

# Medical Management of AVN of Head of Femur- Our Experience

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**Abstract:- Avascular necrosis of the femoral head is a fairly common condition affecting primarily men in their third to fifth decades. It has a high morbidity rate. If left untreated, the femoral head collapses and degenerative changes appear within 2-3 years. It is important to prevent progression of the disease by early management before the head collapse. AVN is one of the common causes for hip arthroplasty in the young and patients may require more than one in their life time. Many non operative treatments have been found in the literature with variable results like bisphosphonates, extracorporeal shock wave therapy, pulsed electromagnetic therapy, anticoagulants, statins, and hyperbaric oxygen etcetera.**

## I. INTRODUCTION

Avascular necrosis of femoral head occurs due to decrease in the blood flow to the femoral head leading to cell death, fracture and collapse of articular surface<sup>3</sup>. It primarily affects men in their third to fifth decades. There is a collapse rate of 67% in asymptomatic and 85% in symptomatic hips<sup>3</sup>. Most untreated patients land up in total hip arthroplasty. There is a lack of level 1 evidence in the literature for treating the pre collapse stage of AVN<sup>3</sup>. There are very few studies on epidemiology of the disease in India. In the study by Harsha Vardhan et al., they found the mean age to be 34.71 years and male to female were found to be 5:1<sup>14</sup>.

### A. Pathogenesis

Many risk factors for AVN have been identified. But the etiology and pathogenesis of AVN remains unclear.

- RISK FACTORS<sup>1</sup>
- Trauma
- Corticosteroids
- Smoking
- Excess alcohol consumption
- Coagulation disorders
- Hemoglobinopathies
- Autoimmune diseases

Decreased blood supply may result from occlusion of the vessels that may be intra or extravascular. Steroids and alcohol cause fatty infiltration of the marrow that may lead to compression of the vessels. Steroids may also increase the vasoconstriction of epiphyseal vessels<sup>1</sup>. Intravascular occlusion may be due to thrombophilia or hypofibrinolysis. Low levels of protein c,s and high levels of lipoprotein a, von willebrand factors were reported in many patients with idiopathic avn. Oxidative stress chemotherapy irradiation may cause direct injury to the cells.

### B. Clinical Features

In the early stages of the disease, patients are asymptomatic. Later patients develop pain in the groin that may be referred to the knee on the same side. On examination, there is restriction of range of motion especially internal rotation.

### ➤ Investigations

#### • Plain Radiographs

Radiographs of pelvis with both hips anteroposterior view and frog leg lateral views are taken. Cystic and sclerotic changes are seen in the femoral head. Crescent sign- curvilinear subchondral radiolucent line typically seen along the anterolateral aspect of the femoral head. It is a poor prognostic sign. As the disease progresses, flattening of femoral head and degenerative changes are observed.

#### • MRI

It is 99% sensitive and specific<sup>1</sup>. On T<sub>1</sub>W images single density line is seen(necrotic viable bone interface).On T<sub>2</sub>W images, a double density line is seen which represents the hypervascular granulation tissue at the necrotic viable bone interface<sup>1</sup>.

### ➤ Classification

A number of classification systems exist. Commonly followed include FICAT AND ARLET CLASSIFICATION, ARCO, STEINBERG CLASSIFICATION.

Table 1 FICAT AND ARLET CLASSIFICATION<sup>1</sup>

Stage I	Normal
Stage II	Sclerotic or cystic lesions A )No crescent sign B) Subchondral collapse (crescent sign) without flattening of the femoral head Stage
Stage III	Flattening of femoral head
Stage IV	Osteoarthritis with decreased joint space with articular collapse

Table 2 STEINBERG CLASSIFICATION<sup>1,6</sup>

Stage 0	Normal or nondiagnostic radiograph, bone scan, and magnetic resonance imaging
Stage I	Normal radiograph; abnormal bone scan and/or magnetic resonance imaging A Mild (15% of head affected) B Moderate (15% to 30% of head affected) C Severe (30% of head affected)
Stage II	Lucent and sclerotic changes in femoral head A Mild (15% of head affected) B Moderate (15% to 30% of head affected) C Severe (30% of head affected)
Stage III	Subchondral collapse (crescent sign) without flattening of femoral head A Mild (15% of articular surface) B Moderate (15% to 30% of articular surface) C Severe (30% of articular surface)
Stage IV	Flattening of femoral head A Mild (15% of surface and 2-mm depression) B Moderate (15% to 30% of surface or 2- to 4-mm depression) C Severe (30% of surface or .4-mm depression)
Stage V	Joint narrowing and/or acetabular changes A Mild B Moderate C Severe
Stage VI	Advanced degenerative changes

Table 3 ARCO CLASSIFICATION<sup>2,7</sup>

Stage 0	All diagnostic studies normal, diagnosis by histology only
Stage I	Plain radiographs and computed tomography normal, magnetic resonance imaging positive and biopsy positive, extent of involvement A, B, or C (30%, respectively)
Stage II	Radiographs positive but no collapse, extent of involvement A, B, or C
Stage III	Early flattening of dome, crescent sign, computed tomography or tomograms may be needed, extent of involvement A, B, or C, further characterization by amount of depression (in millimeter)
Stage IV	Flattening of the femoral head with joint space narrowing, possible other signs of early osteoarthritis

**II. MATERIALS AND METHODS**

This study was conducted in the department of orthopaedics Kurnool medical college Kurnool Andhra Pradesh from July 2021 to December 2022. Patients attending the outpatient department were selected and required investigations including radiographs and mri were done.

➤ *Inclusion Criteria*

- Patients of age 25 to 50 years
- Clinically symptomatic individuals

➤ *Exclusion Criteria*

- Previous surgeries to the hip
- Asymptomatic individuals
- Individuals with sickle cell anemia

A total of 18 patients were selected for the study. There were 16 males and 2 females. All patients received oral tablets and were advised to take in the following manner;

- Methotrexate 2.5 mg on 3 days per week- Monday, Wednesday, Friday.
- Folic acid 5 mg on 3 days per week- Tuesday, Thursday, Saturday.
- Leflunomide 10mg BD
- Alendronate 70mg weekly once at 7 am
- Methyl Prednisolone 4 mg BD for 1 month followed by OD dosing
- Pantoprazole 40mg OD
- Patients were allowed to weight bear as tolerated by pain and no weight bearing restrictions were imposed.

➤ *Investigations*

CBC, LFT, RFT, RBS, LIPID PROFILE, CHEST RADIOGRAPH, ESR/CRP, BLOOD PRESSURE, USG ABDOMEN.



Fig 1 Radiograph before initiation of treatment



Fig 2 Radiograph after 1 year

These are the radiographs of patient with advanced changes in both hips. Patient was not willing for total hip replacement and hence medical management was chosen. Joint space can be seen in the follow up radiograph after one year of treatment.

➤ *Rationale of Treatment*

Methotrexate, leflunomide and corticosteroids are given to decrease the inflammation and synovitis occurring in the joint. Folic acid was given to prevent side effects of methotrexate. Bisphosphonates are given to inhibit osteoclastic activity inside the femoral head. The treatment is started in the precollapse stage. The aim is to prevent the collapse of femoral head and development of osteoarthritis in the joint.

**III. RESULTS**

Patients were analysed with the help of visual analogue scale and Harris hip score. Study sample consisted of 16 males and 2 females. None of our patients went for hip arthroplasty in the study period.

Table 4 VISUAL ANALOGUE SCALE

Number of patients	Pre treatment	Post treatment
10	8	3
6	9	4
2	6	2

Table 5 HARRIS HIP SCORE (HHS)

Number of patients	Outcome(HHS)
6	EXCELLENT(90-100)
11	GOOD(80-89)
1	FAIR(70-79)

**IV. DISCUSSION**

Various non operative managements have been tried to manage avn of femoral head. Wang et al., reported good clinical outcomes with extracorporeal shock wave therapy. There was improvement in pain, function & lesion size<sup>8</sup>. ESWT is believed to stimulate expression of angiogenic growth factors. Use of anticoagulant therapy was found to be beneficial in some studies<sup>9,10</sup>. They used enoxaparin to prevent the progression of the disease. There have been studies on pulsed electromagnetic therapy, hyperbaric oxygen, vasodilators for the management on avn of the femoral head<sup>11,12,13</sup>. Hyperbaric oxygen induces angiogenesis and decreases intraosseous pressure<sup>2</sup>. More studies are required to evaluate role of hyperbaric oxygen in avn of femoral head. Surgical treatments in early stages include core decompression, core decompression with osteoinductive substances, vascularised or non vascularised bone grafting. There are many surgeries with equivocal results. All the procedures aim for bone remodeling and prevention of collapse of head. Total hip arthroplasty is an expensive procedure and may not be affordable by all patients. Patients with avn of femoral head are young and may require more than one hip arthroplasty in their lifetime.

**V. CONCLUSION**

We conclude that our proposed medical management is effective, inexpensive and reliable mode of treatment in the early stages of avascular necrosis of femoral head.

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