Indian Journal of Orthopaedics Surgery 2021;7(4):312–319

Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Orthopaedics Surgery

Journal homepage: https://www.ijos.co.in/

Original Research Article

Functional outcome in the total hip arthroplasty

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ARTICLE INFO

Article history:
Received 27-09-2021
Accepted 15-11-2021
Available online 01-12-2021

Keywords:
Avascular necrosis
Anterior thigh pain
Cemented & Uncemented THR
Modified Harris Hip Score
Stress shielding

ABSTRACT

Introduction: Total hip arthroplasty is a surgical treatment that has been thoroughly documented. The capacity of Total Hip Replacement arthroplasty to treat pain associated with hip joint pathology while retaining mobility and stability of the hip joint is the key to its effectiveness.
The goal of this study was to use the Modified Harris hip score and radiological examination to assess the clinical and functional outcomes of total hip arthroplasty.
Materials and Methods: The study was carried out on 33 hips of 30 patients of Total Hip Replacement operated in the Department of Orthopedics, Vinayaka missions medical College and Hospital and Vinayaka missions Hitec Hospital, Salem, from August 2012 to September 2014. This was a retrospective as well as prospective study. Patient follow up was for a minimum of 6 weeks to a maximum of 12 months (1yr).
Results: 9 patients underwent uncemented total hip replacement in which for 5 patients the acetabular cup was fixed with 2 acetabular screws each. During the procedure 1 patient had Type A2 Vancouver fracture of the proximal femur which was fixed with SS wire cerclage which united as documented by the follow up X-rays. Postoperatively, for two patients we came across dislocation due to adductor contracture, was reduced following adductor tenotomy. Patients were found to be doing normal daily activities by the follow-up. The mean overall pre-operative score was 33.3, which improved to a mean score of 94.2 after surgery.
Dislocation was seen in 2 individual patients.
Conclusion: After THR, which was conducted on a population of active individuals, 96.9% of patients experienced excellent or good pain reduction and function. When pain sufferers were included, the overall average score was 90 points, but after a minimum of five years of follow-up of 91 hips treated with the PCA prosthesis, the average score was 93 points.

1. Introduction

The function and quality of life of patient can be improved with traditional cemented total hip arthroplasty. The rate of femoral loosening appears to be significantly reduced with newer prostheses and cementing procedures.[1] Mechanical loosening is more likely in young, heavier, active males and certain prosthetic designs, regardless of the cementing process. The evidence that cement debrisplays a key role in increasing bone lysis and loosening led to the development of noncemented total hip arthroplasty. Fixation without cement has been established in prosthetic devices, either through "pressfit" or biologic in growth. Stabilization is obtained with the press fit approach by interference fitting the implant into the femur. Fixation is achieved by bone ingrowth into a porous surface with biologic ingrowth. Noncemented devices are most commonly utilised in young patients with strong physical demands, who are more likely

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https://doi.org/10.18231/j.ijos.2021.050

to require a revision surgical treatment in the future.

According to preliminary statistics, noncemented complete hip arthroplasties have a low revision rate and great prosthesis longevity, lasting up to 15 yrs. Patients who undergo cemented hip arthroplasties, have a higher rate of low-grade transient thigh pain. Although the short term results appear to be less desirable when compared to cemented hip arthroplasty, the results of the two surgeries are comparable after 5 to 20 years. The most serious complications of THR and the most common justification for revision are aseptic femoral and acetabular loosening, which can cause discomfort and loss of function.[2] The anatomically designed prosthesis can provide good results in younger active patients, with low prevalence of pain in the thigh and loosening of the component.[3] It is a highly costeffective procedure.[4]

Longterm outcomes of operational treatments, such as total hip replacement, must be evaluated to determine their durability (THR). It allows for the comparison of the outcomes of various clinical interventions, which may lead to modifications in surgical technique and implant design over time.

For evaluating hip arthroplasty, the Harris hip score is most extensively used rating method.[5] The goal of this study is to compare the clinical and functional outcomes of cemented versus uncemented total hip replacements at our facility.

2. Materials and Methods

The study was carried out on 33 hips of 30 patients of Total Hip Replacement operated in the Department of Orthopedics, Vinayaka missions medical College and Hospital and Vinayaka missions Hitec Hospital, Salem, from August 2012 to September 2014. Information on the patients was compiled from clinical details, case files and operation theater records. This was a retrospective as well as prospective study. Patient follow up was for a minimum of 6 weeks to a maximum of 12 months (1yr).

2.1. Inclusion criteria

1. Old age groups
2. Both sexes
3. All cases of radiologically diagnosed to have stiff hip due to erosion or destruction of both acetabulum & head of femur.

2.2. Exclusion criteria

1. Patients who are unfit for surgery
2. Patients with fresh fractures
3. Patients with fractures other than acetabulum
4. Patients with uneroded (normal) acetabulum
5. Patients who came for revision arthroplasty

Patients subjected to surgery will be followed up at regular intervals with clinical & radiological data. Assessment will be done based on a proforma containing all necessary information regarding.

1. Personal details: age, sex, address and occupation
2. Surgical procedure carried out
3. Duration of hospital stay
4. Initiation of mobilization
5. Physiotherapy
6. Range of movements achieved post operatively by way of periodic follow-up.

2.3. Patient information

With their previous operation records, annual X-ray images, and follow-up papers, 20 patients were accessible for a comprehensive 1-year follow-up.

Three individuals had bilateral total hip replacements, whereas 17 had unilateral total hip replacements.

Preoperatively, all patients completed a standard clinical and laboratory evaluation that included brief information about age, sex, address, clinical history, and routine investigations. An Xray of the hip joint was taken in the AP view.

Clinical facts,case files and operation theatre records were also used to compile information on the patients.Clinical evaluation or hospital case sheets and discharge summaries were used to document pre-op ROM, deformities, and their values for the study.

2.4. Pre-operative protocol

2.4.1. Clinical evaluation

A thorough history and clinical examination are required to determine the following: the duration of the illness, the location of the infection in the body, sensory motor examination, vascularity of the limb, the patient's ambulatory status, deformities of the hip, hip ROM, and the status of the other joints.

A goniometer was used to measure the deformities and range of motion.

The modified Harris Hip Score was used to evaluate all of the patients.

2.5. Radiological evaluation

All patients had a radiogram of the pelvis and both hips with the proximal half of the shaft of the femur in the AP view.

1. Acetabulum size
2. Acetabular Bone stock
3. Any protrusion and periacetabular osteophyte production
4. The structural and functional integrity of the acetabulum

5. Requirement for bone grafting
6. Size of the femoral canal were all assessed on the radiograph.

The acetabular and femur components were both templated.

It was established what size acetabular cup to use and how much anteversion to use.

On the femoral side, the implant's neck length, offset, and stem size are selected using a template.

2.6. Surgical technique

We adopted the posterolateral technique in our investigation, which involved making a curvilinear incision across the greater trochanter and extending it proximally to ream the femoral canal from the superior direction.

Splitting the gluteus maximus and incising the short external rotators were used to approach the hip joint, which was accessed by flexing the knee and rotating it internally while keeping it under tension.

The external rotators were used to protect the sciatic nerve. We encountered severe bleeding in a few individuals due to a previous surgical surgery and fibrous tissue in the same hip. Ligatures and cautery were used to achieve haemostasis. By flexing, adducting, and gently internally rotating the hip, the capsule was excised and the hip was dislocated posteriorly. After dislocating the femoral head, the femoral head was retrieved using a pre-planned template for neck osteotomy. The soft tissues connected to the acetabulum are removed, and the acetabulum is reammed up to the bleeding subchondral bone. If any osteophytes were found, they were removed, and the site was irrigated to eliminate any debris. Acetabular cup diameters were one size larger than the previous reamer.

In nine patients, we performed an uncemented total hip replacement, whereas in five others, we used screws to secure the acetabular cup along the posterosuperior quadrant, keeping the centre of the offset in mind.

By significantly internal twisting the leg, the proximal femur was uncovered and delivered out.

By templating and maintaining the anteversion, the femoral canal was hand reamed to the anticipated stem size.

The stability of the femoral stem was evaluated to rotational and extraction forces after it was implanted, and care was made not to fracture the proximal femur.SS wire cerclage was used to treat the proximal femur fracture that occurred during the surgery.

Over a plastic capped head impacter, a prosthetic head of the proper size was placed over the union and fastened with a mallet.Any leftover debris is removed after a wash.

The femoral head was reduced, and the wound was closed over a suction drain after the stability was validated with a functional range of motion test.

2.7. Clinical evaluation

A medical history was obtained and a physical examination was performed at each appointment. The Modified Harris Hip Score was used to assess the clinical and functional outcomes. Each question receives a set number of points out of a possible total of 100. Pain is the first category.

No discomfort 44 points, minor pain 40 points, and crippling 0 points. Function is the second category.

33 points- no limp, no walking assisstance and walk >6 blocks less if used a cane, or could only walk two blocks. The third category, functional activities, includes questions about the patient's ability to climb stairs, put on shoes, sit in a chair for an extended period of time, and use public transit.

Finally, the physical exam results are calculated, and up to 9 points depending on the lack of deformity and rage of motion.

A score of 90-100 great results, 80-90 good results, 70-79 reasonable results, 60-69 poor results, and less than 60 a failed result.

2.8. Rationale of the modified Harris hip score evaluation

The two most important factors to evaluate are pain and functional capacity. They are the leading cause of surgery in the great majority of people with hip issues, and hence carry the most weight.

A point scale with a maximum of 100 points is employed based on this reasoning, with the following maximum potential scores:

Pain	44
Function	47
Range of Motion	05
Absence of deformity	04
Total	100

2.9. Radiological assessment

At the conclusion of the procedure and during follow-up visits, a radiograph was taken.

An anteroposterior image of the pelvis, containing both hips and appropriate femur length, was the usual radiograph.

The radiographic evaluation includes periprosthetic fractures, loosening, osteolysis, dislocation, subsidence, and heterotrophic ossification, as well as complications such as periprosthetic fractures, loosening, osteolysis, dislocation, subsidence, and heterotrophic ossification. A horizontal reference line was drawn through the base of both teardrops on the anteroposterior pelvic radiograph to determine cup inclination.

To determine fixation, total wear, annual wear rate, and the existence, degree, and location of osteolysis, this

radiograph was compared to the one taken at the time of the last follow-up evaluation.

Cups that did not have any radiolucent lines or migration on the radiographs taken at the last follow-up were regarded well fixed.

Cups with a 1 mm wide circumferential radiolucent line and no migration were deemed to have a stable fibrous union.

The zones reported by DeLee and Charnley were used to evaluate periacetabular osteolytic lesions, whereas the zones described by Gruen were used to evaluate femoral osteolytic lesions.

Calcar resorption was distinguished from calcar osteolysis by the rounding of the calcar with a convex form and the removal of calcar-collar contact:

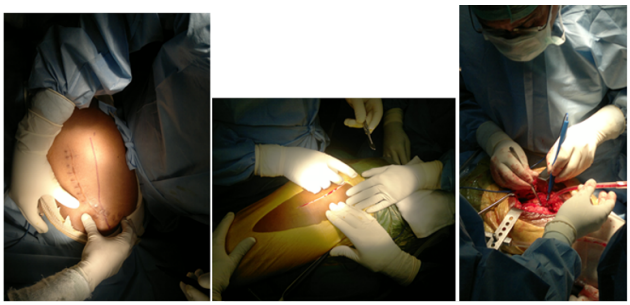

Fig. 1: Exposure of hip joint

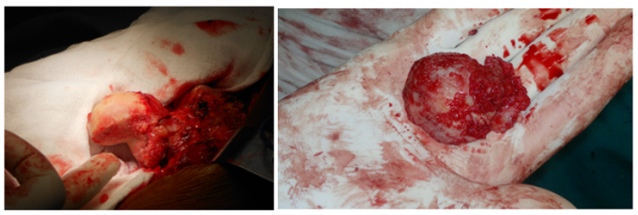

Fig. 2: Delivering the head

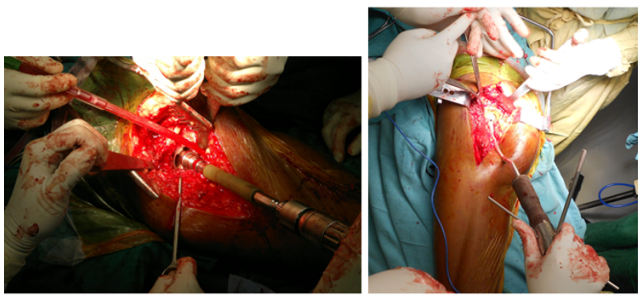

Fig. 3: Preparation of acetabulum

2.10. Statistics

Total hip replacement arthroplasty is used to relieve incapacitating pain in the hip joint. Its effectiveness is based on its ability to reduce pain associated with hip joint pathology while maintaining the hip joint's mobility and stability.

1. This is a prospective analysis, done on 33 hips of 30 patients who had cemented & uncemented Total Hip Replacement and were available for follow-up.
2. 3 patients had bilateral total hip replacement and 27 patients had unilateral total hip replacement. 17 (51.5%) total hip replacement was done on the left side and 16 (48.4%) on the right side.
3. This study population was ranging from 27 to 82 years at the time of surgery.
4. There were 20 (66.6%) males & 10 (33.3%) females.
5. The major cause for surgery was Osteo-Arthritis(primary & secondary) in 15 patients (45.4%) due to many causes and 9 (27.2%) were AVN. Fracture neck of femur & Trochanter group had 5 patients (15.1%). Posterior dislocation had 3 patients (9.09%) & 1 patient (3.03%) with Perthes disease.
6. This is a prospective analysis, done on 33 hips of 30 patients who had cemented & uncemented Total Hip Replacement and were available for follow-up.
7. The prosthesis used were of 2 companies, Zimmer and DePuy. 23 (69.6%) of them were Zimmer.

The study required a minimum of 6 weeks of patient follow-up.

The majority of the patients were followed up on for six to twelve months (96.7 percent).

1. The mean total pre operative score was 33.3. Post operatively the total mean score was 94.2.
2. Pre operatively 18 patients (54.5%) had a poor score. The results showed a significant improvement, wherein 29 patients (90.9%) had an excellent score and 3 patients (6.06%) showed good and 1 patient (3.03%) showed fair results.Poor score was not seen in this study.
3. 2 patients (9.5%) had 1 cm limb lengthening and 2 patients (9.5%) with 1.5cm lengthening in the operated side. All of them had excellent outcome and 1(25%) had excellent results.

In our study, 3.03 percent of patients in the age category of less than 30 years got outstanding post-operative outcome scores.

In the over-30 age bracket, 87.8% received excellent results, while 9.09 percent earned good and fair results.

1. 1 patient with non union fracture neck of femur had fair outcome (70-79 score). But there was no

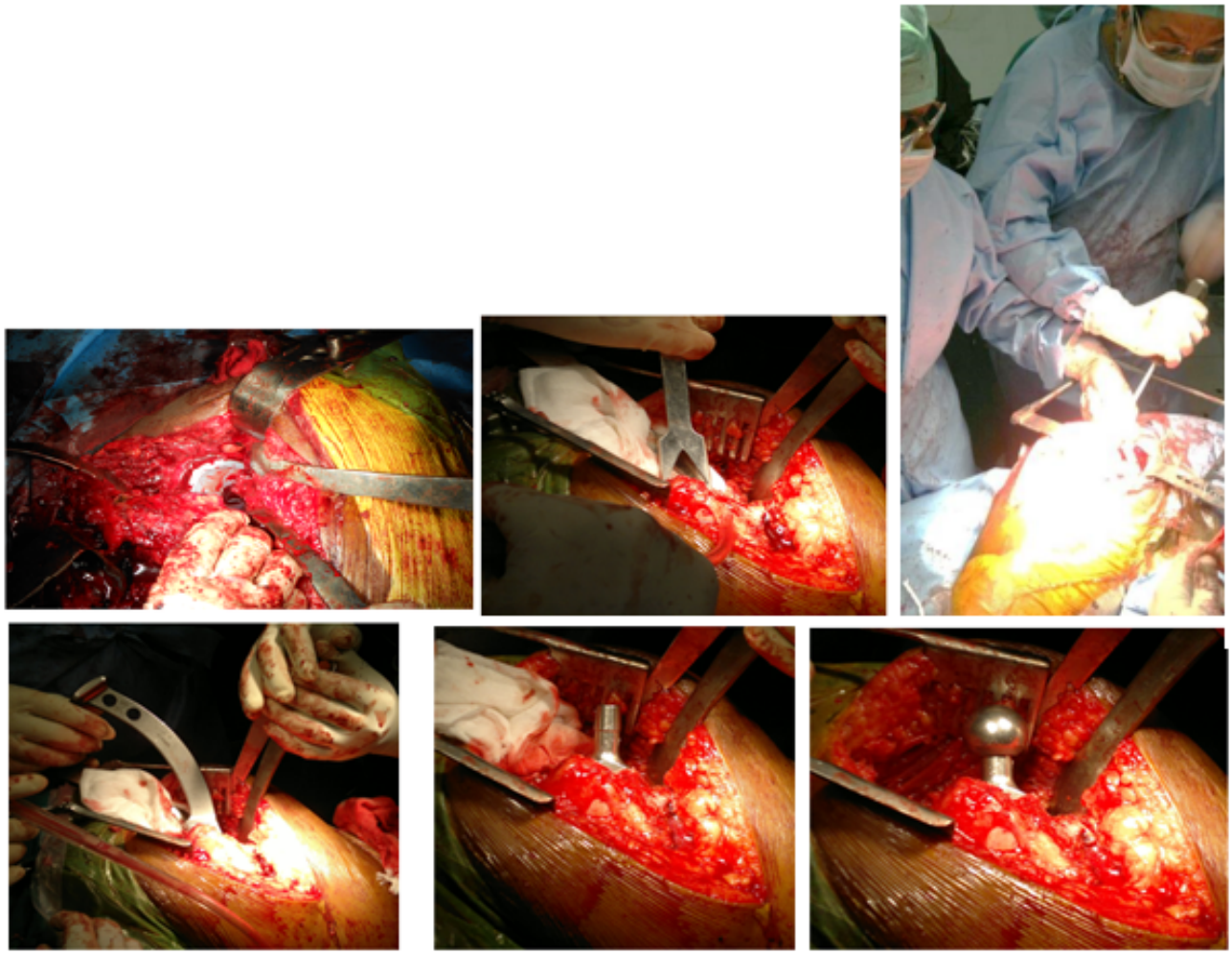

Fig. 4: Preparation and insertion of femoral component

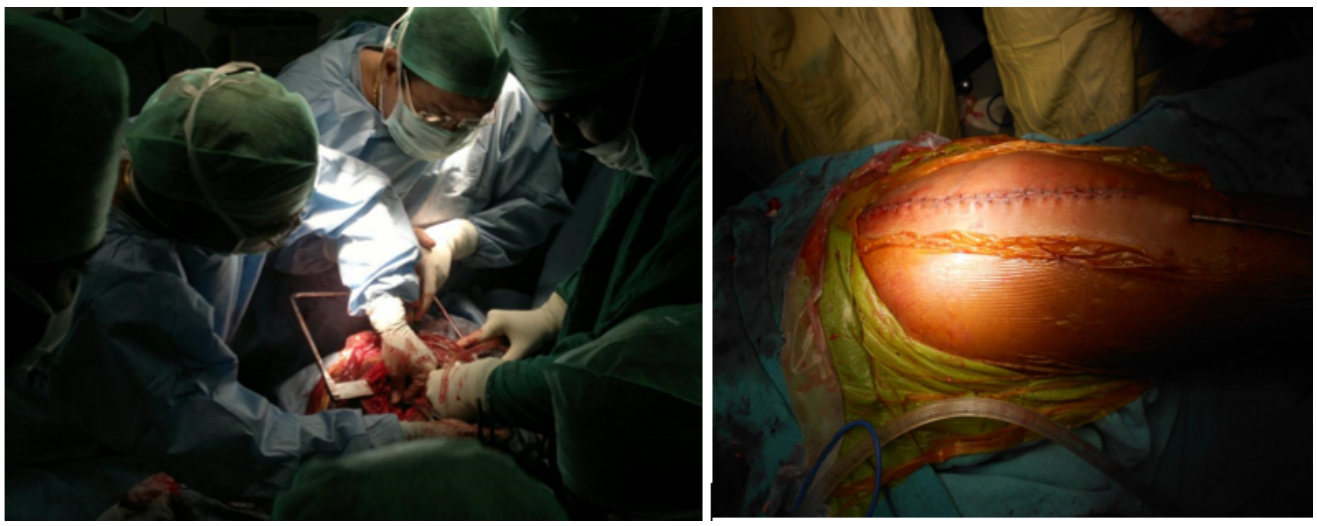

Fig. 5: Reduction and closure

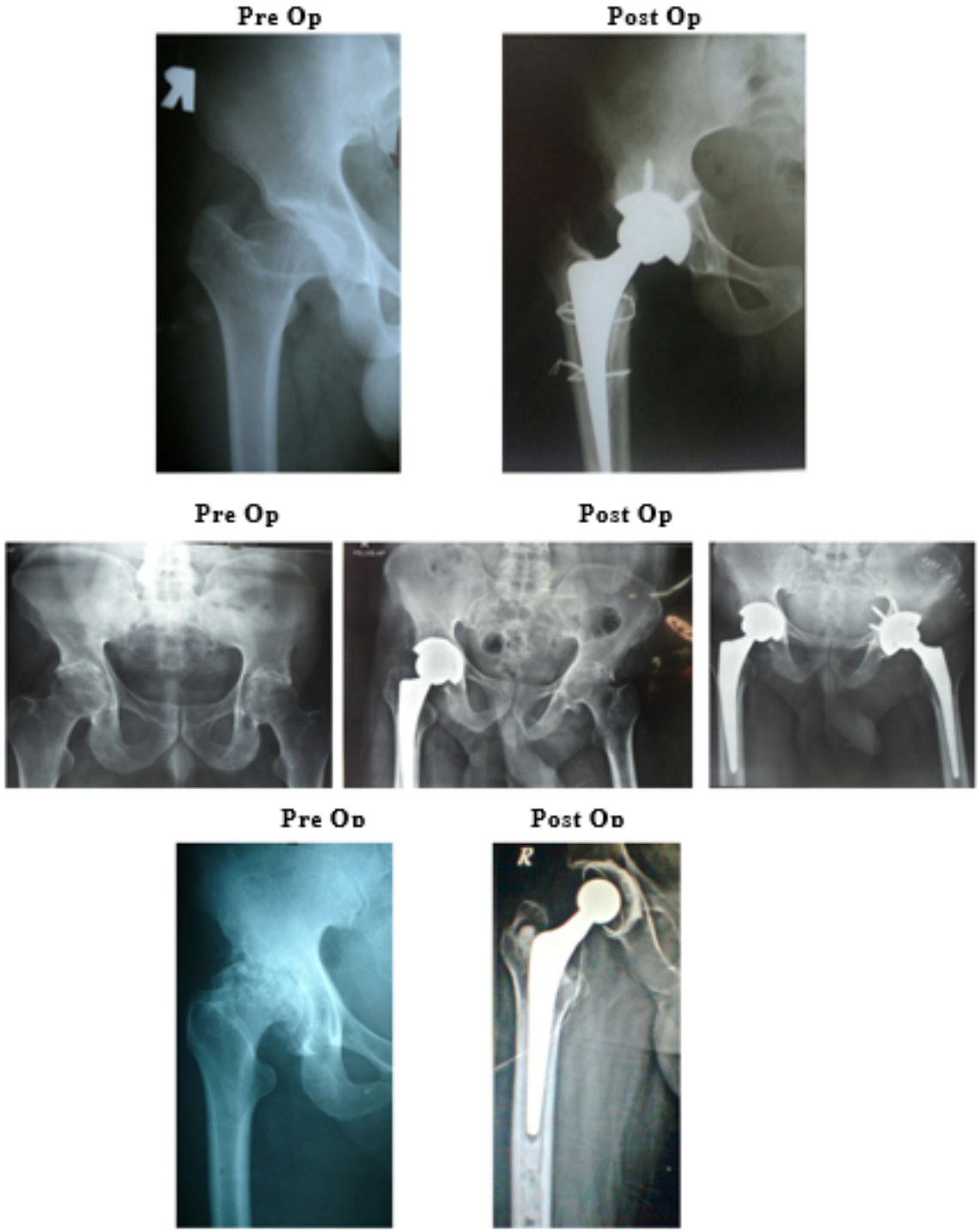

Fig. 6: Showing preop and post op x rays

statistically significance between the indication of surgery and final outcome.
2. 2 patients with Arthritis and 1 patient with non union neck of femur had good outcome (80-90 score)..
3. Dislocation was seen in 2 individual patients. 28 patients did not have any complications. All patients who had complications showed good to excellent results.
4. 1 patient had type A2 Vancouver periprosthetic fracture intraoperatively. Patient showed excellent results were recorded during follow up.

In the current study, anterior thigh pain was experienced by only 14.3% of the patients (3 patients), and it went away after a few months.

Stress shielding was observed in 7 (21.2%) of the patients, with 6 (85.7%) of those over the age of 40.

The patients' outcomes ranged from good to exceptional.

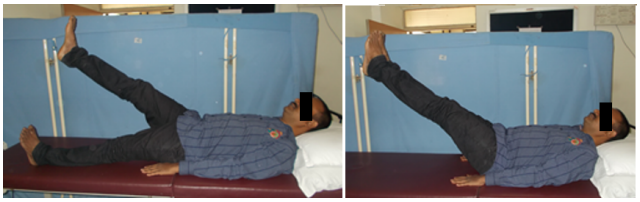

Fig. 7: Case 1

Fig. 8: Case 2

Fig. 9: Case 3: Post op ROM

3. Results

The research involved 33 hips from 30 patients who had total hip replacements. In all the patients, posterolateral approach was used. Intraoperatively, for one patient we came across increased vascularity, due to previous surgery in the same hip. Haemostasis was achieved. 9 patients underwent uncemented total hip replacement in which for 5 patients the acetabular cup was fixed with 2 acetabular screws each. During the procedure 1 patient had Type A2 Vancouver fracture of the proximal femur which was fixed with SS wire cerclage which united as documented by the follow up Xrays. Postoperatively, for two patients we came across dislocation due to adductor contracture, was reduced following adductor tenotomy. Patients were found to be doing normal daily activities by the follow-up.

After THR, which was conducted on a population of active individuals, 96.9% of patients experienced excellent or good pain reduction and function.

The mean overall pre-operative score was 33.3, which improved to a mean score of 94.2 after surgery.

Dislocation was seen in 2 individual patients. 28 patients did not have any complications. All patients who had complications showed good to excellent results.

4. Discussion

Total hip arthroplasty is a medical treatment that has been widely documented. It improves the quality of life of people with moderate to severe hip arthritis by relieving pain and functional impairment. The research involved 33 hips from 30 patients who had total hip replacements. In our study, 53.3 percent of the patients were 50 or older, with ages ranging from 27 to 82. The majority were males, with 20 (66.6%) and females, with 10 (33.3%). For evaluating hip arthroplasty, the Harris hip score is the most extensively used rating method.[5] Our research comprised next generation prostheses that showed improved clinical and radiological outcomes when compared to earlier prosthetic designs. After THR, which was conducted on a population of active individuals, 96.9% of patients experienced excellent or good pain reduction and function. When pain sufferers were included, the overall average score was 90 points, but after a minimum of five years of follow-up of 91 hips treated with the PCA prosthesis, the average score was 93 points.

The hip score averaged 84 points after 46 months in a research that looked at the results of 14 arthroplasties in which the stem was secured without cement.

We discovered that there was no statistical relevance between the reason for surgery and the end outcome in our research.

Only three individuals in the current study experienced anterior thigh pain, which went away after a few months.

In all three cases, a DePuy corail stem was employed.

Extensive pedestal formation is thought to be another radiographic indicator of implant instability - not observed in any instances.

Despite finding osteolysis in zone 2 of the acetabulum and zone 4 of the femur in one patient, the final outcome was unaffected.

Our follow-up, on the other hand, may have been too brief.

In this study during the procedure, 1 patient had Type A2 Vancouver fracture of the proximal femur which was fixed with SS wire cerclage, which united as documented by the follow up X-rays. Though an overall better outcome score was seen in patients with no fracture, patients with periprosthetic fracture had no a statistical significance between the pre operative and post operative outcome score in our study.

5. Abbrevations

AP: Antero-Posterior; AVN: Avascular Necrosis; BW: Body Weight; CCD: Caput-Collum-Diaphyseal; COC: Ceramic On Ceramic; DVT: Deep Vein Thrombosis; HA: Hydroxyapatite; HMWPE: High Molecular Weight Polethylene; LFA: Low Friction Arthroplasty; MOM: Metal On Metal; OTI: Osteo Implant Technology International; PCA: Porous Coated Anatomic; PGE-2: Prostaglandin E2; PMMA: Polymethylmethacrylate; PTFE: Poly-Tetra-Fluoro-Ethylene; ROM: Range of Movements; SS: Stainless Steel; THA: Total Hip Arthroplasty; THR: Total Hip Replacement; TNF-α: Tumour Necrosis Factor Alpha; UHMWPE: Ultra High Molecular Weight Polethylene

6. Source of Funding

None.

7. Conflict of Interest

The author declares no conflict of interest.

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Cite this article: Vinjamuri ARS, Sivanandan MH, Chiranjeevi K P, Sangolgi N, Athipathi S. Functional outcome in the total hip arthroplasty. *Indian J Orthop Surg* 2021;7(4):312-319.