

# A Study on Functional Outcome of Conservative Management of Stage 2 and 3 Avascular Necrosis of Femoral Head

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## ABSTRACT

**Introduction:** The standard treatment for stage 2 and 3 AVN is surgery, core decompression and total hip replacement. Conservative management of stage 2 and 3 AVN with muscle strengthening exercises, intermittent skin traction, calcium supplements, VIT D3, zolendronic acid and a good balanced diet is a unique method of treatment as an alternative treatment to avoid surgery and its complications. However very little is known about the success rates of treatment of stage 3 AVN with this method. The purpose of this study was to define the success rate of conservative management of stage 2 and 3 AVN.

**Material and Methods:** During the period from 2012 to 2016 in KIMS hospital, patients diagnosed with stage 2 and 3 AVN were offered conservative treatment as an alternative to conventional surgical treatment. Traction and aggressive physiotherapy with Zolendronic acid 5mg i.v. infusion, balanced diet, calcium, iron and methylcobalamine supplementation.

**Results:** Overall 9 of the 10 patients treated gained complete range of motion with absolute pain relief without analgesics. X rays revealed improvement in osteoporosis and disappearance of acetabular osteophyte in all of them, rebuilding of vertical trabeculae. Blood Triglycerides and uric acid level touched baseline. Avascular necrosis of femoral head basically due to an insult to the vascular supply to femoral head due to innumerable causes. Among the study group, contributing factors towards AVN were pure non-vegetarian diet, alcohol intake, steroid intake, tobacco chewing, hypertriglyceridemia, hyperuricemia. All these resulted in endothelial damage of vessels.

**Conclusion:** AVN of femoral head stage 2 and 3 managed conservatively with physiotherapy and muscle strengthening exercises, dietary modification and bisphosphonates gave good to excellent results as assessed with Harris hip score.

**Keywords:** AVN, Corticosteroids, Bisphosphonates, physiotherapy, diet modification.

## INTRODUCTION

Osteonecrosis of the femoral head afflicts approximately 20,000 new patients per year, at an average age of 38. In general osteonecrosis of femoral head is due to death of osseous tissue as a result of insult to the vascular supply. Avascular necrosis of bone can occur due to various causes like chronic steroid intake, alcoholism, chronic tobacco consumption, systemic diseases affecting vascular system like systemic lupus erythematosus, sickle cell disease, gauchers disease, even trauma, radiation and caissons disease.<sup>1</sup> Most commonly affected site is femoral head. The possible causes in our case series were corticosteroid use, alcohol intake, tobacco consumption, imbalanced diet. Radiological features of osteonecrosis generally involve collapse of the articular cartilage, fragmentation, mottled trabecular pattern, sclerosis, subchondral cyst and/or subchondral fracture.<sup>2-5</sup> Joint-preserving procedures have a significant failure rate, and some have significant morbidity. It is desirable to

avoid or delay total hip arthroplasty because most patients with osteonecrosis outlive the current state-of-the-art prosthesis. This study aimed at evaluating the functional outcome of stage 2 and 3 avascular necrosis of femoral head treated conservatively by avoiding all the possible risk factors, introducing a balanced diet in their life, muscle strengthening exercises and supervised physiotherapy, traction and with zolendronic acid 5mg i.v. infusion, calcium, iron and methylcobalamine supplementation.

## MATERIAL AND METHODS

During the period from 2012 to 2016 in KIMS hospital, patients diagnosed with stage 2 and 3 AVN were offered conservative treatment as an alternative to conventional surgical treatment. Total sample size was 10 patients was selected randomly. Informed written consent was taken from all the 10 patients and ethical committee clearance was taken from the institute. Stage 2 AVN was defined as mixed osteopenia and/or sclerosis and/or subchondral cysts, without any subchondral lucency and stage 3 as crescent sign and eventual cortical collapse on radiography, according to Ficat and Arlet et al.<sup>6</sup> Patients who elected this method of treatment instead of surgery were included in the study. Stage 4 AVN patients were excluded from the study. All the patients were treated with the conservative regimen. Patients were strictly abstained from the tobacco smoking, alcohol consumption, and a balanced diet was introduced in their diet and initially for 2 weeks were put on skin traction with NSAIDS for symptomatic pain relief and calcium supplements 1200mg / day along with cholecalciferol (vitD3) and supervised controlled physiotherapy and 2 weeks later all the patients received 1 dose of zolendronic acid 5 mg infusion. Supervised aggressive physiotherapy was started and continued with oral calcium, vit D3 supplements, and analgesics for two more weeks and patient was discharged with advice to stop analgesics, continue oral supplements and maintain the balanced diet as advised and continue on aggressive physiotherapy (figure 1).

Follow up examination was undertaken using clinical examination for range of movement, radiograph, and blood investigations to assess the functional improvement and to assess the blood parameters every month until complete functional recovery was achieved.

## STATISTICAL ANALYSIS

Continuous variables were compared using student t tests and

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categorical variables were compared using chi square test. A p value <.05 was considered significant.

## RESULTS

A total of 10 patients were included in the study, all aged between 25-45 years. 6 were left sided involvement and 4 right sided. Result assessed using harris hip score. Most of them had the risk factors like steroid intake, regular alcohol intake, tobacco intake. All the patients had complains of hip pain and difficulty in squatting and sitting crossed leg. All the patients were diagnosed to have stage 2 and 3 AVN by clinical examination, radiograph and MRI. All the patients were treated with the conservative regimen. Patients were strictly abstained from the tobacco smoking, alcohol consumption, and a balanced diet was introduced in their diet and initially for 2 weeks were put on skin traction with NSAIDS for symptomatic pain relief and calcium supplements 1200mg /day along with cholecalciferol (vitD3) and supervised controlled physiotherapy and 2 weeks later all the patients received 1 dose of zoledronic acid 5 mg infusion. Supervised aggressive physiotherapy was started and continued with oral calcium, vit D3 supplements, and analgesics for two more weeks. Limping stopped in 2 weeks. The triglycerides level without Clofibrates touched base line, anemia improved, 9 out of 10 patients showed clinical improvement in respect to reduced need of analgesic dose, improved range of motion at affected hip. 5 patients who had initially high serum triglycerides level touched baseline. 3 patients having high serum uric acid level at the presentation were normalized. Monthly x ray of both hips and pelvis and both hips lateral view were taken which revealed reduction in lucency and sclerosis of femoral head with rebuilding of trabecular pattern with improvement in osteoporosis and disappearance of acetabular osteophytes in 8 of them. Rebuilding of vertical trabeculae seen. Sphericity was maintained. MRI on 14th month showed revascularization of trabeculae with maintenance of articular cartilage without hyper intensity in T2 images. Osteoporosis was completely reverted back from grade 2 to grade 5 according to Sings index.

At follow up of 1 year patients had complete clinical improvement without hip pain and complete range of movement at hip.

Pre treatment MRI and post treatment MRI showing no change in the MRI images with the hip joint space maintained and the contour of the head maintained against to the rule of natural disease progression of avascular necrosis (figure-2, 3). 1 and half years later the MRI study shows exactly the same study as that of previous suggesting alteration in the progression of the disease. Figure 4 shows the gain of complete range of motion at hip and complete pain relief at 1.5 years follow up

## DISCUSSION

Avascular necrosis of femoral head as mentioned above is due to various contributing factors resulting in vascular compromise due to endothelial damage. Most commonly affected site is femoral head. The possible causes in this study were corticosteroid use, alcoholism, tobacco.<sup>7-10</sup> Collapse in the articular cartilage, trabecular pattern getting mottled, sclerosis of femoral head, subchondral cyst and/or even subchondral fracture, fragmentation are the radiological features of osteonecrosis. Radiograph of all the patients hip demonstrates the presence of extensive osteonecrosis of hip



Figure-1: Supervised aggressive physiotherapy

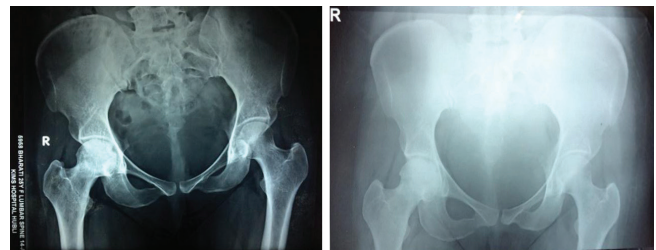


Figure-2: Pretreatment x ray; Figure-3: Post treatment x ray



Figure-4: Post treatment clinical picture

and articular congruity of uninvolved side is maintained. There was affected hip segmental collapse radiologically. In this study rehabilitation has played a vital role. No rest has been given and immediately he was back to his work after two months.<sup>11-13</sup> The main aim of our rehabilitation is to stretch the contracted capsule, reinforcing the strength of muscles surrounding and attached to hip, promoting aerobic capacity of muscles and remodeling of tissues also promoted. Patient were subjected to comprehensive rehabilitation exercises like rotations, flexion, extension with weights attached to their limbs, weight bearing mobilization with change in their diet and underwent treatment for osteoporosis. These exercises prevent venous stasis which increases intraosseous vascularity. Clinically range of motion improvement was very fast and pain drastically came down and limping improved.<sup>14</sup>

Various surgical options for degenerative hip are total hip arthroplasty and osteotomy. Total hip arthroplasty in young individuals should always be avoided as the life span of THA is limited to 25 yrs. The life expectancy of the implant material

is often less with active individuals due to osteolysis around the prosthesis and its loosening and dislocation.<sup>15,16</sup> The success of revision THA is more variable with 10 year longevity of the device varying from 35-100% with a higher rate of failure in the younger population.<sup>17</sup>

Another study by Agarwala et al have reported good outcome in osteonecrosis of femur head with Alendronate<sup>9</sup> therapy by a reduction in the collapse rate and a decrease in the requirement for total hip replacement, compared with the findings of other studies in which treatment was not given. In our case series we have used Zolendronic acid 5 mg, bisphosphonate as single infusion. Treatment when begun in the pre-collapse stages of the disease gives more favourable results.

Wu B et al in their case report reported that fat hypertrophy, intravascular coagulation and fat emboli are the pathology behind the avascularity of femoral head and also stated the beneficial effect of bisphosphonates like alendronate in retarding the progression of the disease.<sup>18</sup>

Plenk H jr et al studied the pathomorphology in the avascular processs and it is the kind of repair process that determine the time course of AVN. new bone formation increases underneath necrotic area and reactive interface when surrounded by bone marrow edema. The subchondral fracture can apparently undergo reconstructive repair by chondral and membranous ossification by “creeping substitution “can reduce the necrotic area.

A case report published in a European journal, by Kyle M et al reported the effectiveness of physiotherapy in aspects of functional improvement in a degenerative hip in a female which was treated successfully.<sup>12</sup>

## CONCLUSION

Avascular necrosis of femoral head with grade two and grade three managed conservatively in this study with physiotherapy and bisphosphonates and oral supplements shows good outcome result as assessed by Harris hip score. The drawback of our study is that more number of studies are needed to address the long term outcome of osteonecrosis considering the disease course, extent of sclerosis. Periodic follow up is essential in monitoring the integrity of femoral head both clinically and Radiologically. Randomized clinical trials are needed to evaluate the efficacy of this treatment in AVN hip.

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