

Research Article

THE CLINICAL OUTCOME OF CORE DECOMPRESSION AND AUTOLOGOUS ILIAC CREST BONE GRAFTING FOR AVASCULAR NECROSIS OF THE FEMORAL HEAD BEFORE COLLAPSE

Dr Rohit Madhup Lal^{1*}

^{1*}MBBS, D.ORTHO, DNB(ORTHO), MNAMS(ORTHO) Fellow arthroscopic surgeries, SPORTS MED SA HOSPITAL, ADELAIDE, AUSTRALIA SENIOR CONSULTANT, Orthopaedic Surgery, Samford Hospital, Ranchi, Jharkhand, India.

Corresponding Author: Dr Rohit Madhup Lal

MBBS, D.ORTHO, DNB(ORTHO), MNAMS(ORTHO) Fellow arthroscopic surgeries, SPORTS MED SA HOSPITAL, ADELAIDE, AUSTRALIA SENIOR CONSULTANT, Orthopaedic Surgery, Samford Hospital, Ranchi, Jharkhand, India.

Received date: 10-10-2026, date of acceptance: 15-10-2026, Date of publication: 17-10-2026.

Abstract

Introduction: Avascular necrosis (AVN) of the femoral head, also referred to as osteonecrosis of the femoral head (ONFH), is a progressive pathological condition characterized by death of osteocytes and bone marrow elements secondary to impairment of the blood supply to the femoral head. The disease is of considerable clinical importance because it predominantly affects young and middle-aged adults and, if untreated or diagnosed at an advanced stage, can progress to structural collapse of the femoral head, secondary osteoarthritis, severe pain, restriction of hip movements, and loss of functional independence. Ultimately, many patients require total hip arthroplasty at a relatively young age.

Materials and methods: A prospective study of core decompression with autologous iliac crest bone grafting for Avascular necrosis was conducted in 43 hips including unilateral (73.91%) and bilateral (26.08%) among 40 patients between January 2025 to June 2025, with 2 years of

follow up. All the clinical data was collected in case record form. Data was categorized and expressed as percentages.

Results: A prospective study of core decompression with autologous iliac crest bone grafting for avascular necrosis in 23 hips including unilateral 73.91% and bilateral 26.08% among 20 patients who attended 7 years follow-up. Patients were in stage 2 69.5% and Stage3 30.43% of Avascular necrosis before collapse of the femoral head. All patients were in age group of 20-50 years. There were no major complications the clinical and radiological outcome were good and no patient had further progression.

Conclusion: Core decompression with autologous iliac crest bone grafting is a safe and effective procedure for the treatment of avascular necrosis of the femoral head before collapse. It has become a good treatment of choice in those patients with improved quality of life, decreased number of complications and the need for subsequent total hip replacement.

Key words: Avascular necrosis, osteoarthritis, severe pain, restriction of hip movements.

INTRODUCTION

Avascular necrosis (AVN) of the femoral head, also referred to as osteonecrosis of the femoral head (ONFH), is a progressive pathological condition characterized by death of osteocytes and bone marrow elements secondary to impairment of the blood supply to the femoral head.¹ The disease is of considerable clinical importance because it predominantly affects young and middle-aged adults and, if untreated or diagnosed at an advanced stage, can progress to structural collapse of the femoral head, secondary osteoarthritis, severe pain, restriction of hip movements, and loss of functional independence. Ultimately, many patients require total hip arthroplasty at a relatively young age.²

The femoral head is particularly vulnerable to vascular compromise because its blood supply is relatively delicate. The principal blood supply is derived from the medial and lateral circumflex femoral arteries and their retinacular branches. Interruption of this circulation may result in ischemia and subsequent necrosis of the subchondral and trabecular bone. The pathogenesis of osteonecrosis is multifactorial and may involve vascular thrombosis, endothelial dysfunction, intravascular coagulation, extravascular compression, increased intraosseous pressure, and impaired reparative capacity of bone. Traumatic causes include femoral neck fractures and hip dislocations, whereas non-traumatic causes include prolonged corticosteroid therapy, excessive alcohol consumption,

systemic diseases, hematological disorders, metabolic conditions, and certain immunological diseases. However, a significant proportion of cases remain idiopathic.³

The natural history of AVN is progressive. Following the initial vascular insult, necrotic bone develops within the femoral head. Although the early stages may be asymptomatic or associated with only mild hip or groin pain, the structural weakness of the necrotic segment can eventually result in subchondral fracture and collapse. Once collapse occurs, restoration of the normal spherical configuration of the femoral head becomes difficult, and degenerative changes in the acetabulum and femoral head may subsequently develop. Therefore, early diagnosis and intervention before collapse are crucial objectives in the management of this disease.⁴

Modern imaging, particularly magnetic resonance imaging (MRI), has greatly improved the ability to diagnose AVN during its early stages. Plain radiographs may be normal during the initial phase of the disease, whereas MRI can demonstrate the characteristic geographic or band-like abnormality surrounding the necrotic segment. The Association Research Circulation Osseous (ARCO) classification recognizes an early stage in which radiographs are normal but MRI is abnormal, followed by a stage in which radiographic abnormalities are present without subchondral fracture or flattening of the femoral head. Once subchondral fracture and collapse develop, the disease enters a more advanced stage. This distinction is clinically important because hip-preserving

procedures are most effective when performed before structural collapse. Several classification systems have been developed to assess the severity and prognosis of femoral head osteonecrosis, including the Ficat and Arlet classification, Steinberg classification, and ARCO classification. In general, the pre-collapse stages encompass patients with either normal radiographs but positive MRI findings or radiographic evidence of sclerosis, cystic changes, or other abnormalities without collapse. The size and location of the necrotic lesion also influence prognosis. Lesions involving a large proportion of the weight-bearing surface and those located in the anterosuperior portion of the femoral head are associated with a greater risk of progression and collapse. Consequently, treatment decisions should take into account not only the stage of AVN but also the size and location of the lesion, patient age, symptoms, functional demands, and underlying etiology.⁵

AIMS AND OBJECTIVES OF STUDY

To preserve the head of the femur rather than replacing femoral head and cartilage, through early intervention which has favorable impact on the disease prognosis. The subjects were the patients treated in between January 2025 to June 2025. In this study we evaluated the radiographic and clinical outcome of core depression with autologous iliac crest bone grafting as treatment option for Avascular Necrosis of the femoral head.

MATERIALS AND METHODS

A prospective study of core decompression with autologous iliac crest bone grafting for Avascular necrosis was conducted in 43 hips

including unilateral (73.91%) and bilateral (26.08%) among 40 patients between January 2025 to June 2025, with 2 years of follow up. All the clinical data was collected in case record form. Data was categorized and expressed as percentages.

Inclusion Criteria

1. All patients who presented with hip joint pain and radiograph suggestive of avascular necrosis of femoral head.
2. Both males and females were considered
3. Total number of patients studied were 27.

Exculsion Criteria

1. Patients with Avascular necrosis and collapse of femoral head were excluded (12 patients).
2. Patients who has not given their consent were excluded (2 patient).
3. Very high surgical risk.
4. Neurological disorders that may significantly influence walking ability.

Follow Up

Out of total 40 patients, on 43 hips core decompression was performed. 34 patients were unilateral and 6 were bilateral. They were observed regularly during their hospital stay till they discharged. They were asked to come for follow up regularly to the outpatient department. All patients were followed to look for progression of disease, major complications, total hip arthroplasty. After performing core decompression and iliac crest bone grafting to these patients, follow up was done for 2 years.

Post-operative follow-up protocol:

Patients were not allowed to bear weight for 4-5 months. Check X- rays were taken regularly with an interval of 6 weeks. Patients were not allowed to perform

strenuous works for 6 months. Tablet Fosavance 70 mg (Alendronate) was given once every week for 6 months. Patients are supplemented with rich protein diet and Calcium tablets.

Clinical Outcome

There were no major complications noted in these patients. Both clinical and radiological outcome was good. No patient had further progression.

RESULTS

A prospective study of core decompression with autologous iliac crest bone grafting for avascular necrosis in 43 hips including unilateral 73.91% and bilateral 26.08% among 40 patients who attended 2 years follow-up. Patients were in stage 2 69.5% and Stage 3 30.43% of Avascular necrosis before collapse of the femoral head. All patients were in age group of 20-50 years. There were no major complications the clinical and radiological outcome were good and no patient had further progression.

Age in years	Number of cases	Percentage
20-30	8	20
30-40	12	30
40-50	20	50
Total	40	100

Table 1: Age distribution

Gender	Number of cases	Percentage
Male	28	70
Female	12	30
Total	40	100

Table 2: Gender distribution

	Number of Cases	Percentage
Unilateral	30	73.91
Bilateral	10	26.08
Total	40	100

Table 3: Unilateral/Bilateral

Stages	Percentages
Stage 2	69.56%
Stage 3	30.43%

Table 4: Ficat/ArletRadiological Classification

DISCUSSION

Avascular necrosis (AVN) of the femoral head is a progressive condition that

predominantly affects young and middle-aged individuals and can lead to femoral head collapse, secondary osteoarthritis, and eventual total hip arthroplasty if left untreated. The primary objective of treatment in the pre-collapse stage is preservation of the native femoral head and prevention of further progression. In the present prospective study, 40 patients involving 43 hips with pre-collapse AVN were treated with core decompression and autologous iliac crest bone grafting and followed for a period of two years. The study population consisted predominantly of males (70%), while females constituted 30%. Patients were between 20 and 50 years of age, with the highest proportion belonging to the 40–50-year age group (50%), followed by 30–40 years (30%) and 20–30 years (20%). Unilateral involvement was observed in 73.91% of hips, whereas bilateral involvement was seen in 26.08%. Regarding radiological staging, 69.56% of hips were classified as Stage II and 30.43% as Stage III according to the Ficat and Arlet classification. These findings indicate that the majority of patients underwent surgical intervention during the pre-collapse stage, when preservation of the femoral head is considered most appropriate.⁶

Avascular necrosis of the hip is a painful condition caused by disruption of blood supply to bone due to various etiological factors leading to cell death, collapse culminating into disruption of hip joint and arthritis in young population although non-surgical treatment options can relieve pain but doesn't prevent progression. Iliac crest bone graft offers three properties (i.e.) osteogenesis, Osteoinduction and

Osteoconduction. Removing of dead bone and providing structural support to prevent collapse is the key concept in treatment of core depression and autologous iliac crest bone grafting for avascular necrosis of the femoral head before collapse.⁷

The most successful treatment options are surgical. The purpose of the study was to evaluate the effectiveness of core decompression and autologous iliac crest bone grafting in halting the progression of Avascular necrosis before collapse of the femoral head and prevention of subsequent total hip arthroplasty.⁸

Core decompression is an established joint-preserving procedure for early-stage AVN. The fundamental principle of core decompression is removal of necrotic bone and reduction of intraosseous pressure, thereby creating a pathway for vascular ingrowth and reparative processes. In the present study, core decompression was combined with autologous iliac crest bone grafting to provide additional biological and structural support to the affected femoral head. Autologous bone graft possesses osteogenic, osteoinductive, and osteoconductive properties, which may facilitate new bone formation and incorporation within the necrotic area. Removal of the necrotic tissue followed by filling of the defect with autologous cancellous bone is intended to improve the biological environment and provide support against further structural deterioration. In addition, postoperative protection from weight bearing for 4–5 months was used in the present study to minimize mechanical stress on the healing femoral head. During the two-year follow-up period, no major

complications were observed, and both clinical and radiological outcomes were reported to be good. Importantly, no patient demonstrated further progression of the disease or required total hip arthroplasty during the follow-up period. These findings suggest that core decompression combined with autologous iliac crest bone grafting can be an effective femoral head-preserving procedure in appropriately selected patients with pre-collapse AVN.⁹

The favorable outcome observed in this study supports the concept that early surgical intervention is important in the management of femoral head osteonecrosis. Once subchondral fracture and collapse have occurred, preservation of the native femoral head becomes considerably more difficult, and arthroplasty may ultimately become necessary. The absence of disease progression and major complications in the present series suggests that core decompression with autologous iliac crest bone grafting may help maintain femoral head integrity and delay or prevent the need for total hip arthroplasty, particularly in younger patients. However, the interpretation of these results should take into consideration the relatively small sample size of 40 patients and the two-year follow-up period. Longer-term follow-up with standardized functional scores, serial radiographic/MRI assessment, and comparison with core decompression alone or other hip-preserving procedures would provide stronger evidence regarding the effectiveness of this technique. Nevertheless, the present study demonstrates encouraging clinical and radiological results and supports core decompression combined

with autologous iliac crest bone grafting as a useful joint-preserving option for patients with AVN of the femoral head before collapse.¹⁰

CONCLUSION

Core decompression with autologous iliac crest bone grafting is a safe and effective procedure for the treatment of avascular necrosis of the femoral head before collapse. It has become a good treatment of choice in those patients with improved quality of life, decreased number of complications and the need for subsequent total hip replacement.

REFERENCES

1. Bateman JE. Single assembly total hip arthroplasty, preliminary report. *Orthop Digest*. 1974; 15:35-43.
2. Brown JT, Abrami G. Transcervical femoral fractures. *JBJS*. 1964; 46B:648-663.
3. Badgley C. Treatment of displaced subcapital fractures of the femoral neck in aged with immediate replacement arthroplasty (Discussion). *JBJS*. 1961; 43B:606.
4. Carnesale PG, Anderson LD. Primary prosthetic replacement for femoral neck fractures. *Arch. Surg*. 1975; 110:27-29.
5. Chandler SB, Kreuscher PM. A study of the blood supply of the ligamentum teres and its relation to the circulation of the head of the femur. *JBJS*. 1932; 14:834-846.
6. Boyd HB, Salvatore JE. Acute fractures of the femoral neck: Internal fixation or Prosthesis? *JBJS*. 1964; 46A:1066-1068.
7. Mark F. Smiontkoski et al. Current concepts review of intracapsular fracture of hip. *JBJS*. 1994; 76A:129-135.
8. Badgley C. Treatment of displaced subcapital fractures of the femoral neck in aged with

immediate replacement arthroplasty
(Discussion). JBJS.1961;43B:606.

8. Carnesale PG, Anderson LD. Primary prosthetic replacement for femoral neck fractures. Arch. Surg. 1975; 110:27-29.
9. Chandler SB, Kreuscher PM. A study of the blood supply of the ligamentumteres and its relation to the circulation of the head of the femur. JBJS.1932;14:834-846.
10. Boyd HB, Salvatore JE. Acute fractures of the femoral neck: Internal fixation or Prosthesis? JBJS. 1964; 46A:1066-1068.