International Journal of Orthopaedics Sciences

ISSN: 2395-1958
IJOS 2017; 3(1): 149-151

www.orthopaper.com
Received: 24-11-2016
Accepted: 25-12-2016

Dr. Jatin Banal
Junior Resident, Department of Orthopaedics, GMC, Amritsar, Punjab, India

Dr. HS Sohal
Professor and Head of Department Orthopaedics, GMC, Amritsar, Punjab, India

Dr. Rakesh Sharma
Associate Professor, Department of Orthopaedics, GMC, Amritsar, Punjab, India

Dr. Jagdish Dhake
Junior Resident, Department of Orthopaedics, GMC, Amritsar, Punjab, India

Dr. Gurjinder Singh
Junior Resident, Department of Orthopaedics, GMC, Amritsar, Punjab, India

Correspondence
Dr. Jatin Banal
Junior Resident, Department of Orthopaedics, GMC, Amritsar, Punjab, India

Autologous (Non vascularized) fibular grafting with cancellous bone grafting for treatment of femoral head osteonecrosis (Ficat and Arlet stage 1 2a 2b 3)

Dr. Jatin Banal, Dr. HS Sohal, Dr. Rakesh Sharma, Dr. Jagdish Dhake and Dr. Gurjinder Singh

DOI: http://dx.doi.org/10.22271/ortho.2017.v3.i1c.24

Abstract
Avascular necrosis of the femoral head is a multifaceted process that leads to articular incongruity and subsequent osteoarthrosis of the joint. Clinicians concur that primary treatment should focus on preservation of the natural surface of the joint; however, there has not been a consensus on how best to accomplish this. The purpose of this study was to evaluate the result of Autologous (non vascularized) fibular grafting with cancellous bone grafting for treatment of femoral head osteonecrosis (ficat and arlet classification grade 1, 2a, 2b, 3). This study describes the long-term results of core decompression with non-vascular (free) fibular graft along with cancellous bone graft from tibia in avn hip in 25 patients with success in 84% of cases. None of the hips that had Ficat stage-I, stage-II A and stage-IIB disease needed a total joint replacement while FOUR hips that had stage –III needed joint replacement. The results of this study show that core decompression with non-vascular fibular graft with cancellous bone graft is a good option at younger age for AVN hip

Keywords: AVN hip, Ficat classification, core decompression, free fibular graft, cancellous bone graft

1. Introduction
Osteonecrosis, also known as avascular necrosis or aseptic necrosis, is a disease of impaired osseous blood flow**,** the bone structures then collapse, resulting in bone destruction, pain, and loss of joint function. AVN is associated with numerous conditions and usually involves the epiphysis of long bones, such as the femoral and humeral heads and the femoral condyles, but small bones can also be affected. In clinical practice, AVN is most commonly encountered in the hip. Early diagnosis and appropriate intervention can delay the need for joint replacement. However, most patients present late in the disease course. Without treatment, the process is almost always progressive, leading to joint destruction. Clinicians concur that primary treatment should focus on preservation of the natural surface of the joint; however, there has not been a consensus on how best to accomplish this.

The non-prosthetic treatment of avascular necrosis is still controversial. Many options have been described, including core decompression, vascularised and non-vascularised bone grafting, muscle pedicle bone grafting and various osteotomies. The use of a non-vascularised graft is more appealing than that of a vascularised graft because it is less technically demanding and may reduce donor-site morbidity. Non-vascularised autologous bone grafting has numerous other theoretical advantages. The procedure provides decompression of the avascular lesion and removal of the necrotic bone in order to interrupt the cycle of ischemia and intraosseous hypertension. Grafting of the defect with fresh cancellous bone and placement of a cortical strut support the subchondral surface and introduce a scaffold for repair and remodelling of subchondral bone it is a relatively simple procedure which can be performed by one surgeon.

2. Materials & Methods
This study consisted of a total of 25 cases. An adult patient of either sex with age above 18 yrs with AVN hip (ficat and arlet grade 1 2a 2b 3) admitted in the department of orthopedics of

Government Medical College, Amritsar was selected for this study. The study was approved by institutional ethical committee. An informed written consent of the patient was obtained before inclusion in the study. Clinical history, general physical examination and local examination were performed. Patient was investigated for operative and anesthetic purposes. A total of 25 hips in 21 males and 4 females underwent surgery. Most of patients who underwent surgery were below 50 years.

Clinical conditions associated with avascular necrosis included steroid use 5 patients, alcohol abuse 8 patients and idiopathic 12 patients.

All patients presented with pain in hip and restriction of movements. 20 also complained of limp while 9 also had the additional complaint of difficulty in squatting.

3. Radiological evaluation

The most widely used classification systems were introduced by Ficat [1], Steinberg, Hayken and Steinberg [3], and Gardeniers [4]. The last two also used MRI, which was not available for all our patients due to financial constraints. Consequently, we used the modified Ficat-Arlet classification which uses the anteroposterior and lateral radiographic appearances of the femoral head. Pre-operatively, 2 hips were diagnosed as stage I, 9 as stage IIA, 10 as stage IIB, 4 as stage III.

4. Clinical evaluation.

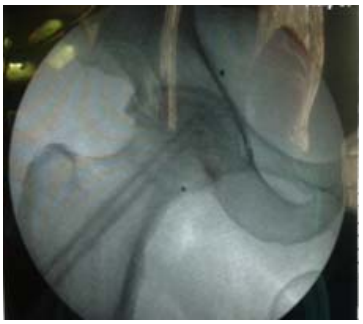
We used the Harris Hip Score for clinical evaluation pre-operatively, postoperatively and subsequent follow ups [4].

It was found that 16% of patients had Harris hip score under 40, 40% had Harris hip score between 40 and 50, 36% had Harris hip score between 50 and 60, 8% of patients had initial Harris hip score more than 60.

5. Operative Technique

The patient was placed in a supine position on a fracture table with appropriate traction. A straight lateral approach was used under an image intensifier in order to locate the avascular lesion. After placing a guide-wire in the necrotic area, which was located pre-operatively by radiographs or MRI, an 8 mm hole will be drilled through the base of the greater trochanter, along the femoral neck and into the necrotic area of the head. Curettes were used under fluoroscopic control to remove necrotic bone from the antero-superior aspect of the femoral head and autogenous cancellous bone graft harvested from proximal tibia is impacted into the excavated area. After these procedures the fibular graft was inserted into the core and its position was checked by image intensifier. The position of the graft was considered to be best when its proximal end is within the necrotic lesion and no more than or less than 10 mm beneath the subchondral bone. Post-operatively patients were non-weight-bearing with crutches for six weeks. Patients were followed regularly at 4, 8,12,16,20 and 24 weeks. Harris Hip Score during each visit was noted. Weight bearing of the patient will be started gradually depending upon the operation result and patient's comfort and compliance.

Harvesting fibular graft



Operative technique- core decompression with fibular graft

Harvesting Tibial Cancellous Graft

6. Observations and Results

Ficat Staging of AVN

Ficat Stage	No. of Patients	Percentage (%)
Stage I	2	8%
Stage IIa	9	36%
Stage IIb	10	40%
Stage III	4	16%
Total	25	100%

7. Pre-Operative Harris Hip Score Initial

HHS Score	No. of Patients	Percentage (%)
<40	4	16%
40-50	10	40%
50-60	9	36%
>60	2	8%
TOTAL	25	100%

8. Post-Operative Harris Hip Score After 24 Weeks

HHS Score After 24 weeks	No. of Patients	Percentage (%)
< 70	4	16%
70-80	5	20%
80-90	5	20%
>90	11	44%
TOTAL	25	100%

9. Donor Site Complications

Complications	No. of Patients	Percentage
Pain At Tibia Site	1	4%
Infection At Tibia Site	1	4%
Pain At Fibular Site	3	12%
Infection At Fibular Site	1	4%
Motor Weakness(Extensor Hallucis Longus (Ehl) Weakness	2	8%
Sensory Weakness	1	4%
Without Complications	16	64%
Total	25	100

Post operatively Eighty Four percent of patients had increase in Harris hip score of more than 20. Their pain diminished, with increase in hip movement. They found improvement in their daily lifestyle e.g. now they could wear shoes comfortably, travel in a public transport. So stage 1 and stage IIA patients have excellent results. Stage IIB patients have good results and stage III patients required total hip replacement within 24 weeks of follow up. 16(64%) patients were completely free of symptoms and 9(36%) patients reported with donor site complications. Out of those 9 patients 1(4%) had tibia site pain, 1(4%) had tibia site infection. 3(12%) patients had fibular site pain, 1(4%) patient had fibular site infection, 2(8%) had motor weakness (extensor halluces longus weakness), 1(4%) had sensory weakness.

10. Discussion

Non vascularized bone grafting techniques for the treatment of osteonecrosis of the femoral head has been popularized from late 1940 [5].

The literature reports a wide range of success rates with these techniques. In this study we have evaluated our experience with non-vascularized bone grafting along with cancellous bone grafting. The aim of this study was whether this technique effectively deferred further surgical treatment and whether the outcomes in this study were comparable to other studies of non-vascularized bone grafts. Our study has several shortcomings including the small number of patients and the short-term follow up. Nevertheless, the early results encourage the continued use and further study of this procedure. The success percentage of hips with non-vascularized bone grafting along with cancellous bone grafting is 84% (21 of 25hips). Similar results were found in other studies. Buckley *et al* [6]. (1991) in their study on 20 hips treated by core decompression and non-vascular fibular graft and reported success in 90% of cases 11.Thorsten M. Seyler *et al* [7]. (2008) in their study reported only 67% success. Despite the limitations of the study, we are encouraged by these early result for the treatment of Stage I, II osteonecrosis of the femoral head. Decrease in progression of symptoms showed that need for hip replacement has been delayed.

11. Summary and Conclusion

1. Core decompression appears to be an acceptable treatment and a reasonable initial surgical intervention for early stages of disease (stage 0, I, IIA IIB).
2. Nonvascularised bone graft with cancellous bone graft is very useful method in treating early stages of femoral head osteonecrosis & defers need of arthroplasty
3. Early detection of the disease (pre symptomatic or pre radiological) is the key to get good results
4. The procedure provides decompression of the femoral head, removal of necrotic bone, and structural support and scaffolding to allow repair and remodeling of subchondral bone.
5. The goals in the treatment of osteonecrosis are to relieve pain and preserve the femoral head far as long as possible with negligible donor site complications However long term follow up is required to see the survivorship.

12. References

1. Ficat RP. Idiopathic bone necrosis of the femoral head: early diagnosis and treatment. J Bone Joint Surg [Br] 1985; 67-B:3-9.
2. Steinberg ME, Hayken GD, Steinberg DR**.** A new method for evaluation and staging of avascular necrosis of the femoral head. In: Arlet J, Naz, Hungerford DS, eds. Bone circulation and bone necrosis. Baltimore: Williams & Wilkins, 1984, 398-403.
3. Gardeniers JWM. ARCO (Association Research Circulation Osseous) Committee on Terminology and Classification. ARCO News 1993; 5:79-82.
4. Harris WH. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end-result study using a new method of result evaluation. J Bone Joint Surg Am. 1969; 51(4):737-55
5. Phemister DB. Treatment of the necrotic head of the femur in adults. J Bone Joint Surg Am. 1949; 31:55-66.
6. Buckley PD, Gearen PF, Petty RW. Structural bone-grafting for early atraumatic avascular necrosis of the femoral head. J Bone Joint Surg Am. 1991; 73:1357-1364
7. Seyler TM, Marker DR, Ulrich SD, Fatscher T, Mont MA. Non-vascularized bone grafting defers joint arthroplasty in hip osteonecrosis. Clin Orthop Relat Res. 2008; 466:1125-1132.