

CASE REPORT

Steroid-induced avascular necrosis of femoral head in ALL patients-two case reports

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ABSTRACT

Avascular necrosis of bone or Osteonecrosis incidence has been increasing in a larger number of surviving ALL patients, especially in adolescents and young adults [1]. Symptomatic avascular necrosis has been reported to occur in up to 20% of children and adolescents with ALL [2]. We are reporting two cases of ALL patients who have been treated with steroids and chemotherapy and developed avascular necrosis of bilateral femoral heads.

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INTRODUCTION

Corticosteroids, such as prednisone and dexamethasone, comprise a core component of ALL treatment in induction, consolidation, and maintenance regimens^[2]. Corticosteroids have some effect on almost every organ and tissue in the body. Significant common toxicities include increased appetite, immunosuppression, myopathy, centripetal obesity, increased risk of thrombosis, osteoporosis, peptic ulceration, pancreatitis, avascular necrosis of bone, psychiatric disorders, cataracts, hypertension, precipitation of diabetes, growth failure, amenorrhea, impaired wound healing, and atrophy of subcutaneous tissue^[3]. Avascular osteonecrosis is caused by focal bone necrosis, resulting in painful and debilitating bone complications distinct from bone marrow density (BMD) loss⁴.

CASE SUMMARY

First case:

We are reporting a case of a 14-year-old girl, who is a known case of pre B cell ALL (CD 10+), initially diagnosed 4 years

back. She was treated with BFM95 high-risk protocol which she completed 18 months ago and was in complete remission. On follow up, the patient had relapsed after a disease-free interval of 11 months (CNS and bone marrow relapse) and was planned for reinduction with prednisone, vincristine, L-asparaginase and daunorubicin along with triple intrathecal injections of cytarabine, MTX, hydrocortisone. Her day 8 PBF and CSF was free of blasts. While on repeat induction, the patient reported pain in both of the hips with limping of gait. X ray pelvis showed contour deformity and sclerosis involving both femoral heads (fig-1). Subsequently, MRI pelvis also showed contour deformity with subchondral collapse and subchondral sclerosis of both femoral heads suggestive of avascular necrosis (fig-2). Patient was advised to stop further steroid

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medication and orthopedic opinion was taken.

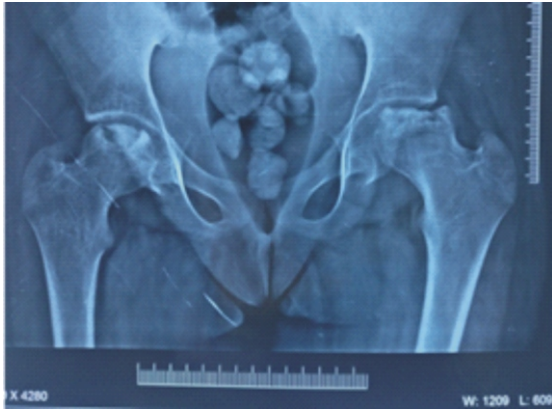


Fig-1: X-ray pelvis, showing contour deformity and sclerosis of both femoral heads

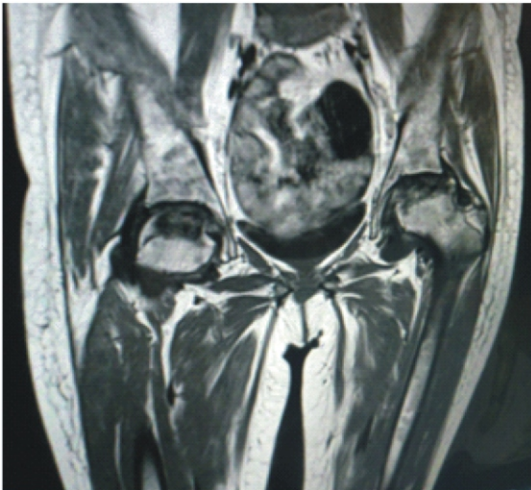


Fig-2: MRI pelvis showing contour deformity and subchondral sclerosis of both femoral heads

Second case:

18-year-old male, diagnosed as a case of T cell ALL, in September 2015 and completed his treatment with moderate risk, BFM 95 protocol till September 2017. After chemotherapy, patient was in complete remission. On follow up, in October 2018, patient-reported pain in the left hip region with difficulty in walking. Bone scan reported increased tracer uptake in the left sacroiliac joint and femoral neck. The biopsy of the left femoral neck showed no evidence of granulomatous or neoplastic pathology. Subsequent MRI pelvis showed altered signal intensity with a hypointense rim in both femoral heads with diffuse edema of left femoral head and neck suggestive of avascular necrosis of femoral heads, more on the left side (fig-3). The patient was advised orthopedic opinion and total hip

replacement (THR) had been done on the left side.

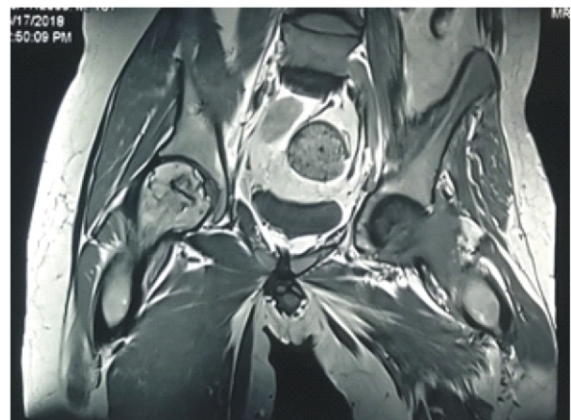


Fig-3: MRI pelvis showing altered signal intensity with hypointense rim in both femoral heads



Fig-4: X-ray pelvis after THR on left side

DISCUSSION

Pathogenesis of avascular necrosis is poorly understood and is thought to involve local vascular damage leading to ischemia due to intravascular thrombi, impaired repair due to metabolic factors, extravascular lipid deposition, and impaired blood flow to medullary cavity due to increase in intraosseous lipocyte size⁵. Risk factors include age older than 10 years, female gender, treatment with a higher cumulative dose of dexamethasone, elevated body mass index, and high-dose radiation⁶. In the Children oncology group study of ALL patients, authors reported that the incidence of symptomatic avascular necrosis increased with age. Its cumulative incidence was approximately 1% in children age less than 10 years, 10 to 13.5 % in 10 to 15 years age group, and 18 to 20% beyond 15 years⁷. AVN most

commonly destroys the femoral heads, knee joint, shoulder joint with multiple joint involvements being common. The majority of patients develop a variable degree of pain and a decreased range of motion. Conventional radiographs are unable to detect osteonecrosis prior to the development of osteosclerosis, collapse, and fragmentation of the articular surface, or subchondral fracture. Diagnosis is made by MRI which is more sensitive and also allows estimation of the extent of involvement⁸. Severe cases of avascular necrosis can result in joint collapse and may require total joint replacement⁹.

Management requires a multidisciplinary approach with early orthopedic surgeon opinion, physical and rehabilitation therapy, and pain control. Treatment decisions are individualized based upon the joint involvement, the extent of osteonecrosis, comorbidities, age expected longevity, and a continued need for immunosuppression¹⁰.

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