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A PROSPECTIVE STUDY OF EARLY COMPLICATIONS OF UNCEMENTED TOTAL HIP ARTHROPLASTY FOR AVASCULAR NECROSIS OF FEMORAL HEAD

Orthopaedics

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ABSTRACT

Objectives: This study the done to assess early clinical & functional outcome of uncemented total hip arthroplasty and early complications, if any with the procedure.

Material and Methods: Study included 30 patients (34 hips) of avascular necrosis of femoral head that were operated with uncemented total hip arthroplasty within the age group 18 to 45 year. Patients were followed up prospectively at the time of discharge, at 4 weeks, 3 months, 6 months and 1 year and results were assessed using Harris Hip score and radiological and clinical parameters.

Conclusion: Total hip arthroplasty remains the treatment standard for advanced stages of avascular necrosis of femoral head despite of relative success of several joint preserving procedures in selected patients.

KEYWORDS

uncemented total hip arthroplasty, avascular necrosis, complications, outcome.

INTRODUCTION - The term Osteonecrosis was first described in 1738 by Munro[1]. Phemister in 1915 described the microscopic findings in necrotic bone, comparing the changes in bone dying as result of infection (septic necrosis) with those resulting from a circulatory disturbance (aseptic necrosis). In 1948, Chandler coined the term `Coronary disease of hip' which was widely accepted.[2,3]. Once the diagnosis of AVN is confirmed, management varies depending upon the age of the patient, stage of the AVN and previous treatment received[4]. Conservative management and joint-preserving procedures are successful in selected patients and in early stages of AVN; however, for those with advanced disease and articular collapse and for those who have failed conservative management, Total Hip Arthroplasty (THA) remains the standard treatment.[4,5] In 1960, Sir John Charnley (Father of the modern THA) has done pioneering work in all aspect of THA including the concept of low frictional arthroplasty, surgical alteration of hip biomechanics, lubrication, materials and design. His design consisted of Teflon Cup and Stainless Steel Femoral Component that was fixed using PMMA cement. Uncemented total hip arthroplasty achieve fixation without cement, either by "press-fit" or by "biologic bone in growth"[6]. It is frequently used in young patients with high physical demands, where a revision surgical procedure in the future will be more likely.

MATERIAL AND METHODS –

This is a prospective study that was conducted in NSCB Medical College, Jabalpur. 30 patients (34 hips) were operated with uncemented total hip arthroplasty. Cases were examined preoperatively and followed up prospectively at the time of discharge, at 4 weeks, at 3 months, at 6 months and 1 year. Minimum period of follow-up was 6 months.

Inclusion Criteria:

- Patients of avascular necrosis of femoral head operated with uncemented total hip arthroplasty in Department of Orthopaedics, N.S.C.B. Medical College & Hospital, Jabalpur (M.P.)
- Patients of both genders of age group 18 – 45 years.
- Patients with AVN of grade 3 & higher.
- Patients willing to give consent for participation in study.

Exclusion Criteria:

- Patients having co-morbidities not associated as a direct cause of avascular necrosis
- Patients who have undergone any other surgery in the affected hip joint.
- Patient not willing for participation in study.
- Patients lost to follow up.

Surgical approach - In this study we have preferred Posterolateral approach with posterior dislocation of hip which is the modification of posterior approach described by Gibson and Moore.

Post op care

- All patients were kept in separate side room.
- Hip positioned in approx 15 degree abduction and neutral rotation, with the help of a triangular pillow splint.
- Gentle isometric exercise was advised from second postop day & were allowed to sit on side of the bed avoiding excessive flexion at hip
- Advised not to sit cross legged and in squatting position.
- Patients were made to bear partial weight over concerned limb and were allowed to walk with support of walker after one week.

Assessment of outcomes-

- Clinical and functional improvement was assessed using Harris Hip Score[8].
- Pain was measured in terms of Visual Analog Scale (VAS) pain Score.
- Radiological parameters were assessed on X ray films (AP and lateral view) including acetabular cup alignment (inclination and anteversion) & femoral stem placement (central, valgus or varus placement).
- Complications were assessed with patient's complaints, clinical examination, radiological and laboratory investigations

STATISTICAL ANALYSIS - The student's paired t-test was used to analyze the difference of means for values preoperatively and postoperatively to determine whether the results were statistically significant. P value of < 0.05 was considered significant.

RESULTS AND OBSERVATIONS –

Out of 30 patients, 26 have undergone unilateral THA while 4 have undergone bilateral THA, so the total operated hips were 34. Average size of incision was 12 cm with average intra operative blood loss was 150 ml. Average operating time was 1.5 hours. Implants of two companies (company M and company Z) were used. Minimum period of follow up was six months and there was no loss of follow up or deaths after surgery. 13 out of 30 patients (43.3%) of AVN of femoral head belong to age group 21-30 years with mean age of presentation is 30.28 ± 8.026 years. 23 out of 30 patients (76.7%)of AVN of femoral head were male with male to female ratio of 3.2: 1. All the hips (n=34) that had undergone THA were of advanced AVN (stage-III & IV, Ficat & Arlet) in which 24 were stage-III (70.6%) and 10 were stage-IV (29.4%). 10 out of 30 cases of AVN of femoral head were idiopathic (33.3%) followed by post traumatic AVN (n=9, 30%), sickle cell

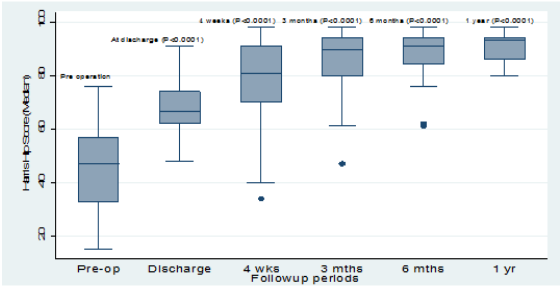
disease (n=5, 16.7%), due to alcoholism (n=5, 16.7%) and steroid intake (n=1, 3.3%).

Outcome-

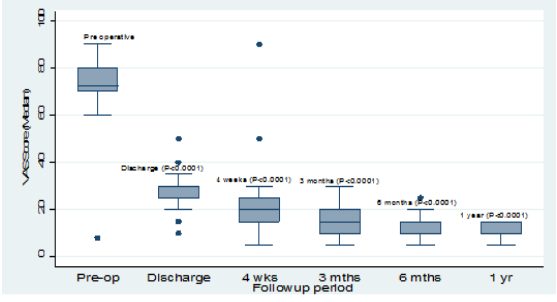
- Mean preoperative Harris hip score 45.088 ± 16.190 (Min. 15 and Max. 76) and mean Harris hip score at final follow up 87.852 ± 8.784(Min. 61 and Max. 98).
- Mean preoperative VAS pain score72.441 ± 13.614 (Min.65 and Max. 90) and mean VAS pain score at final follow up 12.529 ± 5.748 (Min.5 and Max.25).

Radiological parameter –

- 33 out of 34 (97.1%) had normal inclination* of acetabular cup with angle of inclination 30-50 degree.
- 1 hip (2.9%) had horizontal inclination* with angle of inclination < 30 degree.
- All the hips (n=34) had normal anteversion* angle and there was no incidence of excessive anteversion and retroversion.
- One hip out of 34 (2.9%) had valgus placement of femoral stem and 2 hips (8.8%) had varus placement and all other hips (n=30, 88.2%) had centralized placement of femoral stem.



Graph 1 – Sequential change in Harris Hip score



Graph 2 – Sequential change in VAS pain score

Fig 1 Dislocation of prosthesis

Fig 2 Heterotopic ossification

Fig 3- Heterotopic ossification

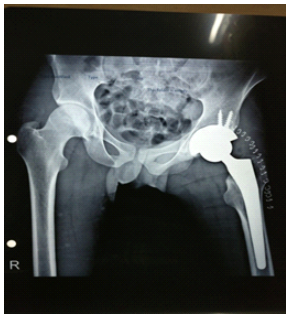


Fig 4 - Limb Lengthening

Complications	Frequency	Percentage (%)
Vascular injury	0	0%
Nerve injury (Foot drop)	1	2.9%
Thromboembolism	0	0%
Bladder injury	0	0%
Post operative infection	1	2.9%
Limb length discrepancy	2	5.9%
Dislocation of Prosthesis	1	2.9%
Heterotopic ossification	2	5.9%
Periprosthetic fractures	1	2.9%
Aseptic loosening	0	0%
Total	**8**	**23.5%**

Table 1 – Complications encountered in our study

DISCUSSION -

Kelmanovich D et al (2003)[14] described in detail five classic approaches to the hip; Smith-Petersen (anterior), Watson-Jones(anterolateral), Hardinge (direct lateral), transtrochanteric, and posterolateral. They stated that the posterolateral approach is the most commonly used approach because it is technically simpler than other approaches and also because it does not interfere with the abductor mechanism of the hip. A disadvantage to this approach is the higher rate of dislocation, reported to be as high as 9.5%. Bhat et al (2016)[15] reported a study on Total Hip Replacement done through oosterolateral approach in Kashmir and analyzed 86 cases(89 hips) during years Dec 2010 to April 2016 . They reported 6 out 89 cases to have dislocation (6.7%). They concluded that though, there is less blood loss, increased dislocation is observed in posterolateral approach. Therefore emphasized that surgeons should choose the approach with which they are conversant and have experience. Kakaria et al (2005)[16] reported 1 hip out of 27 (3.9%) having vertical inclination of acetabular cup which led to recurrent dislocation of prosthesis for which revision surgery was done. Rest all the hips were normally aligned. Thomasson et al (2007)[17] reported 3 cases to have excessive vertical inclination of acetabular cup (>50^0) out of 97 operated hips out of which 2 case reported dislocation of prosthesis and required revision surgery. One case had excessive anteversion of acetabular cup due to which patient had restricted flexion at hip and complaints of thigh pain. Asopa et al[19] in 2014 reported incidence of 0.9% to 3% os sciatic nerve injury in primary total hip arthroplasty. They documented that intraoperative sciatic nerve injury is due to significant limb lengthening, improper placement of retractors, thermal injury related to cement, excessive manipulation and postoperative hematoma. This incidence of LLD in our study is in range of limb length discrepancy (1% to 27%) suggested in the study by Desai et al[20] (2013). They also stated that lengthening is the most common form of LLD and has been associated with back pain and sciatica, neuritis, gait disorders, general dissatisfaction, dislocation of prosthesis, early loosening of components and can lead to gross dissatisfaction of patient, morbidity, and may require revision surgery.

CONCLUSION -

Total hip arthroplasty remains the treatment standard for advanced stages of avascular necrosis of femoral head despite of relative success of several joint preserving procedures in selected patients. This study has shown spectacular results of uncemented total hip arthroplasty in avascular necrosis of femoral head in terms relief of pain, mobility and stability of hip joint with easy rehabilitation. Uncemented total hip components although being costlier than cemented one, are implants of choice in young adults with good bone stock, high physical demands and where more likely a revision surgical procedure is required in the future. Excellent to fair outcomes of THA were recorded in 94.12% of the cases and the poor outcomes in 5.8% cases were due to faulty surgical techniques and implant malpositioning. Proper positioning of implant in situ and size selection is very important otherwise outcomes could be catastrophic. We found no significant correlation between the two companies of implants with the outcomes of surgery and complications rate. The use of Charnley's self retaining retractor should be avoided as much as possible to safe guard sciatic nerve in posterolateral approach for THA. Heterotopic ossification although an

unpredictable complication, can be reduced by proper intraoperative soft tissue handling, reducing the operative time, preventing periprosthetic infection and proper drainage of post operative hematoma. Though the study was not free of complications, we conclude that complications can be well prevented by careful selection of patients, thorough preoperative planning and counseling, meticulous surgical technique which comes with experience, good post operative care and physiotherapy.

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