between 36-55 years 64.5% with the mean age of the patients being 40± 12SD years. Majority of patients underwent right sided THA 52.8%. (Table 1)

Table 1: Social demographic characteristics of patients who underwent THA from the year 2015 to 2019 (N=341)

Variable	Frequency	Percent
Sex		
Male	182	53.4
Female	159	46.6
Total	341	100
Age Group		
46-55	151	44.3
36-45	69	20.2
26-35	64	18.8
15-25	57	16.7
Total	341	100
Side operated		
Right	180	52.8
Left	161	47.2
Total	341	100

3.2 Proportion of indications for THA

Among the 341 patients 305 patients underwent primary THA 89.4% and 10.6% underwent reoperation due to early complications. In patients who underwent primary THA the leading indication for THA was osteoarthritis (coxarthrosis) 48.2% followed by avascular necrosis (AVN) 27.2% where AVN due to SCD alone was 9.1% and femoral neck fracture was 14.4% (figure 2and table 2)

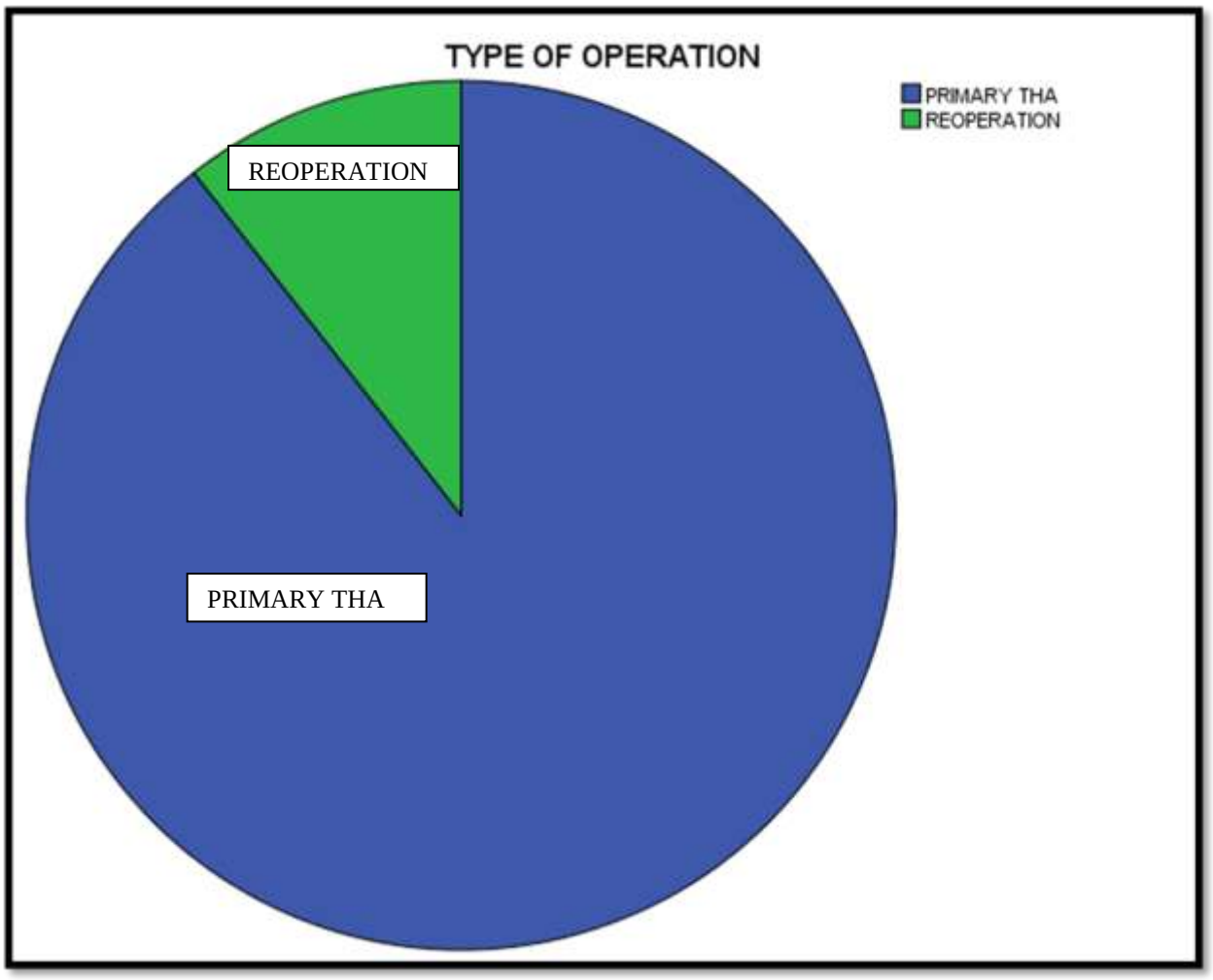

Figure 2: Proportion of primary and reoperation THA among young adults from 2015 to 2019 (N=341)

Table 2: Proportion of indications for THA among young adults who underwent primary THA from 2015 to 2019 (N=305)

Variable	Frequency	Percent
Indications		
Osteoarthritis (Coxarthrosis)	147	48.2
Avascular Necrosis (AVN)	83	27.2
Femoral Neck Fracture	44	14.4
Neglected Hip Dislocation	15	4.9
Acetabular Fracture	10	3.3
Sequelae of Infection	3	1
Hip Dysplasia (DDH)	3	1
Total	**305**	**100**

3.3 Proportion of type of implant used

Among the 305 patients who underwent primary THA, uncemented THA 85.5% was the most implant of choice in the majority of patients, followed by hybrid type 9.2% and the cemented THA type 4.3%. The reverse hybrid THA was the least choice 1%. Size 28mm outer diameter femoral head was most used 94.8% with variety of femoral neck length. (Figure 3)

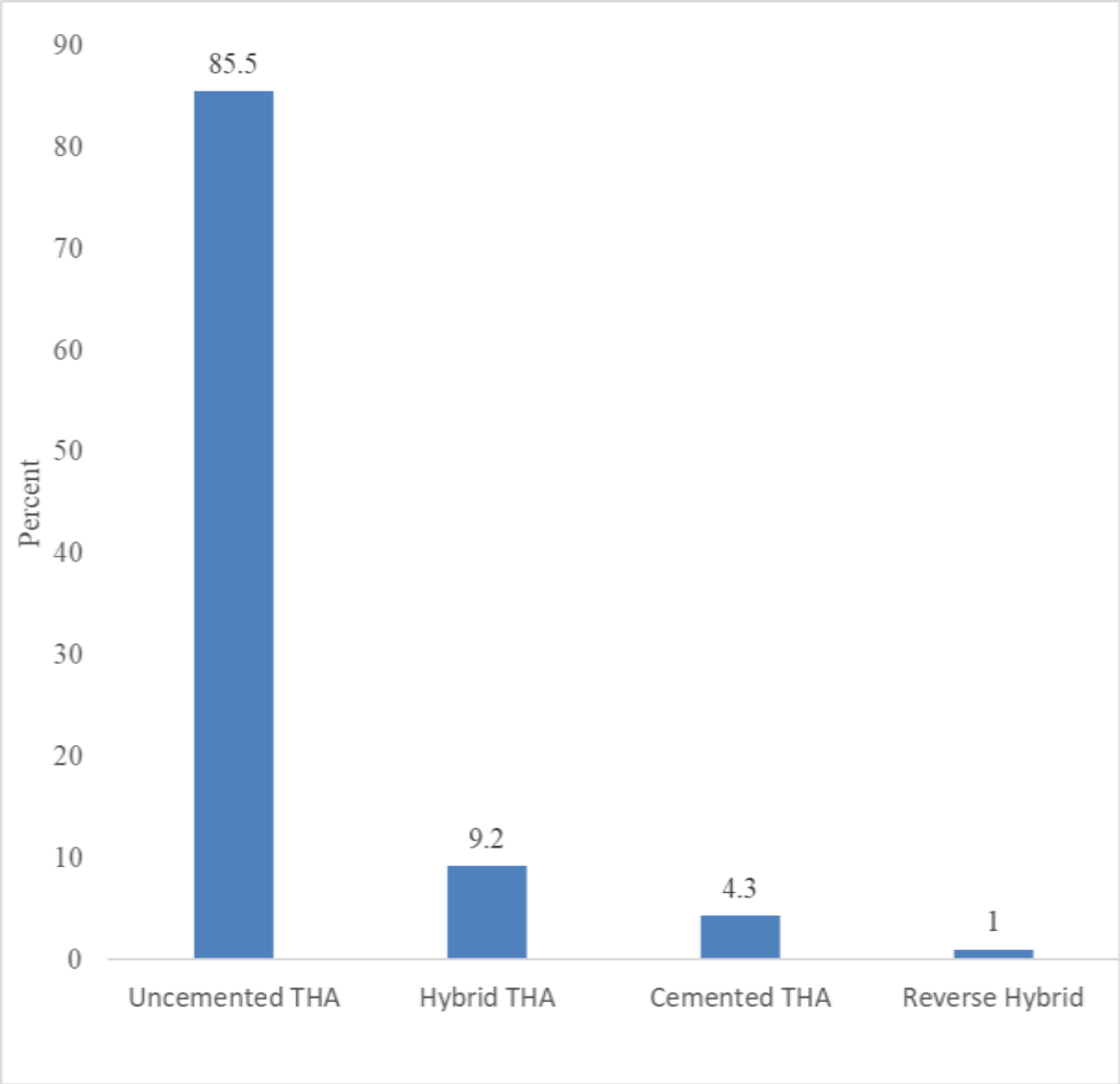

Figure 3: Proportion of indications among patients who underwent THA from 2015 to 2019 (N=341)

3.4 The proportion of early complication and associated risk factors.

Among the 341 enrolled patients 36 patients underwent revision operations due to early complications. Hip dislocation was the leading early complication 5.3% followed by aseptic loosening 2.1 %, implant malposition 1.2%, periprosthetic fractures 1.2% and surgical site infection 0.9 % the least one.

Table 3: Proportion of indications for revision THA due to early complications from 2015 to 2019 (N=36 out of 341)

Variable	Frequency	Percent
Early complications		
Hip Dislocation	18	5.3
Aseptic Loosening	7	2.1
Implant Mal position	4	1.2
Periprosthetic Fracture	4	1.2
Surgical site Infection	3	0.9

The early complications were noted more among males 52.8% and female 47.2% with hip dislocation 60.9% and aseptic loosening 66.7% more among males and periprosthetic fractures more among females 75% The early complications were also noted to increasing with age where age group 36-55 years accounted for majority of the reoperations 50%. Though not statistically significant p =value more than 0.05 (Table 4)

Table 4: Comparison between gender and age group vs early complications among patients who underwent THA from 2015 to 2019

Variable	Hip Dislocation	Surgical site infection	Periprosthetic fracture	Aseptic loosening	Total	P Value
Gender	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N**	
Male	14(73.68)	0(0.00)	1(5.26)	4(21.05)	19	0.149*
Female	9(52.94)	3(17.65)	3(17.65)	2(11.76)	17	
Age Group						
15 to 25	2(66.67)	0(0.00)	1(33.33)	0(0.00)	3	0.085*
26 to 35	7(87.5)	0(0.00)	0(0.00)	1(12.5)	8	
36 to 45	4(57.14)	1(14.29)	1(14.29)	1(14.29)	7	
46 to 55	10(55.56)	2(11.11)	2(11.11)	4(22.22)	18	

3.5 Reoperation rate after THA within one year

Among the 341 enrolled patients 36 (10.6%) underwent reoperations. Majority of them 21 (6.2%) patients underwent reoperation within one year after the primary THA. Thus, the one-year reoperation rate among young adults who underwent primary THA at Muhimbili orthopedic institute was 6.2 %.

Table 5: Showing the duration of reoperation after primary THA from 2015 to 2019 (N1=36 out of N=341)

Variable	Frequency	Percent
Duration		
Within 1 Month	3	**0.9**
Less Than 3 Months	7	**2.1**
3 Months To 6 Months	5	**1.5**
6 Months To 1 Year	6	**1.8**
More Than 1 Year	15	4.4

CHAPTER FOUR

4.0 DISCUSION

The indications for THA in young adults have been increasing worldwide. Muhimbili Orthopedic Institute has also witnessed an increase in young adults undergoing primary THA and reoperations after primary THA. The mean age for patients undergoing primary THA was 40years which was similar to the study by Archibeck et al in New Mexico United states of America with the mean age at primary THA 39years(13) and Magoumou et al in Cassablanca Morocco which was 36 years(15) . However the mean age at primary THA was higher in the study by Kuijpers et al from Dutch arthroplasty registry the mean age was 47.1 years(14). There was male predominance in the study by 53.4% which was the opposite in the studies by Archibeck et al and Kuijipers et al which demonstrated female predominance of 51% and 53% respectively(13,14). In a study by Magoumou et al in Cassablanca Morocco showed a higher female predominance about 60%(15).

The indications for primary THA in the study were mainly due to osteoarthritis accounting nearly half of patients followed by a quarter of patients due to avascular necrosis then femoral neck fracture and neglected hip dislocations. The proportion of Patients with avascular necrosis(AVN) was nearly similar to the study by Archibeck et al which was with a relatively low proportion of osteoarthritis 32.5% and femoral neck fracture (13). In the study by Magoumou et al in Cassablanca Morocco showed high proportions of THA due to Avascular necrosis(AVN) 31.9% and low proportions of osteoarthritis and trauma of femoral neck and acetabulum(15). In the study by Wangen et al the predominant indication for primary THA was similar to this study but it was osteoarthritis due to congenital dislocations with lower proportions avascular necrosis and femoral neck fracture(16).

The implant choice determines the longevity or survivorship of the prosthetic implants and the possible future complications. In this study the predominant implant of choice was the uncemented THA design 85.5% followed by the hybrid THA and uncemented THA with almost same size of femoral head with varying neck length. This was similar to the studies by

Kuijpers et al from the Dutch arthroplasty registry which showed predominance of uncemented THA 79.8% and low proportion of the uncemented design and the study by Magoumou et al in Casablanca Morocco on young adults under 55 years showed similar predominance of the uncemented THA design and low proportion of cemented THA(14)(15).

In this study early complications within one year after primary THA among the young adults the majority were due to hip dislocation which accounted for 5.3% followed by aseptic loosening, periprosthetic fracture, implant mal position and lastly surgical site infection. These finding are similar to the studies by Woolsom et al on Risk factors for dislocation during first 3 months after primary total hip replacement where the rate of dislocation was 4% and the study by Dudda et al on risk factors for early dislocation after total hip arthroplasty study the rate of early hip dislocation was found to be 4.8%(24)(7). In the study by Murphy et al on early reoperations after total hip arthroplasty; incidence, causes and cost in the US medicare population the rate of hip dislocation was relatively as low as 3.6%(5). Also the study by Mei et al on long term outcome of total hip arthroplasty in patients younger than 55 years; a review of systematic contemporary literature the rate of dislocation was the lowest 2.4%(6). In the studies by Woolson et al and Dudda et al showed risk factors associated with early complications after THA in young adults were age of the patient where the older the patient the higher the risk of complications and gender where in this study higher age group of 36-55 years were associated with more early complications and males showed higher complications rates 5.6% compared to females 4.9 % with no statistical difference(7,24). In the study by Plate et al showed the size of the femoral head is the risk early dislocation with the head size less than 26mm and more than 36mm of outer diameter, however in this study the majority of patient underwent THA with size 28mm outer diameter 94.8% with varying femoral neck length(25).

Reoperation is one of the problems in young adults undergoing primary and revision THA, due high activity level in this age group. In this study the one year reoperation rate after primary THA due to the early complications was 6.2% which was higher compared to studies by Murphy et al on early reoperations after total hip arthroplasty which was 3.4% and Mei et al on long term outcome of total hip arthroplasty in patients younger than 55 years which was 1.3% with main similar indication due to hip dislocation and periprosthetic fracture(5,6).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Total hip arthroplasty is common among young adults with mean age at the fourth decade of life and nearly equal male to female ratio. Osteoarthritis (OA) is the leading indication for primary THA nearly half of patients followed by avascular necrosis of femoral head, femoral neck fractures, neglected hip dislocations and by far acetabular fracture, sequelae of hip infection and sequelae of childhood developmental hip dysplasia (DDH). The predominant implant of choice was the uncemented THA design and the hybrid and cemented THA were the least options. The early complications with one year after primary THA were due to hip dislocations followed by aseptic loosening, periprosthetic fractures, implant mal position and surgical site infection. Reoperations within one year were not uncommon due to early hip dislocations, aseptic loosening and periprosthetic fracture with younger age a risk factor.

5.2 Recommendation

There is a need for a long prospective study on long term outcome after primary THA and implant survivorship or longevity.

REFFERENCES

1. Daras M, Macaulay W, Total Hip Arthroplasty in Young Patients With Osteoarthritis. Am J Orthop (Belle Mead NJ). 2009 Mar;38(3):125-9. PMID: 19377644.

2. Kurtz S, Lau E, Ong K, Zhao K, Kelly M, Bozic K. Future young patient demand for primary and revision joint replacement: National projections from 2010 to 2030. Clin Orthop Relat Res. 2009;467(10):2606–12.

3. Ethgen O, Bruyerè O, Richy F, Dardennes C, Reginster JY. Health-Related Quality of Life in Total Hip and Total Knee Arthroplasty: A Qualitative and Systematic Review of the Literature. J Bone Jt Surg - Ser A. 2004;86(5):963–74.

4. Mariconda M, Galasso O, Costa G, Recano P, Cerbasi S. Quality of life and functionality after total hip arthroplasty : a long-term follow-up study. British editorial society of bone and joint surgery 2011;Vol 1–10.

5. Murphy W, Harris S, Lin B, Cheng T, Murphy B, Early reoperation after total hip arthroplasty; incidence, causes, cost in the US medicare population. British editorial society of bone and joint surgery 2019; Vol 101-B, No Supp-12.

6. Mei Y, Gong J, Safir O, Gross A, Kuzyk P. Long-term outcomes of total hip arthroplasty in patients younger than 55 years: A systematic review of the contemporary literature. Can J Surg. 2019;62(4):249–58.

7. Woolson S, Rahimtoolamd Z. Risk factors for dislocation during the first 3 months after primary total hip replacement. J Bone Jt Surg .1999;5403(99):90219.

8. Adelani M, Crook K, Barrack L, Maloney W, Clohisy J. What is the prognosis of revision total hip arthroplasty in patients 55 years and younger? Clin Orthop Relat Res. 2014;472(5):1518–25.

9. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. J Bone Jt Surg - Ser A. 2007;89(4):780–5.

10. Kingori J, Gakuu L. Total hip replacements at Kikuyu hospital, Kenya. East Afr. Ortho. J, 2011;Vol 4(2):44–7.

11. Sharma S, Elhence A, Banerjee S, Jalan D, Gahlot N, Barwar N, Total Hip Arthroplasty in Young Adults. Bone Joint J.2017;2(1):2–4.

12. González Della Valle A, Sharrock N, Barlow M, Caceres L, Go G, Salvati EA. The modern, hybrid total hip arthroplasty for primary osteoarthritis at the Hospital for Special Surgery. Bone Joint J. 2016;98-B(1_Supple_A):54–9.

13. Archibeck M, Surdam JW, Schultz SC, Junick DW, White RE. Cementless Total Hip Arthroplasty in Patients 50 Years or Younger. J Arthroplasty. 2006;21(4):476–83.

14. Kuijpers M, Hannink G, Vehmeijer SBW, Van Steenbergen LN, Schreurs B. The risk of revision after total hip arthroplasty in young patients depends on surgical approach, femoral head size and bearing type; An analysis of 19,682 operations in the Dutch arthroplasty register. BMC Musculoskelet Disord. 2019;20(1):1–7.

15. Magoumou A, Dabiré N, Andaloussi Y El, Abdallah S, Belmoubarik A, Ahed R. Total Hip Replacement in Young Adults Less Than Fifty Year Old: Our Experience. Open J Emerg Med. 2017;05(02):43–74.

16. Wangen H, Lereim P, Holm I, Gunderson R, Reikerås O. Hip arthroplasty in patients younger than 30 years: Excellent ten to 16-year follow-up results with a HA-coated stem. Int Orthop. 2008;32(2):203–8.

17. Kim Y, Kim J, Park J, Joo J. Comparison of total hip replacement with and without cement in patients younger than 50 years of age : The results at 18 years. J Bone Jt Surg - Ser B. 2011;93 B(4):449–55.

18. Schmitz M. Cemented Total Hip Arthroplasty and Impaction Bone Grafting in Young Patients. J Bone Jt Surg - Ser B. 2017;93 B(4):449–55.

19. Busch V, Klarenbeek R, Slooff T, Schreurs BW, Gardeniers J. Cemented hip designs are a reasonable option in young patients. Clin Orthop Relat Res. 2010;468(12):3214–2

20. Shin E, Moon K. Cementless total hip arthroplasty in young patients under the age of 30: a minimum 10-year follow-up. HIP Int. 2018;28(5):507–13.

21. Merchant I, Park C, Complications of Total Hip Replacement. Clin Orthop relat res;2018; Vol 346;865-892

22. Lu Y, Xiao H, Xue F. Causes of and treatment options for dislocation following total hip arthroplasty. Exp Ther Med. 2019;18(3):1715-1722.

23. Murphy W, Harris S, Lin B, Cheng T, Murphy B, The. Early reoperation after total hip arthroplasty: incidence, causes, cost in the US medicare population. Orthopedic Proceedings. 2019, VOL 101; (SUPP_12), 40-40

24. Dudda M, Gueleryuez A, Gautier E, Busato A, Roeder C. Risk factors for early dislocation after total hip arthroplasty : a matched case-control study. J Orthop Surg (Hong Kong). 2010 Aug;18(2):179-83.

25. Plate J, Seyler T, Stroh DA, Issa K, Akbar M, Mont MA. Risk of dislocation using large- vs . small-diameter femoral heads in total hip arthroplasty. BMC Res Notes 5, 553 (2012)

APPENDICES

Appendix I: Questionnaire

Title: INDICATIONS AND EARLY OUTCOME OF TOTAL HIP ARTHROPLASTY IN YOUNG ADULTS AT MUHIMBILI ORTHOPEDIC INSTITUTE FROM 2015-2019;

Questionnaire number……..

1. Patient File Number……
2. Age…….
3. Gender a) Male
   b) Female
4. Date of primary operation…D/M/Y…….
5. Side of hip operated
   a) Right
   b) Left
6. Type of operation
   a) Primary THA
   b) Revision THA

   If answer is b) jump to question 10.

7. Indications for primary THA
    a) Osteoarthritis(coxarthrosis)
    b) A vascular necrosis (AVN)
    c) Femoral neck fracture
    d) Sequelae of infection
    e) Neglected hip dislocation
    f) acetabular fractures
    g) Hip dysplasia (DDH)
    h) Femoral acetabular impingement.
    i) Others……..
8. Choice of implant used.
    a) Cemented THA
    b) Uncemented THA
    c) Hybrid THA
    d) Reversed Hybrid.
9. Femoral Head size.
    a) 22mm
    b) 28mm
    c) 32mm
    d)36mm
10. Early complications after THA
    a) Hip dislocation
    b) Surgical site infection
    c) Peri prosthetic fracture
    d) Aseptic loosening
    e) others

11. Duration of reoperation/revision THA from primary THA

    a) Within 1 month

    b) Less than 3 months

    c) 3 months to 6 months

    d) 6 months to 1 year

    e) More than 1 year

12. Indication for revision THA within one year

    a) Hip dislocation

    b) Peri prosthetic fracture

    c) Infection

    d) Implant malposition

    e) Others

Appendix II: Approval for ethical clearance

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

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Ref. No. HD/MUH/T.179/2018/02
IRB#: MUHAS-REC-06-2020-308

17th July 2020

Deogratias Patrick Nguyale,
MMed Orthopaedics and Traumatology,
School of Medicine,
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED "INDICATIONS AND EARLY OUTCOME OF TOTAL HIP ARTHROPLASTY IN YOUNG ADULTS AT MUHIMBILI ORTHOPEDIC INSTITUTE FROM 2014-2019"

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from **17th July, 2020 to 17th July, 2021.** In case you do not complete data analysis and dissertation report writing by **17th July, 2021,** you will have to apply for renewal of ethical clearance prior to the expiry date.

Dr. Emmanuel Balandya
ACTING: DIRECTOR OF POSTGRADUATE STUDIES

cc: Director of Research and Publications
cc: Dean, School of Medicine, **MUHAS**

Appendix III: Introduction Letter

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
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Ref. No. HD/MUH/T.179//2018

22nd July, 2020

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

Re: INTRODUCTION LETTER

The bearer of this letter is Deogratias Patrick Nguyale, a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MMed. Orthopaedics and Traumatology.

As part of her studies he intends to do a study titled: "**Indications and Early Outcome of Total HP Arthroplasty in Young Adults at Muhimbili Orthopaedic Institute from 2014-2019..**"

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.

Ms. Sharifa Kamby
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Dean, School of Medicine, **MUHAS**
cc: Deogratias Patrick Nguyale

Appendix IV: Permission to conduct research

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AB.145/ 146/02/47 **22nd July, 2020**

Director,
Postgraduate Student,
Muhimbili University of Health and Allied Sciences,
P.O.Box 65001,
Dar es Salaam.

RE: APPROVAL FOR PERMISSION TO CONDUCT RESEARCH.

Reference is made to your letter dated 16th July, 2020 captioned the above subject matter.

I am pleased to officially inform you that, your request for **Mr. Deogratias Patrick Nguyale** to conduct a research on **"INDICATIONS AND EARLY OUTCOME OF TOTAL HP ARTHOPLASTY IN YOUNG ADULTS AT MUHIMBILI ORTHOPAEDIC INSTITUTE FROM 2014 - 2019."** has been approved. Therefore, you're very kindly requested to inform him to start as requested.

It's our hope that you will extend enough cooperation regarding this matter.

.....
Abdallah Mbuguni
For: Executive Director

Cc: Dean, School of Medicine, **MUHAS**
Deogratias Patrick Nguyale