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Original Research Paper

Orthopaedics

FUNCTIONAL OUTCOME OF CERAMIC ON CERAMIC TOTAL HIP REPLACEMENT USING A 36 MM DIAMETER FEMORAL HEAD

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ABSTRACT

Background & Objectives: Pain in the hip joint is one of the most important causes in disabling human locomotion. Total hip arthroplasty represents the greatest single advance in modern orthopaedic surgery. The size of the femur head and the bearing surfaces to be used, have always been a subject of concern in the THR. The present study was conducted to study functional outcome of a ceramic on ceramic total hip arthroplasty using a 36 mm femur head.

Method: In this study 30 patients of 30 diseased hips, aged between 30 and 75 years, who were treated with ceramic on ceramic total hip replacement were studied for 18 months durations. To assess the functional outcome of study pre-op HHS (Modified Harris Hip Score)[1] and WOMAC (Western Ontario &McMaster Universities Osteoarthritis index)[2] was compared to the post op HHS and WOMAC score at 12 months and 18 months.

Results: In this study we observed HHS Modified) excellent results in 17 hips and good result in 13 hips. No fair or poor results were noted. The mean Western Ontario & McMaster Universities Osteoarthritis index showed a significant decrease in the score (Higher scores on the WOMAC indicate more pain, stiffness and functional limitations) from 70.5 to 14.8 at 12 months and 14.2 at 18 months.

Conclusion: This study shows that a ceramic on ceramic bearing THR using a 36 mm diameter femur head has excellent to good result. Long term studies are necessary to study the late complications and to prove the efficacy of the implants and procedure.

KEYWORDS : PFN- Proximal Femoral Nail. HHS- Harris Hip Score, Ceramic, THR: Total Hip replacement, Hip Dislocation

INTRODUCTION:

Total hip replacement is a permanent method of relieving pain in the hip due to various conditions. The aim of the surgery is to relieve pain,at the same time to preserve motion and stability of the joint. Hard-on-soft combinations consist of a head made of stainless steel, cobalt-chromium (Co-Cr) alloy or alumina and a cup made of ultra-high molecular weight polyethylene. Association between high volumetric wear, polyethylene particulate debris, osteolysis, and loosening in total hip replacement (THR) in young patients is well recognized and understood complications of these prosthesis. Alternative bearing materials in THR have been developed to reduce the incidence of osteolysis. Hard on hard bearing with less wear particle debris is a move in this direction. Ceramic on ceramic is a popular hard on hard bearing option. The ceramic material has undergone modifications, and a third-generation ceramic, released in the mid1990s, is believed to have better wear properties [3]. During the initial development of hip replacement, the surgeons tried to make the implants which mimic the size of the natural femoral head. However, it was soon realised that when a large[3] metal ball articulates with a plastic cup, the plastic part gets worn out quickly due to increased volumetric wear. To decrease the "wear" of the plastic, Sir John Charnley (who was one of the pioneers in the development of modern hip replacements), opted for a smaller 22 mm metal head (which is much smaller than the natural femoral head) in the design of Charnley hip replacement. However, a high dislocation rate following hip replacement has been quoted with smaller ball size in multicentre studies [4]. Dislocation continues to be a significant issue after primary and revision total hip arthroplasty (THA). The incidence reported ranges from less than 1% to 5%, with a study on Medicare patients demonstrating a 3.9% dislocation rate within 26 weeks post-operatively after elective THA[5]. Although dislocation is a multifactorial problem, it is well established that stability of THA improves with a larger femur head size. With an increase in the femoral head size, there is a corresponding increase in the head : neck ratio , the range of motion before which impingement occurs and the amount of displacement required before the head dislocates (jump distance).The development of hard/hard couples, mitigating the wear issue, has renewed interest in the use of large heads. There is increasing data to suggest that large femoral head sizes reduce dislocation rates clinically. Jameson et al [6] in a five year analysis of National Health Service patients in England and Wales reported a statistically significant increase in the use of femoral heads of size 36 mm and greater (from 5% in 2005 to 26% in 2009) along with increase in the use of the posterior approach. They found a significant drop in cumulative dislocations in the same period at three months (1.12% to 0.86%), six months (1.25% to 0.96%) and 12 months (1.42% to 1.11%) and at 18 months (1.56% to 1.31%) between 2005 and 2008. Although lab studies and some clinical studies also support the concept that the larger sized balls decrease the dislocation[4,7] we do not have much studies that specifically measure the functional outcome of ceramic on ceramic hip replacement using a 3 6mm head . Hence, this study is intended to determine the functional outcome of the surgery using ceramic on ceramic prosthesis with 36 mm diameter head.

MATERIAL AND METHOD:

In this study 30 patients of 30 diseased hip were included according to inclusion and exclusion criteria's. Written and informed consent obtained. To establish the diagnosis and templating AP view in 15 degree internal rotation and lateral view taken. All preop investigations done to rule out infection and preanaesthetic fitness as per protocol. All patients were operated in lateral position with posterior Southern Moore approach to hip. All surgeries were done by same surgeon with same implant system (ceramic on ceramic total hip replacement with 36mm head) . All patients were given DVT prophylaxis postoperative with inj clexane (enoxaparine sodium) for 5 days and on discharge tab xalerato (rivaroxaban) 10 mg once day for total 35 days post op day. Post operative calf pumps were used to prevent

DVT. 10 Patients were kept postop in ICU as per anaesthsist advice considering old age and comorbid conditions. 3rd postoperative day wound check done. Out of bed mobilisation started on first operative day with physiotherapist help. Patients were discharged on 5th post op day if patients were able to manage personal hygiene using commode, side bed sitting, and postoperative dos and don't well understood . On 10th post op days stiches removed. In our study, patients on discharge were advised to report after 1st month, 3rd month, 6th month and every 6 months thereafter. To assess the functional outcome of study pre-op HHS (Modified Harris Hip Score) and WOMAC (Western Ontario &McMaster Universities Osteoarthritis index) was compared to the post op HHS and WOMAC score at 12 months and 18 month+s. Results were tabulated, statistical analysis done and compared with previous studies.

RESULTS AND DISSECTION:

Patients were evaluated functionally with Harris hip score (modified) and (WOMAC) Western Ontario & McMaster Universities Osteoarthritis index at 12months and 18 months. The mean Modified Harris Hip Score increased significantly from 26.6 pre operatively to 89.3 post operatively at 12 months and 90.0 at 18 months. The mean WOMAC score has decreased significantly from 70.5 pre operatively to 14.8 post operatively at 12 months and 14.2 at 18 months.

Table No1 Modified Harris Hip Score

Harris Hip Score	No of hips	Distribution
Excellent	17	56.7%
Good	13	43.3%
Fair	0	0.0%
Poor	0	0.0%

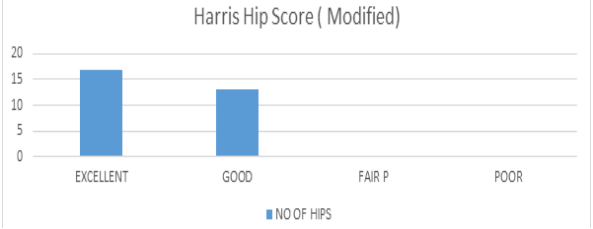

Table No 2 Statistical Representation Harris Hip Score (modified)

HHS	Mean	Standard Deviation	Minimum	Maximum
Pre-op	26.6	11.3	11	52
Post-opat 12 months	89.3	4.1	82	97
Post-opat 18 months	90,0	3.8	82	97

Using Paired T Test, P value is 0.000 (P <0.05) i.e. there is a significant difference between Pre-op HHS and Post-op HHS at 12 months. Using Paired T Test, P value is 0.000 (P <0.05) i.e. there is a significant difference between Pre-op HHS and Post-op HHS at 18 months

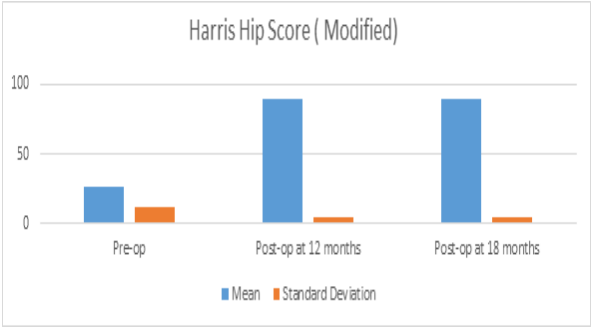

Table No 3 Statistical Representation For Womac Score

WOMAC	Mean	Standard Deviation	Minimum	Maximum
Pre-op	70.5	8.6	48	85
Post-opat12 months.	14.8	6.0	4	29
Post-opat18 months.	14.2	5.9	4	29

Using Paired T Test, P value is 0.000 (P <0.05) i.e. there is a significant difference between Pre-op WOMAC and Post-op WOMAC at 12 months. Using Paired T Test, P value is 0.000 (P <0.05) i.e. there is a significant difference between Pre-op WOMAC and Post-op WOMAC at 18 months.

In this study we observed no incidence of post-operative dislocation. In a study done by **Somesh et.a[81]** compared hip arthroplasties done using a 36 mm femoral head and 28mm femoral head and found that dislocations with a 36 mm femoral head were lower than those for a 28 mm smaller femoral head . Also,Gagala **et al [9]** studied 50 hips with an average follow up of 40 months and showed a decreased risk of postoperative dislocation with 36 mm head .These results are in accordance with our study .Although our study period was short,but there were no incidence of loosening or osteolysis. Sugano et al.[96] in their 11 to 14-year follow up results of THA using a third generation alumina ceramic-on-ceramic bearing showed 14-year survivorship as the end point of revision of 97.9% for the acetabular cup, 97.8% for the femoral stem, and 95.7% for the overall implants.. **Porat et al. [10]** compared ceramic on ceramic (COC) large head THA with metal on metal(MOM) THA and found 26% of the revision in MOM group and 13% in the COC group were bearing related. An uncemented ceramic on ceramic bearing with a large diameter head 36 mm as in our case , gives excellent functional outcomes with reduced rate of complications. The strength of this study is that all hips were primary arthroplasties, all were done using a uniform technique,done by same surgeon and no patient lost for follow- up. The limitation of the study is that the sample size is less and the follow-up duration is not very long so as to demonstrate the long term complications of this procedure

CONCLUSION:

In this study we concluded that 36 mm diameter femoral head, is an excellent procedure in the management of diseased and destroyed hips with chronic and incapacitating pain in . Secondary osteoarthritis of the hip due to avascular necrosis of the femoral head was the most common cause of chronic hip pathology in our study. The assessment of clinical results of uncemented total hip replacement with 36 mm head and ceramic on ceramic bearing ,has shown that there is definitive improvement with regard to pain, function and range of motion post-operatively. With proper patient selection, adequate planning, armamentarium, meticulous surgical technique, we have achieved good results. Long term studies are necessary to study the late complications and to prove the efficacy of these implants and procedure

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