

# Uncemented Total Hip Replacement Using Ha Coated Stem in Avascular Necrosis of Femur Head: Minimum Follow Up of 3 Years

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**Abstract:** 40 patients who were an average of thirty three (range, twenty three to fifty years old) received a hydroxyapatite-coated femoral prosthesis as part of a total hip arthroplasty and were followed for a minimum of three years (average, 3.8 years; range, three to 5.4 years) or until revision. The average Harris hip score was 40 points (range, 22 to 70 points) preoperatively and 91 points (range, 68 to 95 points) at the time of the latest clinical evaluation. et al. All stems were radiographically osseointegrated according to a modification of the criteria described by Engh et al. Two stems were revised, but none of the revisions were performed because of mechanical failure (one, because of an infection; and one, after a traumatic femoral fracture that occurred one year postoperatively). The over-all clinical results associated with hydroxyapatite-coated femoral components were excellent in this group of young patients after short to intermediate-term follow-up. A review of serial radiographs showed mechanically stable implants with osseous in growth.

**Keywords:** Hip Replacement, Avascular Necrosis, Ha Coated Stem

## 1. Introduction

Avn of femoral head occurs in young individual with age <50<sup>1</sup>. Total hip arthroplasty (THA) is considered to be the best treatment for individuals with disabling hip pain due to advanced osteonecrosis with collapse of the femoral head<sup>1,2,3</sup>. Uncemented HA coated THR was developed to obtain biologic fixation and increase the longevity of the implant. Some studies believe there is delamination and generation of HA coated particles leading to osteolysis and implant loosening<sup>4</sup>. There is a renewed interest in the use of HA coated stems specially in young individuals<sup>5</sup>. We evaluate the results of 40 patients operated by primary THA with HA coated stems.

## 2. Materials And Methods

Retrospective and prospective study of 40 patients who underwent primary uncemented HA coated primary THR between 2010 to 2012. The mean age of patients at surgery was 33 years with 27 males and 13 females. All operations were performed at the same institution by posterior approach by one of the 2 orthopaedic surgeons.

The uncemented implant made of titanium alloy coated with HA (corail J&J). The stem has fixation predominantly in the proximal metaphyseal region. Acetabular component is hemispherical with press fit cup.

Postoperative management included 24 hours of antibiotic prophylaxis (second generation cephalosporin), and perioperative and postoperative thromboprophylaxis (anti-thromboprophylactic stockings and subcutaneous low-molecular-weight heparin). Patients were mobilized within 48 hours after surgery full weight bearing with walker started second day of surgery and walker continued for the first 2-3 weeks. Thereafter the walker was discarded.

Radiographic assessment done using AP view of pelvis and lateral view of hip joint and Femur taken at pre-operative,

immediate post-operative and regular interval till 3 years. Radiographic assessment done for stem integration using Engh classification<sup>6</sup>. Assessment of osteolysis using Gruen zone<sup>7</sup> for femur stem and DeLee and Charnley zone<sup>8</sup> for acetabular component. Measurement of cup inclination was done in AP X ray of Pelvis using Geogebra Software<sup>9</sup>.

Pre-operative and regular follow up at 3 month, 6 month, 12 month and yearly done. Harris Hip scoring done at all follow ups.<sup>10</sup>

## 3. Results

There were no gaps seen in stem bone interface at immediate post operative radiographs. Resorption seen in one case in Gruen zone 7. No case had stem subsidence or radiolucent line formation. No case of cortical erosion or cyst formation reported. Reactive line formation began around the stem tip in Gruen zone 4 and visualized well at 6 months. Pedestal formation not seen in any of the patients. No prosthesis had significant subsidence (>2mm). No case of heterotopic bone formation seen<sup>12</sup>.

The mean pre-operative Harris Hip Score was 40 and post operative. Mean Harris Hip Score at one year was 91. One patient complained of persistent thigh pain<sup>13,14</sup>. No patient had limb length discrepancy more than 1 cm<sup>15</sup>.

## 4. Discussion

Patients with advanced avascular necrosis pose challenge to surgeons due to following reasons: 1) High functional demand of prosthesis as patient is young and active 2) outcome depends upon underlying cause of osteonecrosis such as alcoholic<sup>16</sup> and steroid induced<sup>17</sup> patients perform poorly due to immune suppression and osteoporosis 3) Bilateral nature of disease has high forces acting on both lower limb.

The study includes a series of hip arthroplasties using a tapered, titanium HA coated stem. The femoral component has performed well, developed osseointegration and trabecular bridging in all cases.

The use of HA coating has been opposed with some studies showing no advantage of HA coating over other coatings in terms of long term survival<sup>18, 19, 20</sup>.

Several authors have used porous coated stem for avascular necrosis<sup>21, 22, 23</sup>.

Fibular strut grafting had been used in the treatment of avascular necrosis of the femoral head in four cases. Intraoperative difficulty in entering the canal from lateral most part was observed. Fehrl<sup>24</sup> et al observed that residual fibular graft prevented optimal femoral canal fit and positioning of Femoral stem in the coronal plane when performing total hip arthroplasty in patients with previous strut grafting, special attention be directed to adequate graft removal, particularly in the lateral greater trochanteric fossa. In one of our cases residual bone became sequestered and acted as foci of infection. Patient had sinus tract and discharge. Root of the sinus tract was leading to necrosed bone which was used for bone grafting. An intraoperative anteroposterior radiograph with the final femoral broach in place may be useful in verifying adequate strut graft removal and optimal canal fill with proper prosthesis positioning.

No patient had dislocation of prosthetic hip Joint. One patient had early postoperative deep infection of prosthesis in four days of surgery. Two attempts of debridement and lavage was unsuccessful in eradicating the infection. Removal of prosthesis was contemplated. Removal of well fixed HA coated stem was very difficult as bone growth was already started as early as three weeks. On removing the stem coating was all erased from the surface of the stem. It shows that HA coating enhances the osseous growth over the stem<sup>25</sup>. Hydroxyapatite has the property of osteoconduction, achieving a strong bond with living bone in a short period of time, even under loaded conditions.

One patient had intra operative fracture of greater trochanter which was fixed intra-operatively using ss wiring of trochanter.

In four cases of long standing collapse of femoral head due to AVN, lateral subluxation of femoral head and medial osteophytes were seen in the cotyoid fossa. Because of long standing impaction of femoral head, superolateral defect was created in the acetabulum. This had led to more vertical placement of acetabular component. Medialization of cup as in cotyloplasty technique described for dysplastic acetabulum would be useful technique of uncemented cup placement in such cases.

On pre operative CT scan cyst formation was seen in two patients in the weight bearing dome of the acetabulum. Per operatively no special measures were taken as cyst surfaced on reaming.

Only one case of anterior thigh pain was reported may be related to favourable bone response without significant

hypertrophy /remodeling<sup>13, 14, 25</sup>. The lower end of the stem has tapered construct to prevent medullary canal obstruction. This could be one of the plausible causes of decreased incidence of thigh in our series as it produces a stiffness gradient.

High rate of acetabular component wear and osteolysis were noted in few series of steroid induced osteonecrosis<sup>17</sup>. However in our series, steroid induced osteonecrosis was seen in only two patients and clinical and radiological outcome of both of them is excellent.

The strengths of the study are all patients operated in a single institution by the same team of two surgeons using the same approach. In all patients same implant has been used. The etiology in all cases was avascular necrosis of hip. All patients were under the age of 50. The limitations of the study is that it is not a comparative analysis of porous coated and HA coated implants of different shape and the period of follow up is short to midterm. Further study of long duration is desirable.

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