



## “OUTCOME OF LONG STEM TOTAL HIP REPLACEMENT(THR) IN FAILED HEMI-REPLACEMENT ARTHROPLASTY”

### Orthopaedics

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### ABSTRACT

**Background:** The Long Stem total hip replacement after failed Hip hemiarthroplasty (both unipolar or bipolar) has been associated with high rates complications (intra- and postoperative).

**Patients and Methods:** Thirty patients 20 males and 10 females with a mean age of 65 years (range:60-75 yrs) had Long Stem total hip arthroplasty (THA) in failed hip hemiarthroplasty. The duration of the follow-up study was in range of 18 to 60 months, and the cases lost in follow up were excluded from the study. The indications for conversion of hemiarthroplasty to Long Stem THA include acetabular erosions and protrusion causing groin pain, Infection, subsidence and femoral loosening causing groin pain and the typical “start-up” pain, dislocation, breakage of implant leading to loss of function and periprosthetic fracture. Functional outcome of surgery has been assessed by Harris hip Score and compared in both preoperative and postoperative period.

**Results:** Clinically, the mean preoperative HHS was improved significantly from 50 preoperative to 81 points at the last follow up. None of our patients had dislocation and infection postoperatively. None of complications resulted in a poor long-term outcome. The proximal bone remodeling and healing of extended trochanteric osteotomy was recorded on serial X-rays at the last visit compared to the first postoperative radiographs.

**Conclusion:** Management of Hip hemiarthroplasty to Long Stem total hip arthroplasty is a successful option that gives good functional results in both way clinically and radiologically. But The surgeon should well aware of the possibility of intraoperative complications like iatrogenic fractures and perforations.

### KEYWORDS

Long stem THR; Failed ; Hemiarthroplasty; ETO;

### INTRODUCTION

Hemiarthroplasty mostly done in old aged Patients for proximal femur head-neck fractures. It replaces proximal part of femur that is Head,neck and some part of calcar.

Conversion of the failed hip hemiarthroplasty (bipolar or unipolar HA) to Long Stem total hip replacement (THR) is an orthopedic challenge. Hip hemiarthroplasty is less invasive operation in that only Femoral side of the joint is replaced, preserving bone and acetabular stock for future THR procedures.

The indications for conversion of hemiarthroplasty to Long Stem THA include acetabular erosions and protrusion causing groin pain, Infection, subsidence and femoral loosening causing thigh pain and the typical “start-up” pain, dislocation, breakage of implant leading to loss of function and peri-prosthetic fracture.

Well-recognized goals of surgical treatment are immediate pain relief, rapid mobilization and ambulation, accelerated rehabilitation, and maintenance of independent living. In addition to these prerequisites, the ideal implant must be associated with a low risk of surgical complications and subsequent revision.

Long Stem Total hip replacement (THR) is one of the rare but most successful procedures carried out in failed Hemiarthroplasty cases in orthopedics worldwide. Most elderly patients who receive a hip hemiarthroplasty retain the prosthesis for short term benefits. However, some patients may need long stem total hip replacement, particularly if the initial hip replacement surgery is performed at a Late middle-aged patient and the patient chooses to have a very active physical lifestyle or get failed. Long Stem THR surgery is a longer, more complex procedure. It requires extensive planning, as well as the use of specialized implants and tools, to achieve a good result. Pre-operative

investigations in patients who will undergo surgery are more extensive than those required in patients scheduled for a primary surgery. Often, special radiographic projections CT scan of the hip may be necessary to determine position and fixation of the replacement parts (components), and to determine with precision the extent of bone loss around the failed implant. A preoperative aspiration (fluid sample) and/or special blood work may be needed if the surgeon suspects an infection in the failed hip.

It is important to remember that the long stem THR surgeries are very complex requiring a skilled surgeon. Before proceeding with the repeat of this surgery, one must remember that it is important to be sure of the cause of failure. It is important to restore the axis and the center of the hip joint to avoid any further complications. Hence using all possible options, one should be ready with options on acetabular side like impaction bone grafting, meshes, anti Protrusio Cage, large acetabulum cup and on femoral side like allograft, ETO and longer stem implants and cables/wires etc.

Literature search shown that there is a lack of adequate research articles which mention about the study about outcomes of the long stem THR, which may be done due to one of the reasons of failure of in failed hemiarthroplasty of hip mentioned above. Hence, we planned to study which will follow- up patients who have undergone long stem THR and assess the functional outcomes of these patients based on multiple parameters.

### MATERIALS AND METHODS:

A total of 30 patients were enrolled in the study. The mean age of the patients enrolled was found to be 65 years..Majority of the patients enrolled in the study belonged to the 61-65-year age group (12 patients), followed closely by 66-70 years age-group (11 patients).

The patients were instructed to return for follow-ups three weeks, six weeks, and three months, followed by six months and annually visits. Clinically, the Harris Hip Score (HHS) [21] was used for patient's evaluation. A score below 70 points of 100 is defined as poor; between 70 and 79, is fair; between 80 and 89, as good; and greater than 90, as excellent results. He plain X-ray films (AP and lateral views of the hip + AP view of the pelvis) were performed preoperatively, postoperatively and during the follow-up visits

In this study, the most common cause of failed hemiarthroplasty was found to be implant failure (n=9, 30%), which was followed by infection (n=7, 23.33%), per-prosthetic fracture (n=6, 20%), femoral lateral cortex osteolysis (n=5, 16.67%) and acetabular protrusio (n=3, 10%).

**Table 1: Pre-operative Radiological Findings**

Pre-operative Finding	Number of Patients
Broken stem	9 (30%)
Antibiotic Cement Spacer	7 (23.33%)
Peri-implant Fracture	6 (20%)
Aseptic Loosening of stem	5 (16.66%)
Acetabular Protrusio	3 (10%)

Out of all the enrolled patients in the study, 7 of the patients (23.33%) required an extended trochanteric osteotomy while the remaining 23 patients did not require the same.

Pre-operatively, it was found that all the patients had a HHS of <70. The mean HHS post-operatively was found to be  $80.57 \pm 4.64$ , which was significantly higher than the mean pre-operative HHS ( $p < 0.05$ )

The overall mean ESR as well as the mean CRP was calculated pre-operatively, as well as on follow-ups (2 weeks, 6 weeks, 3 months, 6 months, 1 year and 18-24 months). There was decrease in both the mean ESR as well as the mean CRP, which was found to be statistically significant ( $p < 0.05$ ). On sub-group analysis in the patients suffering from infection and treated with antibiotic spacer, there was decrease in both the mean ESR as well as mean CRP over the follow-up period, which was found to be statistically significant ( $p < 0.05$ ).

In the sub-group of patients with acetabular protrusio, use of anti-protrusio acetabular cage with allograft was noted in all the three patients. In the sub-groups with aseptic loosening of stem or implant failure, usage of encirclage stem cables, femoral cables as well as wires was noted along with some patients undergoing ETO. In the sub-group who suffered from infection, 6 of the 7 patients underwent two-staged surgery and 1 out of 7 patient underwent three staged surgery. Femoral cables as well as wires was utilized to manage patients with periprosthetic fractures.

### Operative technique

Planning for a complex Long Stem THA requires more time than primary Hemiarthroplasty. High quality radiograph images of the pelvis and the femur were taken to accurately estimate the bone loss. All the necessary equipment was checked.

The Posterolateral (Southern Moore) approach in lateral position was used in all cases. Extended trochanteric osteotomy needed in some cases. Stem extraction of the implant and bone cement, the fibrous tissue membrane were removed.

The acetabular component was performed first with cement less anatomic fixation with 2 screws at least for secure fixation in all cases. The femoral canal was then reamed and prepared using successive reamers of the system under intraoperative radiology to safeguard against perforation of the canal and misdirection. When reaming completed the last reamer should be stable inside the medulla, then trials were done to determine the length, anteversion and test for stability. As a prophylactic step a stainless steel loop was fashioned around the distal femur throughout the trials and stem impaction to safeguard against iatrogenic fractures of the femur in cases with weak bone stock.

Management of protrusio Defect with Antiprotrusio Cage: The acetabulum was exposed circumferentially, cancellous allograft was morselized into chips, pressing the cancellous chips and condensing them into hemispherical shape. The flanges of the antiprotrusio cage were bent to fit into the slot in ischium and against host ilium. The ring was fixed to ilium and ischium with screws.

The following pictures shows the procedure carried out during the Long Stem THA

### Case 1 Infected Bipolar Hemiarthroplasty

Pre-Op Xray- Infected Right Bipolar HA with Discharging Sinus



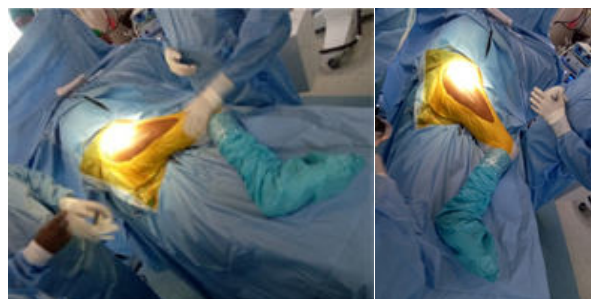
Stage 1 Surgery- Infected Implant Removal with Debridement and Antibiotic Spacer



Stage 2 Surgery- Re-Debridement and Revision Of Antibiotic Spacer with Antibiotic Beads Chain As Discharging Sinus Persist



Position Of Patient On OT Table



Spacer Removal In Stage 3 Surgery for Long Stem THR after all Blood parameters of Infection Normalised



Stage 3 Surgery- Removal Of Spacer and Long Stem THR As infection Settled with Iatrogenic Distal Femur Fracture Managed with Distal Femur Plating Circlege Cables



**Case 2 Impacted Broken AMP Implant for Long Stem THR**



**Use Of Multiple Broad Osteotomy for Extended Tronchantric Osteotomy**



**Broken Impacted Stem Exposure After ETO**



**Use Of Cables to close Extended Tronchantric Osteotomy**



**Case 3 Broken AMP with Lateral Femoral Bone Cortex Osteolysis**



**Long Stem THR Of size 265 mm with Multi hole Acetabular Cup**



**Cable and instruments to tighten and screw driver Multiple Instruments Used to remove impacted cement**

## RESULTS

A total of 30 patients were enrolled in the study. The mean age of the patients enrolled was found to be 65.89 years, and a median age of 66 years. The number of males was 20 in the study while there were 10 females who were enrolled in this study.

There were no fresh cases of dislocation or deep infection in this series up to the final follow up visit. Clinically, the mean preoperative HHS was improved significantly from 50.63 + 5.09 preoperative to 80.57 + 4.64 points at the last follow up

According to the migration criteria of Paprosky none of the cases has femoral stem migration more than 5 mm. Radiologically, there was good osteointegration of the femoral stems with stability up to the last follow up visit.

One patient with deep vein thrombosis (DVT) treated medically with anticoagulants and elastic stockings and had no respiratory complications One patient with iatrogenic oblique fracture distal to stem managed with distal femur locking plate and cables and encircling wires.

The overall mean ESR as well as the mean CRP was calculated pre-operatively, as well as on follow-ups (2 weeks, 6 weeks, 3 months, 6 months, 1 year and 18-24 months). There was decrease in both the mean ESR as well as the mean CRP, which was found to be statistically significant ( $p < 0.05$ ).

## DISCUSSION

We had planned this study as to assess the functional outcomes of Long Stem THR. The goal of Long Stem total hip arthroplasty is to return the patients to the pre-operative functional state as quickly as possible. Based on the parameters used in the study, which are the radiological and the HHS along with the hematological variables, the functional outcome of the Long Stem THR has been positive for all the cases.

Long Stem Total hip replacement (THR) in failed Hemireplacement of Hip is one of rare but the most successful procedural advances carried out by orthopaedic surgeons worldwide. Also, the Long Stem THR surgeries are more complex and take longer intraoperative time to complete surgery. There are various causes of Hip Hemiarthroplasty failure, which include osteolysis, aseptic loosening, acetabular cartilage erosion, periprosthetic fractures, implant related problems and infections. Literature search revealed that though there have been few studies conducted which have assessed the indications of Long Stem THR and the functional outcomes of the same, there is lack of adequate research in India. Hence, we planned to conduct a study which will follow-up and assess the patients who have undergone Long Stem THR and assess the functional outcomes of these patients based on multiple parameters.

The pain following hemiarthroplasty may be due to acetabular erosion or loosening of the prosthesis. The pathology here may be caused by excessive length of the neck, impaction, or incongruences between the acetabulum and femoral head.

To assess functional outcome of the Long stem THR, the most important scoring system used worldwide is Harris Hip Score (HHS). In our study, we found that there was a statistically significant increase in the post-operative HHS (mean score 80.57) as compared to the HHS before the Long Stem THR (mean score 50.63).

Our results showed that conversion of painful hemiarthroplasty gives good results with regard to the pain relief and functional scores which our HHS was improved in follow-up sessions and increased from a mean of 50.63 preoperatively to 80.57 at the last follow-up.

The hematological parameters which we have assessed in our study were the mean ESR, CRP. These parameters were assessed to diagnose the presence of infection as a cause of failed hemiarthroplasty which was later proved on culture

## CONCLUSIONS

Though the Long Stem THR are considered safe and successful surgeries in failed hemiarthroplasty, they are complex operations which need intricate planning.

- The most common indication for Long Stem THR is Implant Failure followed by infection

- Extended Tronchantric Osteotomy (ETO) done for 7(23.33%) patients to facilitate removal of impacted femoral implants and all ETO united in 6 months .
- Cables and Wires in Long Stem THR were helpful in managing ETO, also in Peri-prosthetic Fracture in preventing progression and reduction of Fracture
- There was statistically significant increase in Harris Hip Score after Long Stem THR in all the patients
- In patients needing Long Stem THR due to infection, the surgical procedure was undertaken in two stages with heat stable antibiotic (vancomycin) impregnated cement spacer directed against most commonly isolated organism- Methicillin resistant staphylococcus aureus.

**Conflict of Interest**

The author states that there has been no conflict of interest and there were no potential benefits in any form from a commercial party related directly or indirectly to the subject of this manuscript. No funds, grants, or personnel to be acknowledged have been hidden.