

INDICATIONS AND EARLY OUTCOME OF TOTAL HIP ARTHROPLASTY IN YOUNG ADULTS AT MUHIMBILI ORTHOPAEDIC INSTITUTE, TANZANIA

D.P. Ngunyale, MD, MMed, **B.T. Haonga**, MD, MMed, **M.S. Muhamedhusein**, MD, MMed, FCS Cossecsa, **V.N. Lupondo**, MD, MMed, FCS ECSA, **C.N. Mcharo**, MD, MMed, **K.S. Nungu**, MD, MMed, PhD, Muhimbili University of Health and Allied Sciences, Department of Orthopaedics and Traumatology, P.O. Box 65001, Dar-es-Salaam, Tanzania and Muhimbili Orthopaedic Institute, P.O. Box 65474, Dar-es-Salaam, Tanzania and **R. Ndeserua**, MD, MMed, Muhimbili Orthopaedic Institute, P.O. Box 65474, Dar-es-Salaam, Tanzania

Correspondence to: Dr. Deogratius P. Ngunyale, Muhimbili University of Health and Allied Sciences, Department of Orthopaedics and Traumatology, P.O. Box 65001, Dar-es-Salaam, Tanzania and Muhimbili Orthopaedic Institute, P.O. Box 65474, Dar-es-Salaam, Tanzania, Email: patrickdeogratias541@yahoo.com

ABSTRACT

Background: Total hip arthroplasty is an effective surgical procedure in patients with advanced hip pathologies. The newer techniques, implants and improved functional outcomes have increased demand for the procedure in young adults. The indications for primary and revision total hip arthroplasty, early outcome and its associated risk factors in young adults are not well known at Muhimbili Orthopaedic institute.

Objectives: To determine the indications, early outcome and associated risk factors for total hip arthroplasty among young adults operated at Muhimbili Orthopaedic Institute.

Methods: A descriptive retrospective cross-sectional study, involving 341 patients who underwent total hip arthroplasty. Data was retrieved from total joint registry, verified from patient's files and hospital management information system and analyzed using Statistical Package for Social Sciences version 20.

Results: A total of 341 patients were enrolled in the study, with a mean age of 40 ± 12 years with a slight male predominance of 54.4%. The leading indication for primary total hip arthroplasty was osteoarthritis (48.2%). Other indications included avascular necrosis (27.2%), femoral neck fracture (14.4%), neglected dislocation (4.9%), acetabular fracture (3.3%) and developmental dysplasia of the hip (1%). In majority (85.6%) of patients the implant of choice was uncemented, whilst the hybrid was used in 9.2% and cemented implants in 4.3% of the patients. Thirty six patients (10.6%) had early complications including hip dislocation (5.3%), aseptic loosening (2.1%), peri-prosthetic fracture (1.2%), implant malposition (1.2%) and surgical site infection (0.9%). The reoperation rate within one year was 6.2%.

Conclusion: Total hip arthroplasty is becoming increasingly common among young adults. Osteoarthritis is the leading indication for primary total hip replacement. Early complications within one year included hip dislocation, aseptic loosening, periprosthetic fracture, implant malposition and surgical site infection. The risk factors for reoperations within one year were associated with advanced age and male gender.

Key words: Indications, Early outcome, Total hip arthroplasty and young adults

INTRODUCTION

Total hip arthroplasty is an effective surgical procedure in patients with end stage hip diseases (1). Total hip arthroplasty is the mainstay treatment for osteoarthritis in adults with significant improvement of function and quality of life (2,3).

The success of total hip arthroplasty with its improvement in techniques and biomaterial has increased demand for the procedure in young adults. Furthermore, 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 (4).

Total hip arthroplasty has been shown to have excellent long term outcome but early reoperations remain risk factors in young adults early outcome (5). By the year 2030 it is estimated that more than 25% of all THA will be placed in patients under the age of 55 years. The benefit of regaining mobility in young adults has a significant impact on social and psychological wellbeing. This has pushed many orthopaedic surgeons to opt for total hip replacement even in young adults due to its excellent results (6). 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.

We undertook the study to determine the indications for primary total hip arthroplasty in young adults operated at Muhimbili Orthopaedic Institute. Also, we evaluated the type of implants used and the early complications that necessitated reoperation and analyzed the associated risk factors within one year.

MATERIALS AND METHODS

A retrospective cross section hospital-based study was conducted at Muhimbili Orthopaedic Institute (MOI) located in Dar-es-Salaam, Tanzania. It has a total hip registry book with 100% documentation of the cases done with patient's social demographic information, date of operation, surgical team, indications, 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. The participants included in this study were adults from the age of 18 to 55 years who underwent total hip arthroplasty at Muhimbili Orthopaedic Institute from 2015 to 2019. There were a total of 341 patients who were conveniently selected from the total hip registry book.

The data were collected from hospital total hip arthroplasty registry book, patients case notes for the clinical presentation and clinical diagnosis. Radiological images were retrieved from the Hospital Health Management Information System (HMIS) for radiological evaluation and confirmatory diagnosis of the pre-operative and post-operative X-rays. The information captured from the registry included patients age, gender, clinical diagnosis, type of procedure (whether primary THA or revision / reoperation THA), side of operation and the implants used (the femoral stem, acetabular components and femoral head size whether cemented, uncemented or hybrid type of prosthesis). The information obtained was filled in a pre-tested structured questionnaire (designed data extraction form) with all the required variables for analysis.

Data collected was analysed using the Statistical Software for Student Package (SPSS software version 20). Categorical data like gender of the patient, type of operation, indications, choice of implant and early complications were 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 reoperation THA was expressed as mean \pm SD (standard deviation) and compared using student test.

RESULTS

Social demographic characteristics

A total of 620 patients' records who underwent total hip arthroplasty between January 2015 and December 2019 were reviewed. Among them 341 young adult patients from age 18 to 55 years met the inclusion criteria and were eligible for the study. The males made up 53.4% of the included participants. The most common age group was between 46 to 55 years (44.3%) and the mean age of the included patients was 40 ± 12 SD years. (Table 1).

Table 1

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

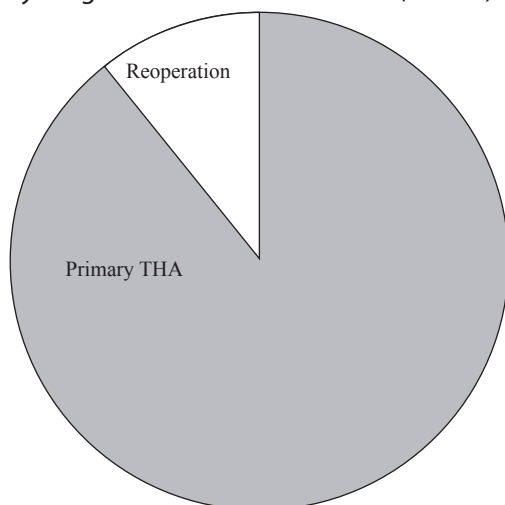
Variable	Frequency	(%)
Sex		
Male	182	53.4
Female	159	46.6
Total	341	100
Age group (years)		
46-55	151	44.3
36-45	69	20.2
26-35	64	18.8
15-25	57	16.7
Total	341	100
Side operated		
Right	180	52.8
Left	161	47.2
Total	341	100

Indications for total hip arthroplasty

Among the 341 patients, 305 (89.4%) patients underwent primary total hip arthroplasty whilst the remaining 10.6% underwent reoperation due to early complications from the primary procedure.

Figure 1

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



Indication for primary total hip arthroplasty

Among the 305 participants who underwent primary total hip arthroplasty, almost half (48.2%) coxarthrosis.

Table 2

Indications for THA among young adults who underwent primary THA from 2015 to 2019 (N=305)

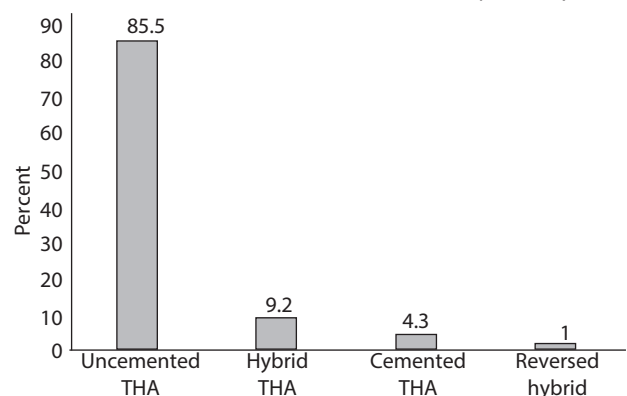
Variable	Frequency	(%)
Indications		
Osteoarthritis (coxarthrosis)	147	48.2
Avascular Necrosis (AVN)	83	27.2
Femoral neck fracture	44	14.4
Neglected hip dislocation	15	4.9
Acetabular fracture	10	3.3
Sequelae of infection	3	1
Hip Dysplasia (DDH)	3	1
Total	305	100

Type of implant used

Among the 305 patients who underwent primary THA, the uncemented implants were the most commonly used (85.5%). The outer diameter of the most commonly used femoral head was size 28mm (94.8%) (Figure 2).

Figure 2

Type of implant used among patients who underwent THA from 2015 to 2019 (N=341)



Early complication and associated risk factors

Among the 341 enrolled patients, 36 patients underwent revision surgery due to early

complications. Hip dislocation was the leading early complication and was seen in 50% of those who underwent revision surgery (Figure 3).

Table 3

Proportion of indications for revision THA due to early complications from 2015 to 2019 (N=36)

Variable	Frequency	(%)
Early complications		
Hip dislocation	18	50
Aseptic loosening	7	19.4
Implant malposition	4	11.1
Periprosthetic fracture	4	11.1
Surgical site infection	3	8.3

The early complications were noted more among males (52.8%). Males also made up higher proportion of hip dislocation (60.9%) and aseptic loosening (66.7%) whereas the periprosthetic fractures was more among females (75%). The

early complications were also higher as the age ranges increased, although this was found not to be 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 (years)						
15 – 25	2 (66.67)	0 (0.00)	1 (33.33)	0 (0.00)	3	0.085*
26 – 35	7 (87.5)	0 (0.00)	0 (0.00)	1 (12.5)	8	
36 – 45	4 (57.14)	1 (14.29)	1 (14.29)	1 (14.29)	7	
46 – 55	10 (55.56)	2 (11.11)	2 (11.11)	4 (22.22)	18	

Reoperation rates after THA within one year

Among the 341 enrolled patients, 36 (10.6%) underwent revision surgery. Twenty one patients (6.2%) underwent reoperation within one year after the primary THA. Thus, the one-

year reoperation rate among young adults who underwent primary THA at Muhimbili Orthopaedic Institute was 6.2%. Another 15 had to undergo revision surgery after more than 1 year.

Table 5

Showing the duration of reoperation after primary THA from 2015 to 2019 (N=36)

Variable	Frequency	(%)
Duration		
Within 1 month	3	14.3
Less than 3 months	7	33.3
3 months – 6 months	5	23.8
6 months – 1 year	6	28.5

DISCUSSION

The indications for hip arthroplasty in young adults have been increasing worldwide. The same phenomenon has been found at Muhimbili Orthopaedic Institute. The mean age for young adults undergoing primary THA is 40 years which is similar to the study by Archibeck *et al.* (7) in New Mexico with the mean age at primary THA of 39 years, a bit higher than found by Magoumou *et al.* (8) in Cassablanca which was 36 years and slightly lower than the study by Kuijpers *et al.* (9) in Holland who found the mean age was 47.1 years. In this study, there was slightly more male patients undergoing total hip arthroplasty than females although the studies done by Archibeck *et al.* (7), Magoumou *et al.* (8) and Kuijpers *et al.* (9) showed the opposite.

The most common indications for primary THA in the study is osteoarthritis accounting for nearly half of patients followed by avascular necrosis, femoral neck fracture and neglected hip dislocations. The proportion of patients with avascular necrosis was similar to the study by Archibeck *et al.* (7) which was with a relatively low proportion of osteoarthritis (32.5%) and femoral neck fracture. In the study by Magoumou *et al.* (8) it was shown that hip arthroplasty due to avascular necrosis contributed to around 1/3rd of the cases. In the study by Wangen *et al.* (10), 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. The differences may be due to the fact that even patients with sickle cell disease, acetabular and femoral head trauma

were all considered as patients with avascular necrosis.

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%) with almost same size of femoral head with varying neck length. This was similar to the study by Kuijpers *et al.* (9) which showed predominance of uncemented THA 79.8% and the study by Magoumou *et al.* (8) which showed similar predominance of the uncemented THA design and low proportion of cemented THA. The uncemented THA design has shown excellent outcome among young adults who underwent primary total hip arthroplasty (7).

In this study, early complications within one year after primary THA among the young adults included hip dislocation, aseptic loosening, periprosthetic fracture, implant mal position and surgical site infection. Eighteen among all the patients (5.2%) had hip dislocation which was slightly higher than the study by Woolson *et al.* (10) where the rate of dislocation was 4% and the study by Dudda *et al.* (11) was found to be 4.8%. In the study by Murphy *et al.* (5), the rate of hip dislocation was as low as 3.6%. Also the study by Mei *et al.* (6), the rate of dislocation was 2.4%.

In the studies by Woolson *et al.* (10) and Dudda *et al.* (11) the risk factors associated with early complications after THA in young adults included age of the patient (the older, the higher the chances) and males showed higher complications rates (5.6% compared to 4.9% in females) although this was not statistically significant. In the study by Plate *et al.* (12), small femoral head size (less than 26mm) had significantly higher risk of dislocation, however in this study the majority (94.8%) of patients underwent THA with size 28mm outer diameter with varying femoral neck length (12). Hip dislocation are multifactorial and include patient factors like activity level, abductor muscular function, surgeon factors including implant mal position and choice of prosthetic implants.

Reoperation is one of the problems in young adults undergoing primary and revision hip arthroplasty. 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.* (5) which was

3.4% and Mei *et al.* (6) which was 1.3% but both had similar indication of revision including hip dislocation and periprosthetic fracture.

Strengths of the paper

- (i) Large sample size
- (ii) Data of five years was collected

Weaknesses of the paper

- (i) Short follow-up time (one year)
- (ii) Retrospective nature of the study
- (iii) Non-comparative study

CONCLUSION AND RECOMMENDATION

Total hip arthroplasty is common among young adults with mean age of 40 years and nearly equal between males and females. Osteoarthritis 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. The early complications included hip dislocations, aseptic loosening, periprosthetic fractures, implant mal position and surgical site infection. Reoperations within one year were not uncommon and they were due to early hip dislocations, aseptic loosening and periprosthetic fracture.

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

ACKNOWLEDGEMENTS

This study was part of a thesis for Masters of Medicine in orthopaedics and trauma completed at the Muhimbili University of Health and Allied Sciences by the first author (Deogratias Patrick Ngunyale). We would like to acknowledge the entire Department of Orthopaedics and Trauma, especially the arthroplasty unit, of Muhimbili Orthopaedic Institute.

Disclosure: This paper was part of the dissertation work as per the requirements of Masters of Medicine at the Muhimbili University of Health and Allied Sciences.

Data availability: The dataset used is available from the corresponding author on request.

Conflicts of interest: None to declare.

Funding statement: The research was self-funded by the authors.

REFERENCES

1. Daras, M. and Macaulay, W. Total hip arthroplasty in young patients with osteoarthritis. *Am J Orthop* (Belle Mead NJ). 2009; **38**(3):125-129. PMID: 19377644.
2. Kurtz, S., Lau, E., Ong, K., Zhao, K., Kelly, M. and 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., Bruyère, O., Richy, F., Dardennes, C. and Reginster, J.Y. 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):963–974.
4. Mariconda, M., Galasso, O., Costa, G., Recano, P. and Cerbasi, S. Quality of life and functionality after total hip arthroplasty: A long-term follow-up study. *Br Edit Soc Bone Jt Surg.* 2011; 1–10.
5. Murphy, W., Harris, S., Lin, B., Cheng, T. and Murphy, B. Early reoperation after total hip arthroplasty; incidence, causes, cost in the US medicare population. *Orthop Procs.* 2019; **101-B** (Supp-12): 40.
6. Mei, Y., Gong, J., Safir, O., Gross, A. and 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):249–258.
7. Archibeck, M., Surdam, J.W., Schultz, S.C., Junick, D.W. and White, R.E. Cementless total hip arthroplasty in patients 50 years or younger. *J Arthroplasty.* 2006; **21**(4):476–483.
8. Magoumou, A., Dabiré, N., Andaloussi, Y.E.I., Abdallah, S., Belmoubarik, A. and Ahed, R. Total hip replacement in young adults less than fifty year olds: Our experience. *Open J Emerg Med.* 2017; **05**(02):43–74.
9. Kuijpers, M., Hannink, G., Vehmeijer, S.B.W., Van Steenberghe, L.N. and 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.
10. Woolson, S. and Rahimtoolamd, Z. Risk factors for dislocation during the first 3 months after primary total hip replacement. *J Bone Jt Surg.* 1999; **5403**(99):90219.
 11. Dudda, M., Gueleryuez, A., Gautier, E., Busato, A. and Roeder, C. Risk factors for early dislocation after total hip arthroplasty: a matched case-control study. *J Orthop Surg (Hong Kong).* 2010; **18**(2):179-183.
 12. Plate, J., Seyler, T., Stroh, D.A., Issa, K., Akbar, M. and Mont, M.A. Risk of dislocation using large- vs . small-diameter femoral heads in total hip arthroplasty. *BMC Res Notes.* 2012; **5**:553.