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Functional outcome of uncemented total hip arthroplasty in young adults: a retrosceptive study

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ABSTRACT

Purpose: Total hip arthroplasty is the treatment of choice in the end stage of arthritis; end stage arthritis requires surgical intervention. The aim of this study is to find out the functional, clinical, and radiological outcome of uncemented total hip arthroplasty in young patients below 45 years of age.

Methodology: This study was conducted in our department from January 2022 to October 2022, and a total 55 cases were taken into our study via proper application of inclusion and exclusion criteria who went for the procedure, uncemented total hip arthroplasty (THA). All patients were either unilateral or bilateral arthritis of the hip less than 45 years of age. Patients were examined clinically, radiologically, and functionally preoperatively as well as postoperatively. Patients were then discharged and then followed up at regular intervals. Patients were evaluated for activity as well as Harris Hip score and radiologically through anteroposterior view as well as lateral view.

Results: All 55 patients were examined and followed up for 2 years at regular intervals, and clinical as well as radiological examination was done. The most common cause of hip arthritis was avascular necrosis of the hip (65%); none of the patients had any major complications. The mean Harris hip score improved drastically from 40 to 95. The activity level was assessed at 2-

year follow-up with maximum patients in the mild manual labor category. On X-ray, bone ingrowth can be seen with no loosening on both femoral as well as acetabular components. No significant association was found between initial alignment of the femoral component and clinical outcome.

Conclusions: Uncemented THA can be used in young patients with excellent to good functional and radiological outcomes at 2-year follow-up with a good satisfaction rate and fewer complications.

Keywords: Arthroplasty,uncemented,harris hip score,functional outcome

I. INTRODUCTION

Total hip arthroplasty (THA) replaces damaged and worn hip joints with a smooth, artificial prosthesis. This low-risk procedure offers improved hip function and flexibility, reduced pain, and better stability in 95% of patients {1}.Various etiology of hip arthritis in young patients such as Ankylosing spondylitis, post traumatic arthritis, avascular necrosis of femoral head which leads to decrease activity level of daily life. End stage arthritis requires surgical intervention that is uncemented Total hip arthroplasty which provide excellent functional and clinical results.Thus, THA remains the treatment of choice for restoring function and activity in end stage hip arthritis{2} , although THA was earlier considered only for elderly patients, good functional results have been reported by multiple studies in younger patients{3,4}.The surgical treatment can be divided into two categories that is with one those that preserve the femoral head (core decompression, osteotomy, nonvascularized and vascularized bone grafting, and autologous bone grating) and with one those that partially or completely replace the femoral head (hemiarthroplasty and total hip arthroplasty) {5-8}.The porous HA coated prosthesis used in uncemented total hip arthroplasty that promotes healing which allows bone to grow in or onto the prosthesis which may led to improved implant survival rate.The use of uncemented THR in adult population is of particular interest because it may have advantages over cemented THR, such as decreased risk of loosening and improved long-term survival of the implant , it also has disadvantages such as early femoral head loosening as well as femur fractures.Hence our study aim to study functional, clinical and radiological outcome of uncemented THA in patients with age less than 45 years.

II. Materials and Methods

It was the longitudinal study from January 2022 to October 2022 done in our institution at government medical college Kota in our department of Orthopaedics.Total 55 patients were operated by single surgeon(1st Author).

Inclusion Criteria :-

Patients with either unilateral or bilateral arthritis of hip less than 45 years of age.

Exclusion Criteria :-

1) Patients with age greater than 45 year of age.
2) Patients with dysplastic hips
3) Patients with septic or tubercular arthritis
4) Patients with neurological weakness of limb
5) Patients which are candidate for cemented total hip arthroplasty

Femoral component (POLARSTEM ™) (Fig. 1), acetabular component (R3 acetabular cup), highly crosslinked polyethylene liner (XLPE ™) and ceramic head was used in our study. All the surgeries were performed under spinal or epidural anaesthesia, I.V. Antibiotics were given preoperatively before 30 min of surgery and continued postoperatively till 2 days.The surgeries were performed through standard posterolateral approach in lateral decubitus position.The patients were mobilised with help of walker from day 1 postoperatively with tolerable weight bearing. Limbs were kept in abduction with pillow between two limbs. Check X-rays were taken and drain was removed on day 2.Patients were discharged on day 5 and stapler were removed on day 12 postoperatively.Patients were adviced following instructions at the time of discharge such as not to squat,not to sit cross-legged,not to cross the lower limb across the midline,use high commode.

Patients were evaluated preoperatively as well as postoperatively at regular interval of 3 months , 6months , 1 year , 2 year.Activity level used in study is defined by Johnston et al.{9} as follows heavy manual labor can bedefined as lifting 23–45 kg or engaged in vigorous sports, moderate manual labor can be defined as lifting 23 kg or less and that can be involved in moderate sports, light labor which includes heavy weight lifting, house cleaning, and walking less than five km. Semi-sedentary can be indicated by white collar job or those light housekeeping. Sedentary activity can be indicated with those having minimal capacity for walking, and bedridden was defined as for those who confined to a wheelchair or bed. Harris Hip score was used to evaluate the functional outcome at two years follow up{10}.Radiological evaluation were done in AP and lateral view , day 2 X-ray were compared with X-ray at two years follow up.On X-rays we evaluated radiolucencies (greater than 2mm in width considered as Osteolysis) , subsidence (stem settled greater than 4mm) , and femoral component alignment(It was considered neutral if the line passing through center of implant and the femur were within three degree, greater than three degree difference indicated a varus or valgus orientation).

III. RESULTS

During the study, total 55 patients were followed up for period of 2 years , study patients were belong to age range of 20-45 years of both gender male(38) and female(17).Clinical and radiological examination were carried out at each follow up for a period of 2 years.Most common cause was avascular necrosis of hip (65%) that is most commonly due to steroids , followed by posttraumatic(20%),Ankylosing spondylitis (11%),and rheumatoid arthritis(4%). Mean average time of operation was around 60 minutes (ranging from 45-75 minutes) with mean blood loss around 300ml (ranging from 250-350ml).The position of the femoral

component on radiography at follow-up, neutral position was found maximum which is 88%, valgus in 12%, and varus in none of the patients at follow-up(Figure 2).

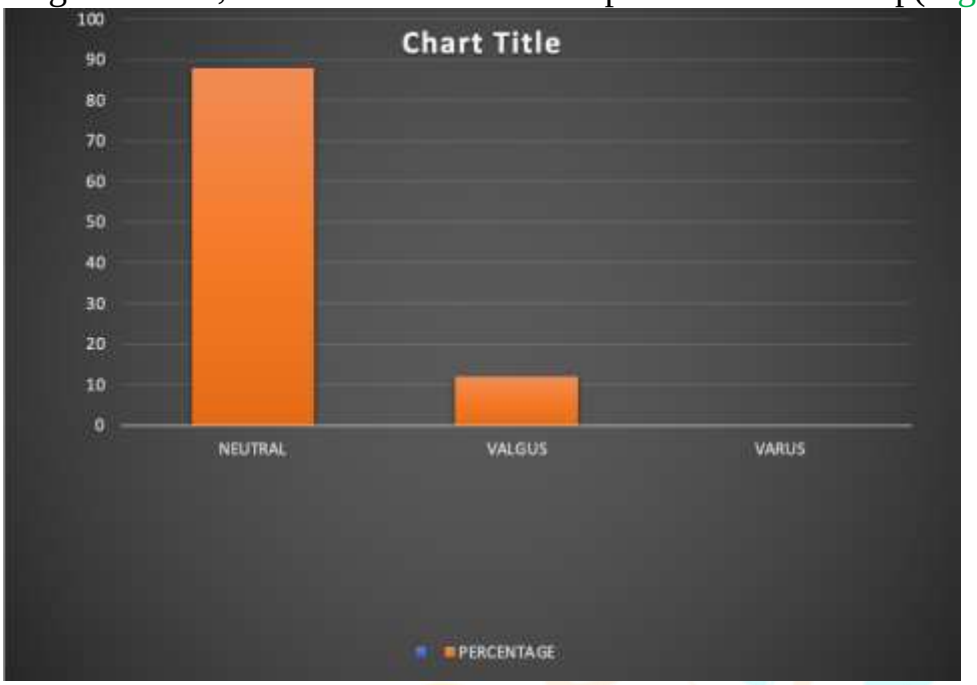

Figure 2:- showing femoral component on radiography

The position of acetabular component on radiograph were demonstrated in Table 1.

Acetabular component position	**No. of Patients (55)**
Anteverted	35
Retroverted	0
Neutral	42
<35 degree inclination	0
35-50 degree inclined	5
>50 degree inclined	8

Table 1 :- showing acetabular component on radiograph

Patients were then evaluated for pain via Visual analog scale preoperatively as well as postoperatively shown in Table 2

Severity of Pain	Preoperatively	Postoperatively
No Pain	0	30
Slight Pain	0	19
Mild	12	5
Moderate	25	0
Severe	18	0

Table 2 :- showing Pain measurement via VAS

then patients were evaluated for limping preoperatively and postoperatively as shown in Table 3.

Limping	Preoperatively	Postoperatively
None	3	29
Mild	9	22
Moderate	28	4
Severe	15	0

Patients were then evaluated for support function preop as well as postoperatively as demonstrated in Table 4.

Support Function	Preoperatively	Postoperatively
None	0	41
Cane for long walk	6	12
Cane most of time	14	2
One crutch	19	0
Two canes	13	0
Not able to walk	3	0

Table 4 :- showing Support function

None of our surgeries had any major complications, then patients were evaluated for Mean Harris Hip Score which shows marked improvement from 40 (preoperatively) to 95 (postoperatively)which increase functional outcome(Table 5).

Results of Harris Hip Score	No.of Hips
Excellent	35
Good	18
Fair	2
Poor	0

Table 5 :- Harris hip scores of patients showing functional outcomes

Bony ingrowth was seen consistently both on femoral and acetabular side in all patients on X-ray, no femoral or acetabular component loosening was seen on X-rays.Patients were also evaluated for restricted range of movement preoperatively as well as postoperatively which shown in Table 6.

Restricted Range of Movement	Preoperatively(%)	Postoperatively
Internal Rotation	93	None
External Rotation	80	None
Abduction	15	None
Adduction	40	None
Flexion	85	None

Table 6 :- showing restricted range of movement

IV. DISCUSSION

Earlier Total Hip arthroplasty has proven successful surgery in elderly patients but recently use of uncemented Total hip arthroplasty is also found successful in term of functional outcome in young adults.The literature reporting functional outcome of uncemented THA in young population is less{11,12} Taking other alternatives of THA such as Hip arthrodesis and Resection arthroplasty in consideration, both this procedure provide pain relief but affect activities of daily life such as inability to sit on chair as well as difficulty in public transport.Resection Hip arthroplasty leads to poor Harris hip score,bad functional outcome,and worse satisfaction rate,also this procedure have gait which consume high energy. Few studies have reported higher failure rate of THA in young patients and have attributed it to higher physical activities{13}.Recently there is quite changes in uncemented implant design,materials,surgical care which increase the life of implants, therefore uncemented THA is procedure of choice in young adults.As in our study, uncemented THA has reported excellent to good functional outcome and excellent radiological outcome. Our study provides opinion that fully HA coated titanium femoral components and porous
coated uncemented cup with highly crosslinked polyethylene liner can provide excellent biological fixation in young patients.The main limitation of the study was small sample size and of short duration follow up, so we recommend to do study in large populations and of long duration follow up for more accurate results.

V. CONCLUSION

Uncemented THA can be used in young patients with excellent to good functional and radiological outcome at 2 year follow-up with good satisfaction rate and less complications.Long follow-up and larger sample size are necessary to establish confirmatory results.

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Fig 1 : Implant used in our study

Fig 3 : Preop Xray shows AVN of left hip

Fig 4 : Shows POD2 Xray

Fig 5 : 6 month Follow up Xray

Fig 6 : 2 year follow up xray

Credit authorship contribution statement

Aakash Bansal: Conceptualization, Writing – original draft, Investigation. **R.P. Meena:** Data curation, Visualization. **Umesh Kumar Meena:** Supervision, Validation. **Bhavyaraj Singh Yadav :** Resources, Investigation, **Rohit Kharalwa :** Images ,investigations