



## Total hip replacement surgery in Ethiopia

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### Abstract

**Background:** Total hip replacement (THR) surgery has evolved over years to the point that it has been considered as “the operation of the century”. For developed countries, arthroplasty is well established for the management of various joint disorders and has completely revolutionised the treatment of the arthritic hip. The story is different in developing nations. Expensive implant costs and lack of trained orthopaedic surgeons are the main constraints; poverty has caused African countries to remain behind from enjoying the benefits of this medical breakthrough. In this study, we report our first and largest series of 50 such surgeries performed at the CURE Hospital in Addis Ababa. We believe that this is the first consecutive case series from Ethiopia and wanted to share our experience.

**Methods:** Prospectively, all consecutive patients that underwent THR at CURE Hospital from October 2009 to October 2013 were followed for over 3 years using clinical assessments and hip scores. The hip implant used was a Stryker Omnifit Uncemented HA-coated prosthesis. The Visual Analog Scale (VAS) for pain and the Modified Oxford Hip Score were used to assess outcomes. Variables recorded for each patient included sociodemographic information, diagnosis, comorbidity, surgical approach, duration of surgery, estimated blood loss, implant sizes for Ethiopian hips, complications, sequelae, hip scores, and final patient satisfaction. These were analysed using SPSS version 16. Patterns and learning points were observed.

**Results:** Of the 50 consecutive THR patients, 26 were male. Mean age was 48 years (range 14-85). In 30 hips, the right side was operated on, and 2 were bilaterally treated. Primary osteoarthritis (OA) and avascular necrosis (AVN) were the leading diagnoses requiring THR. Previous partial hip replacement (PHR, hemiarthroplasty) was converted to THR in 6 patients. The commonest comorbidities were diabetes mellitus and hypertension. There were 4 hips that dislocated after THR and 1 needed revision surgery. There was 1 persistent infection, 1 case of deep vein thrombosis (DVT), and 1 death. Mean EBL was approximately 1 L and only 5 patients needed transfusion. The most common sizes for Ethiopian hips were a 28 mm+0 head, 52 mm acetabular shell, and 140 mm #8 stem. The VAS and Modified Oxford Hip scores both improved significantly, and the results were comparable with international standards.

**Conclusions:** THR is a viable, safe, and effective option in Ethiopia. Appropriate staff training, careful patient selection, continuous supply chain of implants, and establishing a dedicated joint replacement centre will reliably sustain THR surgery.

**Keywords:** THR, total hip arthroplasty, osteoarthritis, hip surgery, implants, arthritis, hip prosthesis

### Introduction

Total hip replacement (THR) is a surgical procedure or a form of arthroplasty whereby both the femoral and acetabular parts of the hip joint are surgically replaced with prostheses of different



human-biocompatible materials. It is among the most successful and cost-effective interventions in medicine.<sup>1</sup> There are a variety of types of prosthetic surfaces, including metal-on-plastic, metal-on-metal, and ceramic-on-ceramic. The type of prosthesis used depends upon the needs of the particular patient, cost, and the surgeon performing the procedure. The indications to perform THR vary, and the large majority of patients who undergo the operation experience improved quality of life. Patients commonly undergo THR after nonoperative treatments (such as activity modifications, analgesics, anti-inflammatories, or use of a cane) have failed to provide relief from the arthritis symptoms. THR involves surgically removing the arthritic parts of the joint (cartilage and bone) and replacing the “ball and socket” part of the joint with artificial components made from metal alloys. A high-performance bearing surface is placed between the “metal” parts and is typically made from a durable polyethylene plastic. Other materials, including ceramics, newer plastics, or metals have also been used.

### **Main historical landmarks of total hip arthroplasty (THA):**

Major hip surgeries have been taking place for at least 3 centuries. Attempts have progressed from rudimentary surgeries to the modern THR. Major milestones can be summarised as follows:

**Excisional Arthroplasty:** Anthony White (1782-1849), of the Westminster Hospital in London, is credited with the first excisional arthroplasty in 1821. This procedure ameliorated pain and preserved mobility, but at the expense of stability.<sup>2</sup>

**Intertrochanteric Osteotomy for Pseudoarthrosis:** John Rhea Barton (1794-1871), in Philadelphia, is credited with performing the first osteotomy on an ankylosed hip in 1826. He performed an intertrochanteric osteotomy without anaesthesia in only 7 minutes. After 20 days, he manipulated the osteotomy site to produce a fibrous non-union (pseudoarthrosis).<sup>3</sup>

**Interpositional Arthroplasty:** Auguste Stanislas Verneuil (1823–95), from Paris, France, performed soft tissue hip interpositions in 1860. Léopold Ollier's (1830-1900) work in Lyon, France, also generated tremendous interest in the concept of interpositional arthroplasty using fascia lata, skin, and pig-bladder submucosa.<sup>4</sup>

**Hip Cheilotomy:** John Benjamin Murphy (1857-1916), from Chicago, simply removed overhanging bone osteophytes from the base of the head of the femur and the rim of the acetabulum—a procedure described as hip cheilotomy.<sup>5</sup>

**Ivory Ball & Socket:** Berliner Professor Themistocles Glück (1853-1942) led the way in the development of hip implant fixation. In 1891, Glück produced an ivory ball and socket joint that he fixed to the bone of tuberculosis patients with nickel-plated screws. This is the earliest recorded attempt at hip replacement and occurred in Germany, with results presented at the 10<sup>th</sup> International Medical Conference.<sup>6</sup>

**Radical Hip Excision (Girdlestone):** In the 1940s, resection of the femoral head, especially for tuberculosis and infection, was popularised by Gathorne Robert Girdlestone (1881-1950) from the military Orthopaedic Centre in Oxford, United Kingdom. *“If thine femoral head offend thee, pluck it out and cast it from thee!”*<sup>7</sup> This operation is still practiced in developing countries and occasionally used today as last resort in failed THA.

**Mold Arthroplasty (Glass and Steel):** In 1925, the American surgeon Marius Smith-Petersen created the first mold arthroplasty out of glass. This consisted of a hollow hemisphere that could



fit over the femoral head and provide a new smooth surface for movement. Despite glass being a biocompatible material, it failed to withstand the great forces going through the hip joint and shattered. Smith-Petersen, along with Philip Wiles, later went on to trial the first stainless steel total hip replacement that was fitted to bone with bolts and screws.<sup>8</sup>

**Metal-on-metal:** The first to use a metal-on-metal prosthesis on a regular basis was English surgeon George McKee. In 1953, he began by using the modified Thompson stem (a cemented hemiarthroplasty used for neck of femur fracture treatment) with a new 1-piece cobalt-chrome socket as the new acetabulum. This prosthesis had a good survival rate, with 1 study showing a 28-year survival rate of 74%. Yet this method grew unpopular by the mid-1970s because of the local effects of metal particles seen during revision surgery for prosthetic failure.<sup>9</sup>

**Hemiarthroplasty (Thompson-Moore):** Frederick Röeck Thompson (1907-83) developed a Vitallium® prosthesis in 1950, which featured a distinctive flared collar below the head and a vertical intramedullary stem, designed by Harold R. Böhlman (1893-1979), from Nebraska, and Austin Moore (1899-1963). Dr Moore inserted the first such metal prosthesis at The Johns Hopkins Hospital in 1940. These were the first hip arthroplasty products that were widely distributed. They eventually became legendary and are still widely used for replacement of the femoral head and neck in developing countries, especially following femoral neck fractures in the elderly.<sup>10</sup>

**Low-friction Arthroplasty:** The orthopaedic surgeon, Professor Sir John Charnley, who worked at the Manchester Royal Infirmary, is considered the father of the modern THA. His low-friction arthroplasty, designed in the early 1960s, is identical, in principle, to the prostheses used today. Charnley's design consisted of 3 parts: a metal femoral stem, a polyethylene acetabular component, and acrylic bone cement.<sup>11</sup>

### ***Current statistics on THR***

In 2010, according to the CDC, there were 332,000 THR surgeries performed in the U.S. and today it is widely recognised as among the most successful surgical interventions ever developed. Arthritis (OA, post-traumatic, and rheumatoid) and AVN account for over 95% THR indications. 85% of patients undergoing total hip replacement have a diagnosis of osteoarthritis (OA).<sup>12</sup>

Ninety to 95 per cent of patients can expect to have their total hip replacement functioning at 10 years, and in 85% they will still be functioning at 20 years.<sup>13</sup>

More than 90% of patients with THR report having either no pain or pain that is manageable with use of occasional over-the-counter medications.

### ***Expected outcomes***

Quality of life after surgery approximates that of a healthy reference population.<sup>14</sup> The large majority of hip replacement patients are able to walk unassisted without any limp for reasonably long distances. Improvements in pain, energy levels, sleep, social, and sexual function are all observed.<sup>15</sup> Oxygen demands on activity are decreased and walking ability improves.<sup>16</sup> Most of these improvements are seen within 3 months of surgery.<sup>17</sup> These gains in quality of life allow large numbers of patients to retain their independence and function more actively in society.

Many have no distance restrictions at all and resume hiking, golfing, bicycling, and other non-impact recreational activities. Running, jogging, twisting, heavy manual work and impact sports



are avoided. In general, quality of life after surgery approximates that of a healthy reference population.

### ***Future THR trends and demands***

Extensive research and greater quality designed studies are underway in areas of minimally invasive single incision surgery, computer assisted navigation surgery, biomaterial engineering of implants with maximum longevity, and manufacturing of better and cost-effective implants for younger patients engaged in high-impact activities. Despite over a 100-year history of THR surgery, a technique and a material to suit all patient characteristics is not yet a reality. Issues of implant longevity and indications in youth are also areas of technological research work.

### ***Care after surgery***

After THR, patients typically spend a few days in the hospital after the procedure (3 to 5 days is most typical). Some patients benefit from a short inpatient stay in a rehabilitation facility to help transition back to living independently at home. Most patients will walk with a walker or crutches for 3 weeks and then use a cane for another 4 weeks; after that the large majority of patients are able to walk freely. Immediate weight bearing is permitted in most cases depending on other surgical circumstances. Patients are allowed to shower following hospital discharge provided that there is no drainage coming from the incision site.

### ***Patient instructions***

Each patient is instructed in “Hip Precautions” after surgery. CURE Hospital provides pictorial instructions written in our language. There is a short list of restrictions on particular motions designed to prevent dislocation of the joint replacement. Driving is permitted between 2 and 4 weeks after the surgery. Specific precautions are individualised depending upon the approach used, but in general patients are encouraged to avoid the extremes of hip rotation (twisting motions of the leg) and flexion (bending forward). Low chairs, low couches, and swivel chairs should be avoided. Physiotherapy is important and usually lasts about a month, depending upon the patient age, fitness, and level of motivation; 2 to 3 therapy sessions per week are average for this procedure. The specific therapy procedures vary with the surgical approach but balance, safe walking, and reviewing hip precautions are emphasised early, and muscle strengthening are goals later on.

Like any major surgical procedure, total hip replacement is associated with certain medical and surgical risks. Although major complications are uncommon they may occur. The possibilities include infection, VTE, bleeding or blood transfusion, and anesthesia-related or medical risks. Hip-specific risks include infection at the surgical site (1-4 %) dislocation (1-9%) or VTE (1-3%). However, the overall frequency of major complications following total hip replacement is low, typically less than 5% depending on the individual’s medical risk factors.

In the event that a total hip replacement requires re-operation sometime in the future, the results are generally good, although often not as good as one typically gets with an uncomplicated first-time hip replacement. The results of repeat hip replacements (revisions) often depend on a number of factors that are not in the surgeon’s (or the patient’s) control such as: infection, bone loss, and the condition of the muscles and other soft tissues around the hip joint. But in general, revision hip replacement can achieve a durable result and provide substantial relief of pain. There



is good evidence that the experience of the surgeon correlates with outcome in all types of joint replacements including total hip replacements.

### ***THR in East Africa***

Recently THR is regularly practiced in some African countries, but sufficient data is not available in the literature.<sup>18</sup> In the previous years, THR is also known to be the commonest reason of referrals of Ethiopian patients for Orthopaedic surgery abroad.<sup>19</sup>

### ***Objectives***

The general objective of this study was to assess if it is feasible, viable, and safe to regularly perform THR surgery in Ethiopia. The specific objectives were to determine:

- 1) If THR is safe and effective for patients in Ethiopia,
- 2) Types of hip conditions for which THR operation is indicated in Ethiopia and
- 3) To describe the common sizes of THR implants fit in Ethiopian hip joints

### ***Methods***

Prospectively, all the first 50 consecutive hips that underwent THR surgery at CURE Hospital, between October 2009-November 2013, were followed until January 2017, using the VAS and Modified Harris Hip Score.<sup>20-22</sup> Average follow-up was 5.5 years (range 7.3 years-3.2 years). Standard primary THR protocol was followed including preoperative evaluation and preparation, surgery and postoperative rehabilitation. An internist, anesthesiologist, orthopaedic surgeons, skilled operation theatre staff, and a physiotherapist were part of the team.

### ***Inclusion criteria***

All patients who had significant disabling hip pain and moderate to severe functional limitation of activities of daily living due to various hip pathologies (from any cause) were included. Patients who had 1 or more of the following radiological signs were also included: loss of sphericity of the femoral head, collapse of the weight bearing area of the femoral head, flattening of the femoral head, joint space narrowing, nearly fused joint, acetabular changes, and osteoarthritic changes. Patients had to be willing to regularly follow up with a rehabilitation programme (guided by a physiotherapist) and comply with the doctor's instructions at the outpatient department (OPD).

### ***Clinical steps at CURE Hospital***

**Preoperative:** The patients were first electronically registered (EMR) and seen at the OPD. Most come referred from other hospitals with imaging studies done. After a diagnosis was made by the orthopaedic surgeon, preoperative VAS and Hip Scores were documented. Patients may be assisted by the surgeon or OPD trained nurse when needed (elderly, illiterate). They were then investigated further by an internist and anesthesiologist to ensure that they are fit for surgery. Routinely, the following laboratory investigations are done: Complete blood count, LFT, RFT, chest x-ray, and random blood sugar. Electrocardiogram and echocardiogram are done on selected patients after internist/anesthesiologist evaluation. The patient is admitted the day prior to the surgery. Two units of donated blood are ready as a backup. Most of the surgeries are done under spinal anesthesia. Intravenous prophylactic antibiotic (Ceftriaxone i.v.) is given during the



administration of the anesthesia within 1 hour of skin incision. The patient is put in a lateral position. The skin is prepared using betadine.

**Intra-operative:** Posterolateral approach is usually used to expose the hip which is then manually dislocated. Reaming of both the femur and the acetabulum is done using power instruments. Stryker Omnifit un-cemented HA-coated implants were used. After fitting with the appropriate implant size, the new hip is relocated/reduced and tested to confirm stability. Closure is done in 3 layers after irrigation with normal saline. A drain is not routinely used. A sterile dressing is applied, and an abduction pillow is placed between the knees. TED stockings and SCD's (Segmental Compression Device) are used for DVT prophylaxis. The patient is then taken to the private ward with the abduction pillow in place for the first 24 to 48 hours and then it will be kept for 6 weeks only while on bed. Intravenous antibiotics are usually given for another 1 day. Low molecular weight heparin (Enoxaparin 40 mg) is given daily after surgery until the patient leaves the hospital.

**Postoperative:** Control x-ray is taken immediately after surgery to confirm that the implants are in place. Physical therapy is started after 24 hours by a senior physiotherapist. The patient is typically allowed to bear full weight on the operated limb unless otherwise stated by the surgeon. The physical therapist teaches the patients on the precautions to take at home. A small pictorial leaflet is given to them. Emphasis is put on avoidance of hip flexion. The patient is allowed home between the fifth and seventh day after surgery depending on how independent he is with transfers and ambulation. The patient goes home with either a walker frame or 2 crutches and an elevated toilet seat. Routinely patients are next seen at the clinic 6 weeks later. The wound is inspected to confirm that there are no features of infection and another X-ray is taken to check on the implants. The patient is encouraged to do hip strengthening exercises and reminded about hip precautions. After this the patient is followed up for the next 1 year on a 3-monthly basis.

Another x-ray is taken after 1 year and every year thereafter. Clinical assessment with hip scoring was done at every visit. Demographics were recorded including variables such as diagnosis, comorbidity, surgical approach, duration of surgery, estimated blood loss, implant sizes for Ethiopian hips, complications, sequela, hip scores and final patient satisfaction. These were analysed using SPSS version 16. Patterns and learning points were observed.

### ***Statistical analysis***

Data from the Hospital's EMR was generated and analysis was carried out using the SPSS version 16. Additionally, data of hip scores collected by clinical assessment or phone call were recorded. Mean and standard deviation (SD) was calculated for quantitative data and percentage for categorical variables. Numbers and percentages were compared by Pearson Chi-square test. The association of complications with the various covariates was calculated using odds ratio, with a confidence interval of 95%. Results were considered significant if the P-value was < 0.05.

### **Results**

Of the 50 consecutive THR surgeries followed, 24 were male and 20 were female patients.

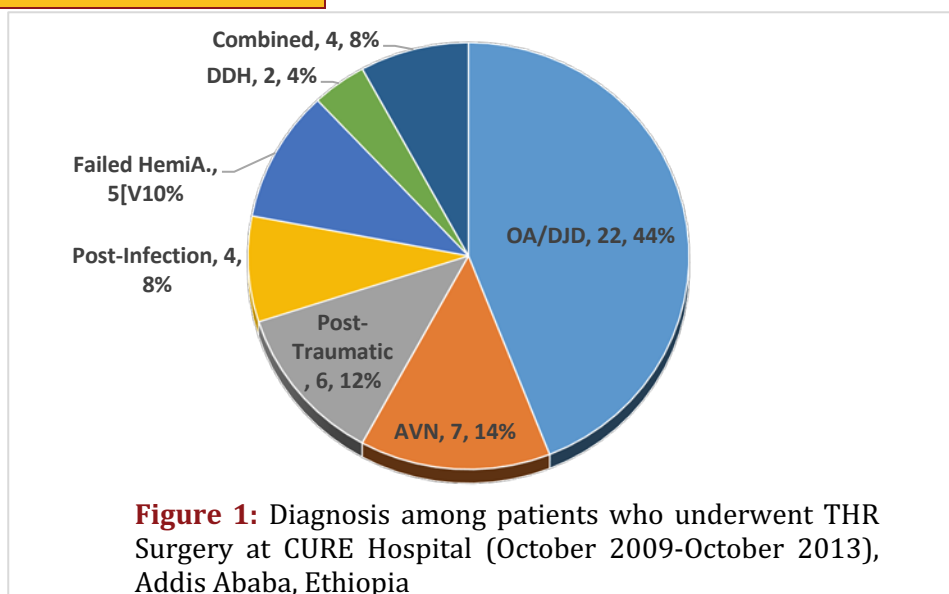
Average follow-up was 5.5 years (range 7.3-3.2 years). About two-thirds (30 of 44; 68.1%) of the patients came from the capital city of Addis Ababa. As shown in Table1, the average age was 47 years (range 14-85; SD 14.5). In 23 hips, only the right side was operated, in 15 hips only the left

hip was replaced. Six patients had bilateral surgery. Figure 1 shows that primary OA and AVN were the main diagnoses requiring THR.

We did not encounter patients with sickle-cell disease or FAI. Previous partial hip replacement for femur neck fracture was converted to THR in 6 patients. Average preoperative VAS score was high (68 mm) in the range of severe pain and the average modified Harris Hip Scores were very low. The posterolateral approach to the hip was used in all cases except 1 anterolateral approach. The most common medical comorbidities were hypertension (n = 5), asthma (n = 4), and diabetes (n = 2). Five patients were on ART. Table 2 lists all complications after the surgery. Two THR hips dislocated as a result of a fall accident. One was reduced closed and the other was reduced openly due to a delay in presentation. Both dislocations were posterior dislocations and fall injury was the cause. No re-dislocations occurred after reduction. One patient with a diagnosis of DDH developed a loose acetabular component and a postoperative infection that required 2 revisions (Girdlestone at CURE & THR, later abroad). One patient developed a loose stem, which was revised with a cemented stem. There were 2 temporary sciatic nerve palsies that fully resolved. There was 1 persistent deep infection, 1 DVT and 1 death from cardiac arrest. The average EBL was approximately 750 mL (range 350-1600 mL) and only 5 patients needed transfusion. These 5 transfused patients were among the first 12 patients operated where EBL was also higher. Average total surgical time was 113 minutes (range 70-165 minutes).

**Table 1: Age Distribution of patients who underwent THR surgery at CURE Hospital, Ethiopia**

Age group (years)	n	%
14-19	9	18
20-29	5	10
30-39	3	6
40-49	10	20
50-59	8	16
60-69	7	14
70-79	3	6
80+	5	10
<b>Total hips</b>	<b>50</b>	<b>100.0</b>



**Figure 1:** Diagnosis among patients who underwent THR Surgery at CURE Hospital (October 2009-October 2013), Addis Ababa, Ethiopia

**Table 2: Postoperative complications encountered in patients who underwent THR surgery at CURE Hospital (October 2009-October 2013), Addis Ababa, Ethiopia**

Complication	n	%
Operated hip dislocation	2	4
Temporary sciatic nerve palsy	2	4
Aseptic loosening of implants	2	4
Deep infection	1	2
Deep venous thrombosis	1	2
Cardiac arrest	1	2

**Table 3: Comparison of VAS and Modified Harris Hip Scores of pre- and postoperative periods in patients who underwent THR surgery at CURE Hospital (October 2009-October 2013), Addis Ababa, Ethiopia**

Average preoperative scores	
Average VAS before operation	68 mm
Average MOHS before operation	20.6
Average MHHS before operation	< 70

**Table 4: Latest outcome categories of THR Surgery patients operated at CURE Hospital and followed for 3-7 Years; Using Modified Harris Hip Score (MHHS) and Modified Oxford Hip Score (MOHS), March 2017, Addis Ababa, Ethiopia**

Outcome category	Latest MHHS follow-up January 2017 (N = 44) n (%)	Range (HHS)	Latest MOHS follow-up March 2017 (N = 44) n (%)	Range (OHS)
Excellent	32 (72.8%)	90-100	32 (72.8%)	> 41
Good	7 (15.9%)	80-89	7 (15.9%)	34-41
Fair	2 (4.5%)	70-79	2 (4.5%)	27-33
Poor	2 (4.5 %)	60-69	3 (6.8%)	<27
Failed	1 (2.3%)	< 60		
Not answering Phone calls	2			
Death from unrelated causes	4			

N.B: HHS 90-100 for excellent results, 80-89 being good, 70-79 fair, 60-69 poor, and below 60 a failed result; and OHS > 41 is excellent, 43-41 good, 27-33 fair, and < 27 indicates a poor result



**Table 5: Comparison of other studies of average modified Harris Hip Scores (mHHS) of THR surgery with patients operated at CURE Hospital, Addis Ababa, Ethiopia**

Publication	Preoperative Harris Hip Score	Latest Harris Hip Score
Garino, Steinberg (N = 62)	45	92
Katz RL, Bourne (N = 63)	39	88
A. Chandra et. al (N = 25)	45.04	88.4
Our study (N = 50)	33 (50 hips)	88.7 (44 hips)

**Table 6: Distribution of years of latest follow up as of January 2017 of patients who undergone THR surgery at CURE Hospital (Between October 2009–October 2013), Addis Ababa, Ethiopia**

Years on follow-up	n	%
> 7	6	13.64
6-7	13	29.55
5-6	9	20.45
4-5	9	20.45
3-4	7	15.91
<b>Total</b>	<b>44</b>	<b>100</b>

### **Implants & instruments**

All sizes were available on the shelf. The most commonly used size for Ethiopian hips was a 28 mm + 0 head, 52 mm acetabulum shell, and 140 mm #8 stem.

### **Outcomes**

As shown on Table 3, preoperative average modified Oxford Hip Score (OHS) was 28.6 and average VAS was 68 mm. For the 44 patients who were recently interviewed by phone, the average Oxford Hip score at latest follow up was 40.6 (range 17-48), and the average modified Harris Hip Score (mHHS) at follow-up was 88.7 (range 58.3–100). All preoperative mHHS were below 70/100 and MOHS below 20/48 which are thresholds for indications of THR surgery. As shown on Table 4, in the latest follow-up 88.7% of our patients had excellent or good results. Two patients (8%) had fair results in the follow-up but still had a significant improvement in both Oxford and Harris Hip scores.



### ***Statistical significance***

All patients who were included in our study had poor hip scores preoperatively (mOHS < 20, mHHS < 70). Average postoperative scores increased (OHS 40.6, HHS 88.7). Comparisons to other studies are shown on Tables 5. The average latest follow-up hip scores improved in a statistically significant manner, with a P-value of 0.044.

### **Discussion**

Total hip replacement (THR) is the definitive standard treatment for relieving pain and restoring function in people with moderate to severe osteoarthritis when medical and conservative treatments no longer work.<sup>23</sup> However, patients needing elective total hip arthroplasty in government hospitals of developing nations do not enjoy this benefit, or often wait because resources do not match demand.

This technology and essential procedure is not accessible to many patients suffering from this condition in cost-sensitive developing countries like Ethiopia. As shown in our study, the population living in large cities has some access to this surgery. THR is an expensive surgery and most citizens in developing nations cannot afford direct payments. Some funding or insurance may help to cover costs. In addition to equipment/implant cost and availability, lack of an adequate number of trained specialists and theatre staff are also a limitation. Mulimba has well emphasised these similar hurdles in his Kenyan study.<sup>18</sup>

### ***Observations at CURE Hospital***

CURE Hospital is the first in Ethiopia to perform THR in a routine schedule regularly.

As related literature from our region is scarce, we feel this is a prospective study to learn many lessons from. The patients who came to us for primary THR surgery were a younger age group (14-85 years; mean age 47 years). This age for primary THR may increase as the backlog of large numbers of Ethiopian patients requiring THR are operated and as the general national life expectancy increases.

The indication for THR are comparable to other studies but our patients presented very late as evidenced by high VAS and low hip preoperative scores. The increased conversion of previous hemiarthroplasties done elsewhere to THR is explained by the fact that at that time there were no established centres that regularly do THR in Ethiopia. Partial replacement sometimes remains as the only choice, works for few years, and as pain increases from acetabular cartilage erosion, conversion to THR is required.

The team experience gained at CURE helped to do the THR surgery faster and at a lower estimated blood loss (EBL). Transfusions were only done for 5 of the first 12 patients and none for the following patients. Additionally, improvements in transfusion criteria, and intraoperative techniques may have accounted for this.

Stryker Company provided full-range implants with a substantial discount, but we need sustained long-term providers established in Ethiopia. Adequate stock of common size implants is important. Our study identified the commonly used sizes for Ethiopian adult hips.



The government support (duty free, minimal taxes) helps reduce costs. Insurance and funds for those who can't afford the surgery remains the best option to access this essential surgery.

Our dislocation rate of 4% is comparable to other studies, but this could be potentially lowered further with appropriate education postoperatively to prevent falls.<sup>24-26</sup>

It is a well-studied fact that prophylactic antibiotic use will decrease the rate of postoperative infections.<sup>25</sup> In addition, the CURE Hospital demonstrated good ventilation, temperature regulation, 'time-out' and limited/controlled theatre staff movement. Prophylactic antibiotics are routinely given during anesthetic administration. The low infection rate in our study of 2% is comparable to numbers from developed countries. It is lower than similar centres in East Africa.<sup>27,28</sup> We also encountered a similar incidence of DVT and temporary sciatic palsy (possibly from retractors) as the Kenyan/Kikuyu study.

Comparing VAS and hip scores before and after THR, most of our patients are well satisfied with the outcomes. Our final follow-up results are comparable to both older and newer similar studies.<sup>29-31</sup> Modified Harris Hip Score (mHHS) was done by the surgeons using mobile calls and online calculations for the score.<sup>32,33</sup>

We used both scoring systems (HSS & OHS) postoperatively. Modified OHS (12 items, rated 0-4, sum graded out of 48) was easier and quicker to administer<sup>34</sup>. We compared the correlation of the 2 scores and found that both are well correlated, as shown in the literature.<sup>35</sup>

## Conclusions

THR surgery is a viable, safe and effective option in Ethiopia. Appropriate staff training, careful patient selection, continuous supply chain of different implants and establishing a dedicated joint replacement centre will reliably sustain THR Surgery.

## Recommendations

The following are our recommendations:

1. THR is essential surgery in Ethiopia but is expensive. Costs are prohibitive from being accessed by many needy patients. Government support in any form, including establishing national funds, insurance policies, etc. is crucial to sustain and make this technology affordable.
2. Establishing more hospitals/centres that perform Total Joint Replacement surgeries in Ethiopia is timely. This would help keep patients locally for the surgery, rather than going abroad. International collaboration with centres of excellence is necessary.
3. Orthopaedic specialty training institutions shall train increased numbers of surgeon that perform THR in the country. The demand is high. The theatre nurses and other staff training is also part of this effort to build an efficient team.
4. A sustained yet affordable Total Joint Replacement implants and instruments importer is needed in Ethiopia.
5. Improvements in follow-up, providing platforms to discuss THR and collecting THR surgery data from all centres in the country into 1 pool will give more insight towards a national joint registry.
6. Patient follow up using phone calls shall be encouraged. Easy to use & reproducible scoring systems make it possible and cost effective. In addition, regular follow up with the clinician is required.



7. We recommend using 1 form of hip outcome scoring pre- and postoperatively as an easy way to follow patients, but it is also possible to correlate different scoring systems.

### Acknowledgments

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