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Results of uncemented THR in Indian patients in Indian conditions

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Abstract
Introduction: The hip joint is the most important joint of the body as it enables a person to assume various postures. Diseases of this joint are always alarming because if untreated, produces serious disability, for this reason various methods of management of hip diseases have been devised, but failure of conventional management in advanced stages of hip diseases like AVN, osteoarthritis, rheumatoid arthritis, congenital subluxation or dislocation, bone tumor etc. have brought a new surgical era of Total Hip Replacement. By relieving pain, total hip arthroplasty has probably given more pleasure to humankind than any other surgical procedure. THR is the most common adult reconstructive hip procedure performed in the western countries. By doing our study we want to study various aspects of uncemented THR and to see early and midterm complication of uncemented THR and compare with other studies.
Aim: The aim of this work is to study patients with advanced stages of hip diseases operated by Uncemented THR.
Materials and methods: This was the retrospective study of 23 cases operated with uncemented total hip arthroplasty with at least 2 years follow up at the tertiary care center hospital affiliated with medical college. Cases belonging to various age groups and having various pathologies of hip joint and treated with uncemented THR were assessed in respect to post-operative betterment of short and long term follow up. Patients were included in the study as per the inclusion and exclusion criteria. At regular follow-ups, patients were assessed as per the Harris hip score and X-ray findings.
Results and Discussion: The study comprise of post-operative result of Uncemented Total hip replacement. In comparison of other published series, it is a small study. All patients included in my study were operated with modified gibbson postero-lateral approach. All the patients in my studies were having acceptable range of motion scale according to modified Harris hip score.90%patients regained their abductor powers postoperatively indicating importance of post-operative abductor strengthening exercises. These reults were comparable to other published studies.
Conclusion: In our study comparing the following parameters of, functional limp, range of motion, daily activity affection and Harris hip score doesn't show any significant difference among our reference study and functional results of the patients are good suggesting that uncemented total hip replacement prosthesis is good modality to treat the patients with advanced hip arthritis especially young patients.

Keywords: THR, Uncemented, patients, management, AVN, osteoarthritis

Introduction
The hip joint is the most important joint of the body as it enables a person to assume various postures. Diseases of this joint are always alarming because if untreated, produces serious disability, for this reason various methods of management of hip diseases have been devised, but failure of conventional management in advanced stages of hip diseases like AVN, osteoarthritis, rheumatoid arthritis, congenital subluxation or dislocation, bone tumor etc. have brought a new surgical era of Total Hip Replacement (THR) [1].
A quote from Cicero, "Pleasure is the absence of the pain is true today". By relieving pain, total hip arthroplasty has probably given more pleasure to humankind than any other surgical procedure. THR is the most common adult reconstructive hip procedure performed in the western countries. THR evolved because of the many important changes in femoral head prosthesis design, the availability of suitable component materials and manufacturing techniques, and a better understanding of hip mechanics especially the need for resurfacing the acetabulum to reduce friction.
Special recognition must be given to the late Sir John Charnley for his pioneer work in all aspects of total hip arthroplasty, including the concept of low frictional torque arthroplasty,

Surgical alteration of hip biomechanics, lubrication, materials, design, and operating room environment. A major advancement was his use of cold curring acrylic cement (polymethyl methacrylate) for fixation of the components. His periodic reviews, as well as those of other investigators, of the results in significant numbers of patients have been invaluable, especially concerning wear, infection, loosening, and stem failure.

The success of total hip arthroplasty is based essentially on the creation of stable, artificial weight bearing surfaces with low friction between components that are fixed securely in bone, careful selection and evaluation of patients, as well as on meticulous attention to operative technique and asepsis.

The basic concept of low frictional torque arthoplasty has become established. The laboratory and clinical contributions of Sir John Charnley have improved the quality of life for many patients.

The history of hip arthroplasty has been dynamic, and research continues to improve results, especially in your patients. Investigation has proceeded along two major paths, one to eliminate the use of cement and the other to improve the cemented hip.

Sir John Charnley's low friction arthroplasty [2] became popular because he used head with 22mm diameter which has less frictional tourque than 32mm head but it has more penetration leading to neck impingement and secondarily causing acetabular impingement. And there is also chances of trochanteric nonunion. Due to this reasons Charnley's low friction arthroplasty given up.

By doing our study we want to study various aspects of uncemented THR and to see early and midterm complication of uncemented THR and compare with other studies. Basic aim of THR is to relive the intractable pain of hip arthritis and provide painless mobile hip. Additional objectives of THR is to correction of the deformity and restoration of hip mobility and stability.

AIM

The aim of this work is to study patients with advanced stages of hip diseases operated by Uncemented THR. This study includes various conditions in which Uncemented THR remains the mode of treatment and I have aimed at studying all aspects of this surgery including its various complications. Shortly in this study. I have put forward early and mid-term post-operative results of Uncemented THR surgery in Indian subjects with Indian conditions.

Materials and Methods

This was the retrospective study of 23 cases operated with uncemented total hip arthroplasty with atleast 2 years follow up at the tertiary care Centre hospital affiliated with medical college. Cases belonging to various age groups and having various pathologies of hip joint and treated with uncemented THR were assessed in respect to post-operative betterment of short and long term follow up.

Inclusion Criteria

- Age between 18 - 90 years.
- Patients operated with uncemented THR atleast 2 years back.
- Patients who had undergone Primary or Index surgery.
- All patient who had significant disabling hip pain and moderate to severe functional limitation of activities of daily living due to various hip pathology with any of the etiology.
- Patient who had Ficat and Arlet staging [3] more than 2B.
- All patient who had unilateral or bilateral hip involvement.

Exclusion Criteria

- Age < 18 years and > 90 year.
- Old non-unions and mal-unions.
- All those patients who lost follow up during prospective study.
- Patients with severe systemic disease like renal and liver disease contraindicated surgical procedure.
- Patients who had undergone cemented total hip replacement.

Intraoperatively

All the operations were done under spinal anaesthesia or general anesthesia or epidural anesthesia, once the patient was found to be fit for anesthesia and surgery. Those patients who developed abductor contracture were first treated with tenotomy. All patients were treated by uncemented total hip arthroplasty [4].

The entire procedure was done in lateral position and done through modified Gibson approach[5]. Then muscle was splitted and femoral capsule identified and cut and then femoral head was removed. The acetabulum and femoral canal were then prepared by sequentially increasing size of reamer and then uncemented THR was performed.

Post-operative regimen

Toes mobilization exercise was started immediately after effect of epidural anesthesia subsides. Pillow kept between two legs of patient immediately after operation.

Parenteral antibiotics for the period of 5 days were given to all the patient post operatively, after that oral antibiotics were started all the patient for the period of 5 to 7 days. Oral analgesics were prescribed to the patients for a period of 10 to 14 days.

All patients were advised to perform toe mobilization and calf pumping exercises to prevent DVT from the day of operation.

Every patient was catheterized one day before the operation, and catheter was removed on the third day after operation. Drainage tube was removed on the first dressing on the third post-operative day.

Status quadriceps strengthening and knee bending exercises were started on the third post-operative day. Hip abductor strengthening exercise was started on the fifth post-operative day to all patient. Patients were study advised to avoid cross leg sit and squat.

Post-operative x ray was done on the second day of the patient as soon as the patient become vitally stable. The stitches were removed on 12th to 15th post-operative day.

Patients were next called after another 3 weeks for reassessment. Both clinical as well as radiological, was performed and if fixation was found to be progressing satisfactorily full weight near was started as tolerated. Patients were next called at 45 days for a similar reassessment.

At regular follow up

At every time of follow up, patients were assessed by the following parameters

- Harris hip score [6].
- X-rays.(PBH and hip with thigh AP view)

In x-ray implant position was checked in every patient, whether femoral stem was going in varus or not, acetabular component

position, acetabular and femoral component fixation, any development of heterotopic ossification or not.

Post-operative complication developed in study patient

1. Dislocation
2. Infection
3. Loosening
4. Anterior thigh pain
5. Neurological injury(foot drop)
6. Limb length discrepancy
7. Heterotrophic ossification.

Complete record of injury, treatment and follow up examination was maintained according to a prepared Proforma

Results and Discussion

Table 1: Distribution of patients by AGE of the patients

Age group	No of cases of THR	Percent
20-30	0	0%
31-40	05	21.7%
41-50	14	60.8%
51-60	03	13.04%
61-70	01	4.34%
Total	23	100%

Age	In our study	JY Kim, Korea	S Munigangaiah
Mean age	48.2	46.8	43.91

- The average age incidence in my study is 3-4-5th decades.
- In this series most of the patients are in younger age group because Osteonecrosis is more common in younger age group and early diagnosis and quick, efficient and affordable management availability in a geographically advantage location.
- In other studies, majority patients are also in between 4-5th decade.

Table 2: Distribution of the patients by SEX.

Sex	No of cases of THR	Percent	JY kim
Male	18	78.26%	73%
Female	05	21.74%	27%
Total	23	100%	100%

- Osteonecrosis is more common in males due to post traumatic complication and alcohol intake because alcohol intake is much more common in male patients so in my study male patients are more than females.
- While in western countries, number of female patients are more as compared to my study because osteoarthritis are much more common in them.

Table 3: Incidence of side of joint involvement at presentation

Operated side	No of cases of THR	Percent	S Munigangaiah
Unilateral (right)	7	30.43%	59.3%
Unilateral (left)	8	34.78%	
Bilateral	4(4+4=8)	34.78%	40.7%
Total	23	100%	

- In my study 4 patients are operated for bilateral hip, 7 patients are of right side and 8 patients are of left side. It has got no significance.
- In my study, unilateral affection of the hip is much more common, and it is similar to the study of S Munigangaiah [8].

Table 4: Incidence of various indications

Etiology	No of cases (hip) of THR	Percent	JY KIM, korea
Primary Osteoarthritis	2	8.69%	15.2%
Osteonecrosis	15	65.21%	65.8%
Inflammatory	1	4.34%	15%
Post-operative failure	5	21.73%	-
Total	23	100%	

- In my study most of the patients 15 hips had Osteonecrosis, most of are of idiopathic and others are probably due to post traumatic complication and alcohol intake.5 hips are due to the failure of the primary surgery.2 hips are due to osteoarthritis and one hip is of inflammatory pathology.
- It is similar to other reference study JY kim [8], as the osteonecrosis is the most common indication for the THR.

Table 5: Incidence of associated illness.

Associated illness	No of cases	Percent
Diabetes	4	17.39%
Hypertension	5	21.73%
Ischemic heart disease	1	4.34%
None	13	56.52%
Total	23	100%

- In my study, 4 patients are having hypertension, 3 patients are having diabetes and one patient is having ischemic heart disease. All other patients are having no associated illness.

Table 6: Approaches used

Surgical approach	No of cases	Percent
Smith Peterson[9]	0	0%
Modified gibbson's[5,9]	23	100%
Total	23	100%

- All patients in my study were operated with modified gibbson approach.

Table 7: Incidence of limb length discrepancy in patients operated with uncommented THR.

Limb length discrepancy	No of cases (hips)	Percent
Shortening	3	13.04%
Lengthening	4	17.39%
None	16	69.56%
Total	23	100%

- In my study 16 hips operated with uncemented THR are having no limb length discrepancy, 4 hips having limb length lengthening and 3 hips having limb length shortening.
- In limb length shortening, out of 4, two hips have limb length shortening in between 0.5 to 1 cm. which is clinically not significant and for that shoe raise is given to that patient.
- In limb length lengthening, all four hips have limb length lengthening in between 0.5 to 1 cm. which is clinically insignificant.

Table 8: Incidence of early complication in uncemented THR.

Early complication	No of cases (hips)	Percent	Moczynski (%)	Johnston (%)
Early infection	3	13.04%	9.7%	2%
Dislocation	2	8.69%	3.7%	1%
Nerve palsy(sciatic)	2	8.69%	-	
Hematoma	0	0%	-	
Per op shaft fracture	0	0%	0.8%	2%
None	16	69.56%	-	
Total	23	100%		

- In my study 3 hips developed Early infection, 2 hips having dislocation, Two patients were developed sciatic nerve palsy immediate after operation and in both it is sciatic nerve palsy and recovered within 2 months of period. So while doing postero-lateral approach there is high chance of doing sciatic nerve injury.

Table 9: Association of infection and comorbid illness.

Associated illness (diabetes)	Infection (No. of hips)
Yes	1
No	2
Total	3

- In my study 3 patients got infection in which one patient is having diabetes, after operation in which two patient managed conservatively in form of daily dressing and antibiotic and one patient needed surgical debridement and at present patient is having no infection or any pain after surgical debridement.
- Infection rate is higher rate in my study as compared to others may be due to poor hygiene of the patients and patient were from lower socio-economic class and lower education.

Table 10: Association between dislocation and limb length discrepancy

Limb length discrepancy	Dislocation (no of hips)
Yes	2
No	1
Total	3

- Out of 3 patients who developed dislocation, two patients are having limb length discrepancy.
- In limb length discrepancy, there are high chances of dislocation in shortening dur to in shortening there is decrease in vertical and horizontal offset leads to increase stress on the implant and in shortening soft tissue covering(abductor muscle are lax). so chances of dislocation are high.

Table 11: Incidence of late complication in patients treated with uncemented THR.

Late complication	No of cases (hip)	Percent	Moczynski[10] (%)	Johnston[11] (%)
Thigh pain	3	13.04%		
Heterotopic ossification	2	8.69%	-	-
Loosening	0	0%	1%	5%
Thromboembolism	1	4.34%	3.2%	-
Implant breakage	0	0%	-	-
Per prosthetic breakage	0	0%	-	-
None	17	73.91%		
Total	23	100%		

	Our study (%)	JY Kim, Korea (%) [8]
Anterior thigh pain	13.04%	11.4%

- In my study, 3 hips developed anterior thigh pain, 2 hips is having heterotopic ossification, no patients developed loosening in form of fibrous fixation of femoral and acetabular components and 1 patient developed thromboembolism.
- One patient developed thromboembolism after the operation for that patient is admitted in surgical department and managed conservatively in form of pharmacological management and regular physiotherapy.

Table 12: Grade of heterotopic ossification.

Brooker classification of HO	No of hips
Grade I	-
Grade II	-
Grade III	2
Grade IV	-
Total	2

- Two patients developed grade III HO according to brooker classification. but both patients are having no restriction of range of motion and managed in form of regularly follow up every 2 months and physiotherapy in form of hip abductor strengthening exercises.

Table 13: Duration of NWB in patients operated with Uncemented THR.

NWB on discharge	No of cases(hips)	Percent
Yes	13	56.52%
No	10	43.47%
Total	23	100%

- In my study, 10 patients were started PWB at the time of discharge and 13 patients were kept NWB at the time of discharge.
- All 13 patients started PWB within 2 months of the surgery.

Table 14: Duration of starting PWB in patients operated with Uncommented THR.

PWB	No of cases(hips)	Percent
Within 7 days	10	43.47%
Between 7- 30 days	7	30.43%
Between 30-45 days	6	26.08%
>45 days	0	0%
Total	23	100%

- In my study,10 patients were started PWB within 7 days of operation and 7 patients were started PWB in between 7 days to 30 days and 6 patients were started PWB in between 30-45 days after operation.

Table 15: Duration of FWB in patients operated with Uncemented THR.

FWB on discharge	No of cases(hips)	Percent
Within 30 days	10	43.47%
Between 30-45 days	7	30.43%
Between 45-60 days	6	26.08%
After 60 days	0	0%
Not able	0	0%
Total	23	100%

- In my study, 10 patients were started FWB within a month of the operation, 7 patients were started FWB in between 30-45 days and 6 patients were started FWB in between 45-60 days of the operation.

Table 16: Incidence of Limp in patients operated with uncemented THR.

Limp at follow up	Hip Score	No of cases	Percent
None	11	16	69.56%
Slight	8	7	30.44%
Moderate	5	0	0%
Severe	0	0	0%
Total		23	100%

- In my study 16 patients are having no limping at 2 years follow up, 7 patients are having slight limping.
- Limping is mainly occur in patients due to either limb length discrepancy or hip abductor muscle weakness.
- For treating limping, patients with having limb length discrepancy were given shoe raise and hip abductor strengthening exercise advised to the patients with abductor muscle weakness.

Table 17: Incidence of need of support in walking in patients at 2 years follow up.

Support	No of cases(hips)	Percent
None	23	100%
Cane for long walk	0	0%
One crutch	0	0%
Two cane	0	0%
Two crutches	0	0%
Total	23	100%

- In my study all patients have no need of support while walking.

Table 18: Walking distance in patients operated with uncemented THR.

Walking distance	No of cases(hips)	Percent
Unlimited	23	100%
Six block (1000 metres)	0	0%
Two to three block (500 metres)	0	0%
Indoor only	0	0%
Bed/chair only	0	0%
Total	23	100%

- In my study, all patients can walk upto unlimited distance without any difficulty.

Table 19: Daily living activities affection in patients operated with uncemented THR.

Daily living activities	No of cases(hips)	Percent
Good	19	82.60%
Fair	4	17.39%
Poor	0	0%
Total	23	100%

- In Daily activities, according to modified Harris hip score, I have included if patient is able to climb up stair or down stair or not, if patient is able to sit in a chair comfortably for one hour or not, if patient is able to wear shoes and socks with ease or not and if patient is able to do public transportation or not.
- In my study,19(83%) patients are having good score in daily living activities and only 4(17%) patients are having fair result and none patient is having poor result in daily living activities at two years follow up.
- In patients having fair result in daily living score are advised to modified their life style and all are advised to do physiotherapy in form of hip abductor
- Strengthening.

Table 20: Range of motion in patients operated with uncemented THR. Range of motion scale in patients operated with uncemented THR according to modified Harris hip score.

Range of motion	Score	No of hips	Percentage
211-300	5	10	43.47%
161-210	4	13	56.52%
101-160	3	-	-
61-100	2	-	-
31-60	1	-	-
0-30	0	-	-
Total		23	100%

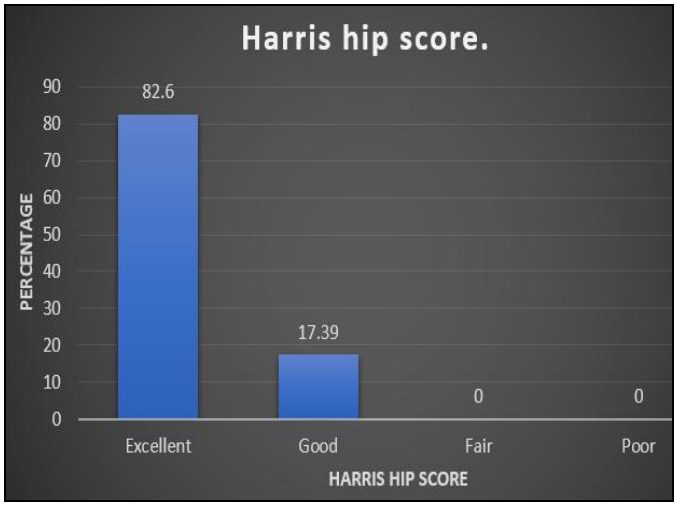
- Range of motion scale is measured according to modified Harris hip score.
  A. Flexion (140 º)
  B. Abduction (40 º)
  E. Adduction (40 º)
  C. External Rotation in Extension (40 º)
  D. Internal Rotation in Extension (40 º)
- The sum of all range of motion are included in range of scale.

- In my study, All 23 hips are having good range of motion according to modified Harris hip score.

Table 21: Harris Hip score[6]:

Harris hip score	Score	No of cases	Percent
Excellent	90-100	19	82.60%
Good	80-89	4	17.39%
Fair	70-79	0	0%
Poor	<70	0	0%
Total		23	100%

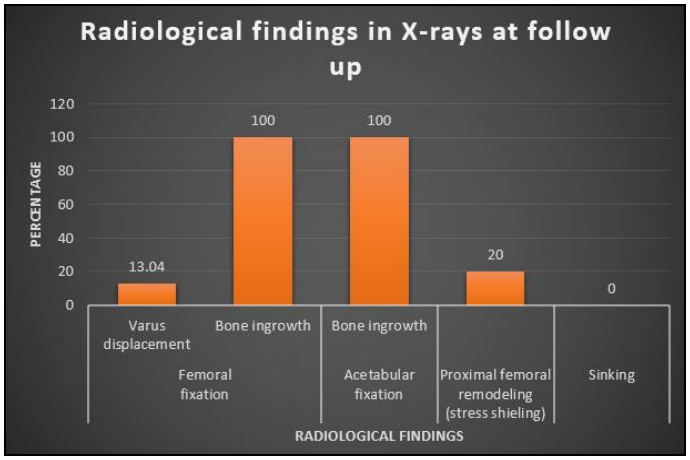
	In our study	JY Kim, Korea[8]	S Munigangaiah[7]
Mean modified Harris hip score	94.4	90	93.89



- In my study 19 patients are having excellent Harris hip score,5 patients are having good score and only one patient is having poor outcome at 2 years follow up because that patient develop loosening around the femoral stem.
- In my study, functional outcome in form of modified Harris hip score is excellent (>90) at follow up which is similar to all my reference study.

Table 22: Radiological findings in X-rays at follow up

Sl.no	Radiological finding	No of hips	Percentage
	Femoral fixation		
1	Varus displacement	3	13.04%
2	Bone ingrowth	23	100%
3	Fibrous ingrowth	0	0%
4	Unstable	0	0%
	Acetabular fixation		
1	Bone ingrowth	23	100%
2	Fibrous ingrowth	0	0%
3	Unstable	0	0%
	Loosening	0	0%
	Proximal femoral remodeling (stress shieling)	5	20%
	Sinking	-	



- Fixation of femoral and acetabular component in form of bone ingrowth, fibrous ingrowth and unstable is decided according to engh's criteria.
- In my study, on x-ray radiological examination, in 3 hips femoral Implant is in varus position. All 23 hips showing femoral bone ingrowth in femoral component. All 23 hips showing acetabular ingrowth in acetabular component. Five hips showing proximal femoral stress shielding effect at follow up X ray examination.

Conclusion

In our study comparing the following parameters of, functional limp, range of motion, daily activity affection and Harris hip score doesn't show any significant difference among our reference study and functional results of the patients are good suggesting that Uncemented total hip replacement prosthesis is good modality to treat the patients with advanced hip arthritis especially young patients.

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