

Evaluation of Union of Neglected Femoral Neck Fractures Treated with Free Fibular Graft

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ABSTRACT

- Objective* To evaluate the frequency of union of neglected femoral neck fractures treated with free fibular graft.
- Study design* Descriptive case series.
- Place & Duration of study* Department of Orthopedics Bahawal Victoria Hospital Bahawalpur, from April 2009 to January 2010.
- Methodology* Patients of neglected femoral neck fracture (one month postinjury) were included in the study. They were operated and internal fixation was done with cancellous screws and free fibular graft placed. They were followed till the evidence of radiological union.
- Results* Out of 55 patients there were 40 males and 15 females. Ages ranged from 20 year to 50 year. The duration of injury was from 4 weeks to 6 months. Fifty patients achieved complete union while five patients developed non-union with complaint of pain. There was no wound infection and hardware failure.
- Conclusion* Fracture reduction and internal fixation with use of free fibular graft and cancellous screws for neglected femoral neck fractures is the treatment of choice.
- Key words* Bony union, Fracture- femur, Fibular graft.

INTRODUCTION:

Fractures of neck of femur are great challenge to orthopaedic surgeons. With increase in life expectancy and addition of geriatric population to society, the frequency of fracture neck of femur is increasing day by day.¹ Fracture neck of femur in younger population is reported to be 3-5% of the total femoral neck fractures. This mostly occurs as a result of high velocity injuries.^{2,3} In developing countries patients with these fractures usually present after a significant delay.^{4,5}

There is no defined lag period for such fractures to be called "neglected"⁶ Myers et al introduced this term to indicate a delay of 30 days or more, from the

time of injury to seek medical help.⁷ With delay these fractures usually result in non union. The rate of non union is between 10-30% for such neglected fractures.^{8,9} Delay in surgery leads to variable degree of neck absorption, proximal migration of distal fragment and disuse osteoporosis. These factors together make it further difficult to achieve close reduction and stable fixation.¹⁰

There is no consensus regarding the treatment of neglected fractures of neck of femur in younger population. The management protocol thus remains a subject of controversy. However, most agree that attempts should be made to salvage the head. Established treatment options include valgus osteotomy with or without various implants and bone grafting techniques (muscle pedicle, free vascularized or non vascularized fibula).^{3,11,12} Fixation of such neglected femoral neck fractures with free fibular graft and cancellous screws has shown good results.¹³ The objective of this study was to evaluate the union of neglected femoral neck fractures treated with free

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fibular graft.

METHODOLOGY:

This descriptive case series was conducted in the Department of Orthopaedic Surgery Bahawal Victoria Hospital Bahawalpur, from April 2009 to January 2010. Total of 55 patients were included in the study. All patients of either sex, presenting after one month of injury, either not treated or treated by various internal fixation methods with no radiological signs of union, were included in the study. Patients having pathological femoral neck fractures or with uncontrolled diabetes mellitus, renal failure or any bleeding disorders were excluded.

Patients fulfilling the inclusion criteria were admitted and informed consent was taken. Patients were operated and fracture was fixed with free fibular graft and cancellous screws. They were protected with long leg back slab. Stitches were removed at 2nd week and back slab was removed at 4th week after surgery. At 8th week, patients were encouraged to walk with crutches. They were assessed for union by the presence of trabecular continuation across the fracture line on anterolateral and posterior radiograph for final outcome at 20th week. Satisfactory union was defined as clinically no movement and pain at fracture site and presence of trabecular continuation across the fracture line on radiographs.

Data were analyzed using SPSS version 10.0. Quantitative data including age and duration of fracture, were analyzed by using mean and standard deviation. Qualitative data including satisfactory union (trabecular continuation across fracture site) of neglected fractures were calculated by frequency and percentages. Confounders like duration of injury were controlled using stratification during analysis of the results.

RESULTS:

A total 55 patients of neglected femoral neck fracture were included in the study. There were 40 male and 15 female patients. Age ranged from 20 year to 50 year. Duration of injury varied from 3 weeks to 6 months. Five patients had received treatment earlier. Satisfactory bony union was achieved in 50 patients. The time required for union varied from 4 months to 6 months. In four cases, union occurred in 10°-20° (mean 15°) of varus, because of gross osteoporosis and loss of reduction. Nonunion occurred in 5 cases. No major donor site morbidity was seen in any case; however, seven patients had minor complaints such as mild ache, ankle swelling after rigorous walking and some weakness of long toe flexors and extensors. This

weakness resulted because of the loss of normal origin of long muscles; Superficial infection was seen in three cases, but no deep infection or osteomyelitis occurred.

DISCUSSION:

Several osteotomies have been described for old femoral neck fractures by Mc Murray's, Blount, Dickson, and Stewart. They concluded that realignment osteotomies give most predictable result in young patients even in the presence of small areas of necrosis by modifying the mechanical environment about the fracture site. Dickson combined the cancellous bone grafting with an abduction osteotomy and reported encouraging results; however, he maintained that established femoral head necrosis was irreversible even after grafting.¹⁴ Marti et al treated 41 patients with nonunion of femoral neck fracture and claimed healing in 86% cases. They further maintained that the improved biomechanics after osteotomy makes the bone grafting unnecessary.¹⁵ In present study this approach is not followed. Osteosynthesis using different techniques of bone grafting is described for neglected fractures of femoral neck.^{8.}

The bony union rate in present study is 90% is comparable to that of Le Croy, Nagi and Sandhu.^{3,10,16} Hou noted that the iliac pedicle graft provides viable option, which hastens the fracture healing and also maintains head viability.¹⁷ Meyers and Baksi popularized muscle pedicle bone graft.^{7,18} Meyers used quadratus femoris and sartorius muscle pedicle grafts or fibular graft in 136 patients, and the reported rate of nonunion and avascular head was 11% and 3% respectively. Baksi treated 56 un-united intracapsular fractures by internal fixation and muscle pedicle grafting and obtained satisfactory union in 75% cases, delayed union in 7%, and nonunion in five cases. He concluded that muscle pedicle accelerates the healing of un-united fracture even in the presence of avascular head.¹⁸

Nagi treated 16 old and 10 fresh fractures of neck of femur by open reduction and internal fixation with cancellous screw and non-vascularized fibular graft and reportedly achieved bony union in nine out of 10 non-unions. He also noted clinical and radiological improvement in four patients with preoperative avascular changes in the head.¹⁶ Nagi stated that closed reduction was unlikely after three weeks, though we were able to obtain closed reduction in most of our cases up to eight weeks. This may be attributable to preoperative skeletal traction for 1-2 weeks. Hip spica as recommended by Nagi et al, was not applied to any of our patients.

Literature has suggested that osteonecrosis is not a contraindication of osteosynthesis. They observed that reaming provides internal autogenous graft and encourages growth of vascular granulation tissue. We agree with Sotto-Hall that the femoral head is not necessarily osteonecrotic even with extended period of neglect, as such patients instinctively assume the position of maximum joint capacity (flexion, external rotation, and abduction), which relieves intra-articular tamponade.¹⁹

Vascularized fibular graft and vascularized iliac bone grafts are reported to give superior result; however, this consists of microvascular anastomosis that most orthopedic surgeons are not commonly well versed with. Leung and Shen obtained 100% union and satisfactory clinico-radiographic picture at 5-7 years follow-up using vascularized iliac bone graft augmented by screw fixation.²⁰ The use of non-vascularized fibular strut graft is technically less demanding. Fibula being cortical bone provides mechanical strength besides stimulating union, and its incorporation with the surrounding bone gives biological fixation. Once the graft is re-vascularized, the osteoblasts stimulated by bone morphogenic protein replace the resorbed bone. If this bone is appropriately stressed, the graft acquires sufficient strength to handle the observed forces. Minor morbidities such as mild ache and ankle swelling after rigorous walking were noted at the donor site in our study, as reported by Anderson and. This is attributed to the loss of origin of long muscles.²¹

CONCLUSION:

Non-vascularized fibular strut graft along with cancellous screws provided a dependable and technically less demanding alternative.

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