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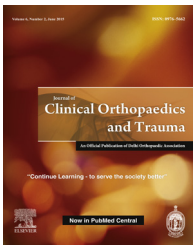

Original Article

Analysis of outcome of avascular necrosis of femoral head treated by core decompression and bone grafting

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ABSTRACT

Background: Femoral head is the most common bone affected by avascular necrosis. Core decompression procedure, when done in the initial stages, before collapse, may arrest or reverse the progress of avascular necrosis and thereby may preserve the normal femoral head. Hence, we have analysed the clinical, functional and radiological outcome of core decompression and bone grafting in patients with Osteonecrosis of the femoral head (ONFH) upto stage IIB (Ficat & Arlet).

Materials and method: A study was undertaken at our institute from June 2010 to June 2013 wherein 20 patients (28 hips) of ONFH upto grade II B (Ficat & Arlet) were treated with core decompression and the outcomes were studied. Patients were subjected to core decompression of the affected hip. All the patients were operated in lateral position. In 26/28 hips, cancellous grafting was done after harvesting graft from the posterior iliac crest. In 2 patients cortical non-vascularised fibular graft was used.

Results: Functional outcome was assessed by Harris hip score, wherein 19 hips (67.85%) had good or excellent outcome; 1 hip (3.57%) had fair out come. However, 8 hips (28.57%) showed poor result. For stage I, 12/13 hips (92.3%) improved, whereas for Stage IIA, 6/11 hips (54.54%) showed improvement and for stage IIB, only 2/4 hips (50%) showed improvement. Less than 25% of the hips required a replacement or salvage procedure. Strict non weight bearing was complied by 23 hips (82.14%), whereas 5 hips (17.85%) were not compliant. If we exclude non compliant patients, our success rate was 92.3% for grade I, 100% for grade IIA and 50% for grade IIB.

Conclusion: Core decompression and bone grafting provide satisfactory outcome when patients are carefully selected in early stages of the disease, before the stage of collapse.

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1. Introduction

Avascular necrosis (AVN) is defined as a cellular death of bone components due to interruption of blood supply. The bone structures then collapse, resulting in bone destruction, pain, and loss of joint function.[1] Certain bones have precarious blood supply; hence even a small vascular insult can result in avascular necrosis of the part supplied by it. The head of femur is the most common bone affected by avascular necrosis. Clinically the pain may be minimal at onset, but if no active intervention is done it may worsen gradually, affecting the activities of daily living. It affects young population and if not managed timely, leads to the collapse of femoral head eventually requiring hip arthroplasty.

Avascular necrosis of femoral head (ONFH) is associated with many etiological factors and usually one or more risk factors are present but approximately two-thirds of this is related to alcohol abuse and corticosteroid intake. Rest are mainly idiopathic.[2] The rationale for the use of core decompression is based on the concept that increased intra-medullary pressure is involved in the pathogenesis of avascular necrosis. Thus by core decompression, creeping substitution to the necrotic area occurs by bringing the blood supply through the drilled channels thereby decreasing the intra-medullary pressure. This may arrest or reverse the progress of avascular necrosis before the collapse occurs thereby avoiding articular collapse and its sequelae. Hence when acted, vigilantly at initial stages before collapse occurs, core decompression may preserve the normal femoral head.

In this study, we have analysed the clinical, functional and radiological outcome of core decompression and bone grafting in patients with ONFH upto stage IIB (Ficat & Arlet).

2. Materials and method

The current study was undertaken at our institution from June 2010 to June 2013 wherein 20 patients (28 hips) of AVN of femoral head upto grade II B (Ficat & Arlet) were treated with core decompression. Patients with sickle cell disease were excluded as these patients are expected to have recurrent vascular infarcts thereby nullifying the principle of core decompression.

The patients meeting the inclusion criteria were evaluated in terms of age, sex, occupation, pain with its detailed characteristics, limp, duration of symptoms, progression of symptoms, deformity, support required to walk or not, any history of trauma and history of other joint pain. History of risk factors like steroids and alcoholism was also noted. They were thoroughly examined for their pre-operative hip range of movement as well as their debility and their Harris hip score was noted. They were also investigated by routine blood investigations (complete hemogram, ESR, CRP, liver and kidney function tests) and radiologically by hip AP and Frog leg view X-rays and MRI of both hips to know the amount of involvement of the femoral head, stage the disease as well as to check the status of contralateral hip. It also helped to map out the affected areas of the hip.

Following adequate explanation about the procedure and necessary consent, patients were subjected to core decompression of the affected hip. Patients were operated in lateral position and guide-wire was inserted through lateral cortex just below the base of greater trochanter under image intensifier. Based on primary mapping of the affected area in head and under image intensifier guidance, the guide pin was directed towards the affected area. Confirming position of the guide pins in both AP and lateral views (taken by keeping the leg in flexion, abduction and external rotation), serial reaming was done by DHS reamer to scrape out the necrotic sclerotic part.

The affected part being sclerotic was harder to scrape out as compared to the normal bone and this gives an indirect confirmation of the affected area. The margins of the core created were thereafter curetted till normal feel of the bone is achieved and confirmed under image intensifier. The core thus created was filled by bone grafts. In 26/28 hips, cancellous grafting was done after harvesting graft from the posterior iliac crest. As patients were placed in lateral position it was easier to harvest graft from posterior iliac crest and also larger quantity of graft can be obtained to fill the larger void.

Cancellous bone graft has both osteogenic as well as osteo-inducing properties, thereby facilitating the scaffold for new bone formation. However, in 2 patients cortical non-vascularised fibular graft was used to provide mechanical support. However, decision of the type of graft was purely surgeon based.

Patients were advised strict non weight bearing for atleast 3 months though hip range of movement exercises in bed were started from 2nd post-operative day as per pain tolerance.

The patients were followed at an interval of 1, 3 and 6 months post-operatively and at the latest follow-up were re evaluated clinic-radiologically by X-rays. Weight bearing was started after 3 months only after the void in the femoral head showed new bone formation. If patient agreed, a repeat MRI was done at 6 months or later to compare the outcome of core decompression. The outcomes were judged based on Harris hip score.

3. Results

There were 20 patients in our study, out of which 14 (70%) were with bilateral and 6 (30%) with unilateral involvement (total number of hips involved with ONFH were 34). 6 out of 34 hips with stage 3 or 4 ONFH were excluded, leaving 28 hips. Male (80%): Female (20%) ratio was 4:1. Majority of patients (60%) found in our series were chronic alcoholics. A majority of patients (53.57%) had encountered difficulties in daily living. There were 13 hips (46.42%) of Ficat & Arlet grade I, 11 hips (39.28%) of grade IIA and remaining 4 hips (14.28%) were grade IIB (Table 1).

The procedure adopted in 26 hips (92.85%) was core decompression and cancellous bone grafting. Remaining 2 hips (7.14%) were treated with core decompression and fibular grafting.

Alcohol consumption contributed in majority of patients 12/20 (60%) for AVN. 1 patient had AVN following long term