

Analysis of Outcome of Osteonecrosis of Femoral Head Treated by Core Decompression and Fibular Strut Grafting

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Abstract: *Introduction: Osteonecrosis is a progressive disease of impaired osseous blood flow with wide ranging etiology and poorly understood pathogenesis commonly affecting patients in third, fourth and fifth decade of life. Most of these are idiopathic and are at young when diagnosed. There are various modalities of conservative and surgical methods to halt the natural history of the disease. Core decompression and fibular strut grafting one of the simplest of the joint preserving surgeries and widely reported in the past few decades. A wide range of success rates has been reported with cortical strut grafting techniques in various studies, ranging from 61% to 90%. Materials and Methods: The present study includes 22 cases of osteonecrosis of femoral head treated by core decompression and fibular strut grafting at our institute. Clinic radiological examination of all cases done and included in the study based on inclusion and exclusion criteria. The patients were also assessed preoperatively and postoperatively with the Harris Hip score. All patients underwent core decompression and fibular strut grafting in the supine position through standard postero-lateral approach. Patients were followed up 3 months, 6 months and as recent follow-up as patients came after the surgery. Conclusion: Osteonecrosis of femoral head is an important disease affecting hips at younger age. It is important to diagnose and treat osteonecrosis as early as feasible to prevent progression of the disease and forestall the need for THR. In order to provide mechanical support to the infarct to prevent collapse / further collapse the graft should be placed in the center of the lesion and under sub-chondral bone. Fibular strut graft is easy to obtain, does not leave behind much functional or cosmetic problems at donor site. It provides biological and mechanical fixations.*

Keywords: Osteonecrosis, Core decompression, Fibular strut graft

1. Introduction

Osteonecrosis is a progressive disease of impaired osseous blood flow with wide ranging etiology and poorly understood pathogenesis commonly affecting patients in third, fourth and fifth decade of life (1-5). Many patients are young when diagnosed and affects individuals lifestyle. Considering the relatively young age at presentation, natural history of the disease being progressive and poor long term results after THR, various head preserving surgeries have been used for this disease to avert the need for THR. Core decompression and fibular strut grafting one of the simplest of the joint preserving surgeries and widely reported in the past few decades. A wide range of success rates has been reported with cortical strut grafting techniques in various studies, ranging from 61% to 90%. Further usefulness of the procedure in the post collapse stage has not been well defined in various studies (8-11).

2. Materials and Methods

The present study includes 22 cases of osteonecrosis of femoral head treated by core decompression and fibular strut grafting at M S Ramaiah Medical teaching hospital and Sri Sathya Sai General Hospital from March 2001 to March 2006.

Inclusion Criteria

1. Stage I, II & III osteonecrosis of femoral head
2. All cases of non-traumatic causes
3. Any age and both sexes

Exclusion Criteria

1. Stage IV Osteonecrosis
2. Osteonecrosis secondary to trauma

On admission of the patient all the patients were assessed clinically. A detailed history was obtained and they were subjected to a thorough clinical examination. Radiological investigations included plain radiographs in the form of X-ray pelvis with both hips AP and frog leg lateral views. In patients with unilateral symptoms and in affordable patients MRI was done to assess the condition of the opposite hip and also to confirm the diagnosis and staging of the disease. The patients were also assessed preoperatively and postoperatively with the Harris Hip score. All patients underwent core decompression and fibular strut grafting in the supine position through standard postero-lateral approach. Postoperatively the patients were advised non-weight bearing for 12 weeks. Patients were followed up 3 months, 6 months and as recent follow-up as patients came after the surgery.

3. Discussion

It is accepted that, in most patients, the natural history of atraumatic avascular necrosis of the femoral head is progression to collapse and eventual degenerative arthritis of the hip. The progression usually occurs within 12 to 24 months after diagnosis. The disease usually affects young people, so if possible one should avoid or delay replacement arthroplasty (1-5). The goal should be early diagnosis and preservation of the femoral head. Several forms of head preserving surgeries have been advocated for the treatment

of early stage avascular necrosis of the femoral head. These include core decompression, structural and non-structural bone grafting, the use of vascularised bone grafts, femoral osteotomy and surface replacement arthroplasty (6-11). Ficat and Arlet reported good results in 80 to 90% of patients after core decompression alone. Others have not been able to reproduce these results. There have been several fairly large retrospective reviews assessing the results of core decompression performed with various techniques. In all of these studies, the authors found that the results of core decompression were substantially worse when there had been collapse of the femoral head preoperatively. Smith et al. retrospectively evaluated 114 hips and noted a substantial decrease in the rate of satisfactory results when a crescent sign had been present²⁷. The success rate for Ficat Stage-I hips was 81%, but the rates for hips with a crescent sign or definitive collapse were 20% and 0%, respectively (12-16)

Core decompression and vascularised fibular grafting as compared with non-vascularised grafting has a better clinical and radiological outcome. However, this can be a lengthy procedure requiring expertise in micro vascular technique. Complications from harvesting the fibular graft such as peroneal nerve palsy, and subtrochanteric fracture after placement of the graft can occur for surgeons with less experience with this technique (17-19).

Osteotomies popularized by Sugioka et al also have shown good results but again not replicated in many other studies (20). Technically it is a more demanding procedure and also conversion to THR at a later date will be more difficult after osteotomies.

In the present study core decompression and fibular strut grafting was done in hips of Osteonecrosis of stage IIA, IIB and III. The main purpose was to improve the clinical condition of the patient particularly in terms of pain and also to forestall the need for THR in these patients especially in stage III hips. We analysed our results and compared them with those obtained by various other studies utilizing different modalities of treatment. Our analysis is as follows:

Series	Age group
Dunn and Grow	26 – 59 years
Buckley et al	31-55 years
Mont et al	19-42 years
Marciniak et al	16-54 years
Our study	21-49 years

Our patients are comparable with Mont et al group and majority are in their 3rd decade.

Sex Distribution

Our series had male preponderance with 82% males and 18% females.

Series	Male	Female
Dunn and Grow	76%	24%
Buckley et al	68%	32%
Mont et al	43%	57%
Marciniak et al	58%	42%
Our study	82%	18%

Stage of Disease Included in the Study

In our study Ficat and Arlet stage IIA, IIB and stage III were included.

Series	Stage corresponding to Ficat and Arlet included in study
Dunn and Grow	Stage I, II, III and IV
Buckley et al	Stage I and Stage II
Mont et al	Stage II and Stage III
Marciniak et al	Stage II and Stage III
Our study	Stage II and Stage III

Surgical method used:

Series	Procedure done
Dunn and Grow	Core decompression and fibular strut grafting (Phemister technique)
Buckley et al	Core decompression and fibular strut grafting (Phemister technique)
Mont et al	Core decompression and non-vascularised bone grafting through window in the femoral head
Marciniak et al	Core decompression and vascularized fibular grafting
Our study	Core decompression and fibular strut grafting (Phemister technique)

4. Results

Series	Result	Follow-up
Dunn and Grow	30%	5 years
Buckley et al	90%	8 years
Mont et al	86%	4 years
Marciniak et al	62%	5 years
Our study	85.5%	2.5 years

In our study we had 85.5% successful result. The Harris hip scoring was used to assess the functional outcome. In 8 stage IIA hips 1 hip had excellent result, 6 good and 1 poor result. In stage IIB 3 excellent, 7 good, 1 fair and 1 poor result. In stage III there were no excellent results, 7 good and 1 poor result. The 2 failure hips were of one male patient with stage IIA on one side IIB on the other side, who at the end of 1 year had no improvement in the functional outcome and he underwent B/L Bipolar replacement. The other poor result was seen in a female patient with SLE who was continued on steroids post-operatively also for her disease. The placement of the graft in all 3 cases was under the sub-chondral bone and within the lesion in the antero-superior segment.

In 3 of the excellent results the graft placement was in the antero-superior quadrant and within the lesion and 5 mm from the sub-chondral bone. In 1 case the graft placement was eccentric and there was mild graft degenerative changes but functional outcome was excellent. In these cases etiology was idiopathic in three and alcoholism in one.

In our study stage II hips (20 hips) 4 had excellent results and 13 had good results with an overall success rate of 85%, which is comparable with other standard studies.

For stage III hips there is no consensus in the literature about the choice of the procedure. Core decompression with

vascularized bone grafting, various methods of non-vascularized bone grafting and osteotomies mentioned.

In our case all though the number of cases and duration of follow-up is less, (a follow-up range between 15 months to 54 months) 7 out of 8 cases had a good functional outcome. One poor result was seen in a female with SLE on steroids and the patient was of only 15 months follow-up. All patients except for the patient with poor result were satisfied with the treatment and had improved quality of life.

Therefore from our study we conclude that in Stage III disease core decompression with fibular strut grafting can help in improving the functional outcome of the patient.

Further the complications in our series were few and minor (superficial wound infections in 2 cases and EHL weakness in 3 all of them resolving without any sequelae). However a more long-term follow-up of these hips is required to determine the survivorship analysis and the effectiveness of the procedure to fore-stall the need for THR.

5. Conclusion

- Non traumatic osteonecrosis of the femoral head is common in third decade of life and affecting predominantly the males (alcoholism being one of the causes for male preponderance)
- It important to diagnose and treat osteonecrosis as early as feasible to prevent progression of the disease and fore stall the need for THR.
- In order to provide mechanical support to the infarct to prevent collapse / further collapse the graft should placed in the center of the lesion and under sub-chondral bone.
- Post – operative protocol in the form strict non-weight bearing for 3 months and partial weight bearing for further 3 months and if possible life style modification are necessary for good results and to delay THR.
- Fibular strut graft is easy to obtain, does not leave behind much functional or cosmetic problems at donor site. It provides biological and mechanical fixations.
- The procedure as a whole is simple cost effective and if properly done in appropriate cases has minimal complications and is effective in improving the functional outcome of the patient.

However a more long-term follow-up of these hips is required to determine the survivorship analysis.

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