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INTERNAL FIXAT ION OF NEGCLETED FEMORAL NECK FRACTURE BY MUSCLE - PEDICLE BONE GRATING

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ABSTRACT
a patient neglacted femoral neck fracture in adults still poses average age 45 years All fractures were more than 4 weeks old at the time all of our presented cases showed non-union of their femoral neck fractures A modified technique was used freshening[1] of the fracture surfaces using chancellors graft fixation utilizing 3 lag screws with quad rates femoris muscle pedicle graft applied to the posterior neck surface. Muscle pedicle bone graft based on the quadrates femoris muscle was shown to accelerate union intravascular femoral neck fractures.[2,3]

INTRODUCTION
The treatment of femoral neck fracture (FNF) is still a matter of controversy even after so many recent advancements in Orthopedics. Nonunion (NU) and avascular necrosis (AVN) are the two main complications of this fracture. The rate of NU has been reduced by anatomical reduction and stable fixation of fractures but the incidence of AVN is evident. In 1982, the autogenous muscle pedicle graft based on the quadratus femoris muscle was used for the first time. 2 Later, fresh autogenous cancellous iliac bone chips combined with muscle pedicle bone grafting have been reported to be good. 3’4 scrows We have treated patients of displaced femoral neck fracture with late presentation by Meyers' technique.[3] So we are presenting analysis of the results of 8 patients treated by this method.

PATIENTS AND METHODS
From August 2006 to May 20l2 open reduction and internal fixation with muscle pedicle grafting was done in 8 patients with fractured femoral neck in Al-Ramadi Teaching Hospital with a mean follow -up of 2 years (range l years to 4 years) were included. All patients of displaced femoral neck fractures were treated by Meyers 'MH.[3] procedure. Patients with femoral neck fracture with an inability to walk (due to reasons other than the femoral neck fracture), or with a life expectancy of less than five years, or with an inability to cooperate in the postoperative program were excluded from the study. All young patients with a displaced femoral neck fracture presenting late (more than 4 weeks old) or had unacceptable closed reduction of a fresh fracture were included in the study.

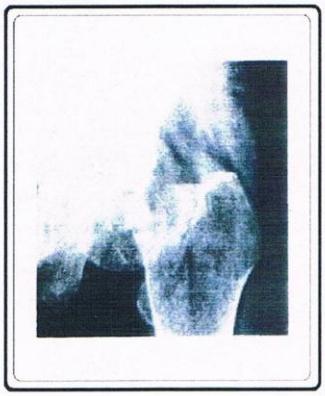
Out of 8 patients, 3 were males and 5 were females. Their age ranged. from 20 to 65 years (average age 42.5 years). All fractures were more than 4 weeks old at the time of operation. Road traffic accident was the commonest mode of trauma (4patients), followed by fall from height (2patients) and slip while walking (2patients). The left side was involved in five patients and the right side in three patients. Two patients presented with associated injuries (simple fracture both bone forearm, and simple fracture calcaneum,). Majority (62,5%) of the fractures (5/8 cases) in our series were trans—cervical. The 3/8 cases(37.5%) were sub-capital. All the cases were Garden stage, RS[4], IV. All the patients were kept in below knee skin traction with Thomas knee splint while waiting for surgery.

Surgical procedure
The patients were operated in lateral position. A close reduction under X-ray control was attempted; only minor adjustments were required under direct vision after the fracture site was exposed. The posterior Moore's[5] approach was used in all cases. The quadratus femoris muscle was identified with its insertion on the quadratus tubercle at the intertrochanteric crest. The width of the graft was l.5 cm and thickness was l cm. An inverted "T" incision was made on the posterior part of the capsule and the fracture were visualized directly. Final minor adjustments regarding anatomical reduction were done under direct vision.[6] Fixation was done by three cancellous lag screws in all cases. The length of the screws was confirmed under X—ray control.

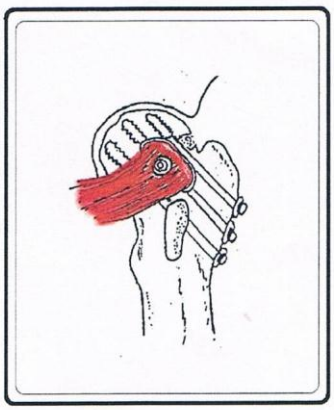
The cephalic[7] end of the graft was trimmed and a slot was made in the femoral head and posterior aspect of the neck across the fracture site.

The graft[8] was then placed into this slot and after impaction, it was firmly secured with a screw reinforced by circumferential proline suture.

The postoperative mode of immobilization depended upon the rigidity of the fixation and the age of the patient. During the period of immobilization, patients were encouraged to start active quadriceps exercises and non-weight bearing exercises of hip and knee. The average period of immobilization in the postoperative phase was one weeks. Partial weight bearing was allowed gradually depending upon the status of union. Full weight bearing was allowed only after full osseous union, on an average of 6months after the operation.



pre opreation
figure (1)



after opreation
figure (2)

DISCUSSION

Anatomical reduction, impaction and rigid internal fixation are essential in treating femoral neck fractures. Muscle pedicle bone grafting has been advocated by many investigators along with rigid internal fixation to prevent NU and AVN of the femoral head. This provides an additional source of blood supply for the femoral head which may have been rendered ischemic by the fracture and also allows reduction and impaction of the fracture under direct vision.[3'4'6]

The severity of the comminution of the posterior cortex of the neck is observed quite frequently2. The marked deficiency in the intramedullary bone of the femoral neck and head prevents rigid fixation of the fragments by any metallic implant. The muscle pedicle bone grafting provides some structural stability to the posterior aspect of the neck even when posterior cortex has been severely comminuted.

Our results are quite comparable with the results of the Reynolds, F.C[9] series3 as well as Indian series4. These early results suggest that a marked reduction in the incidence of late segmental collapse and AVN of the femoral head was achieved by muscle pedicle bone grafting technique. We believe that this graft stimulates early and complete revascularization of the head of the femur following displaced fractures of the femoral neck by providing an additional source of vascular supply when the original one has been reduced by the fracture.

We have used cancellous lag screws in all cases. Lag screws 'fixation provides the best rigid fixation. 7 Meyers' et al[3] and Baksi[10] have preferred modified Hagie pins fixation in their studies.

We fixed the muscle pedicle bone graft with circumferential prolene sutures and we switched over a smallscrew for better fixation. Graft dislodgement was not seen in any patient. It was easy to fix the graft with screw and fixation was better. Meyers' in his series also preferred graft fixation with screw while Baksi preferred circumferential silk suture for the fixation of graft.

The mean delay in surgery was five weeks. The various reasons for the delay included non-compliance of the patient for surgery, illiteracy, patients being unfit for the surgery. Hence this procedure is of special significance to those areas of the world where late reporting is not uncommon.

We agree with the concept of Meyers[3] that posterior approach hardly damages further vascularity of the femoral head as the main lateral epiphyseal vessel lies in the superior part rather than in the posterior part of the capsule. We have not encountered any arterial bleeding during cutting the capsule posteriorly. Kovalos.[7] This procedure requires no special equipment over and above that used for a standard internaly fixation procedure and that prosthetic replacement can be easily carried out as a revision surgery in the failed cases by schatzker and tile.[11]

RESULTS

The total number of study patients was eight. All of them were complaining from displaced femoral neck fractures

and treated by Meyer's procedure. Study patient's age was ranging from 18 to 65 years with a mean of 39.5 years and standard deviation (SD) of ± 18.11 years. Females represented 62.5% of study patients. (Figure 1).
The most common cause was FFH (50%) while the left and right femur was involved in equal proportion (50%). (Table 1).

No associated injuries were presenting and the highest proportion of fractures were sub-capital (62.5%). (Figure 2).

All the fractures were Garden stage III, IV.

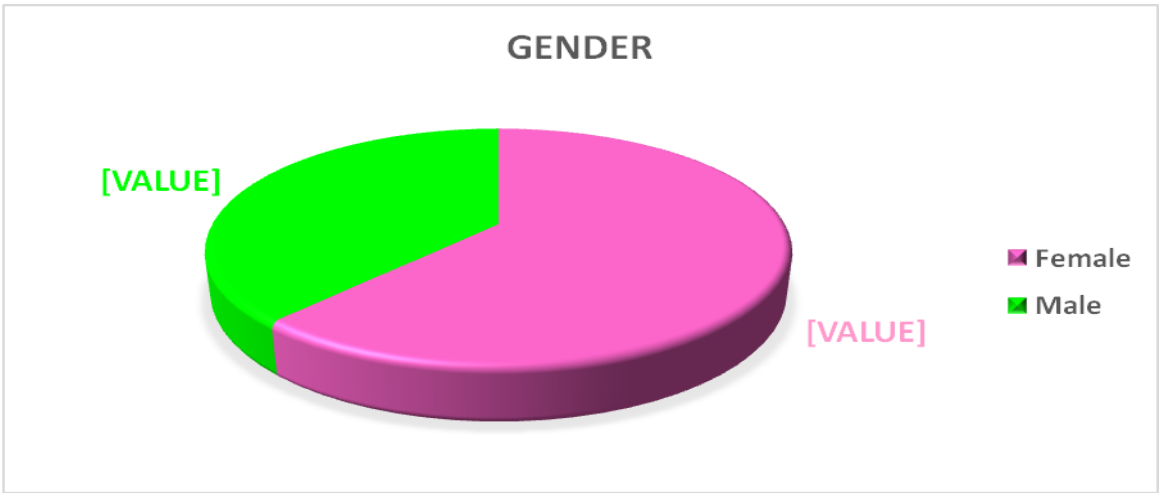


Figure 1: Distribution of study patients by gender.

Table 1: Distribution of study patients by certain fracture details.

Variable	No. (n=8)	Percentage (%)
Cause of fracture		
RTA	1	12.5
FFH	4	50.0
Slip while walking	3	37.5
Side of fracture		
Left	4	50.0
Right	4	50.0

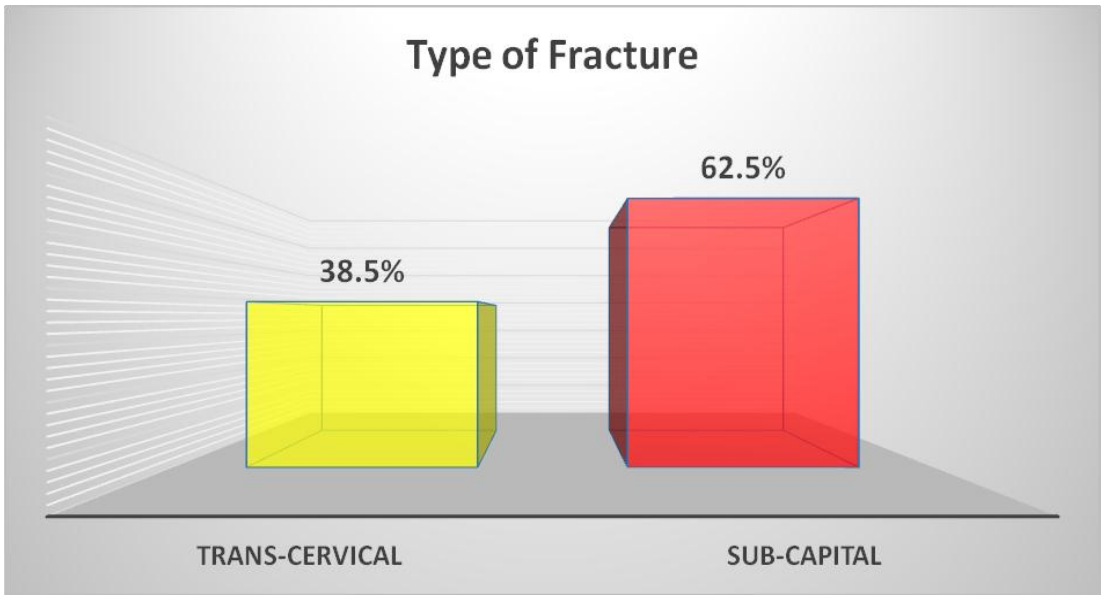


Figure 2: Distribution of study patients by type of fracture.

Postoperatively, there was clinical as well as radiological union of fractures in 87.5% of study patients as shown in figure (3).

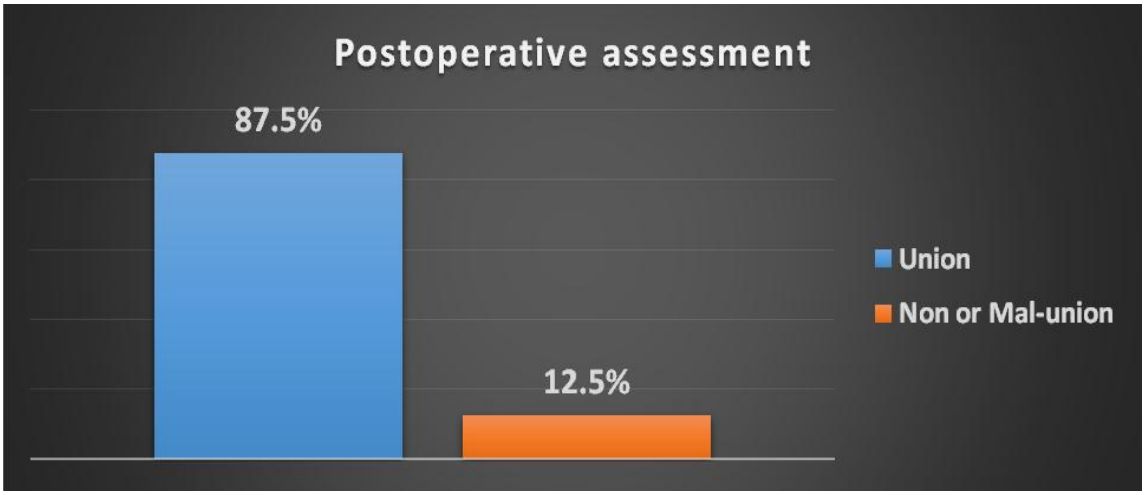


Figure 3: Distribution of study patients by postoperative assessment.

Evaluation of hip function done by hip rating system and good result was seen in 62.5% of study patients as shown in figure (4).

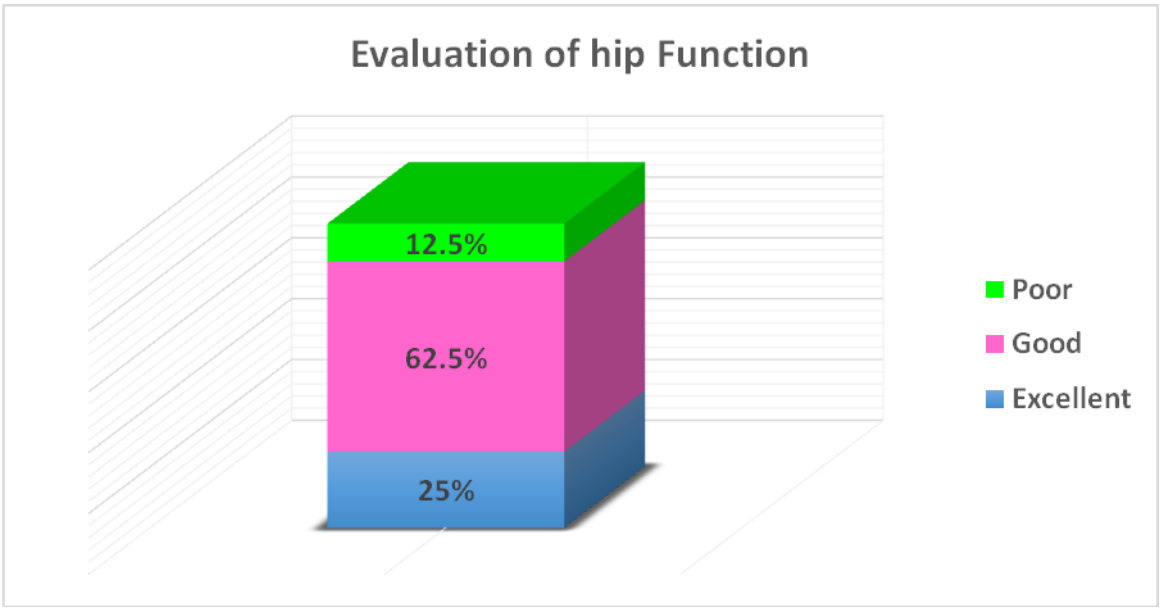


Figure 4: Evaluation of hip function postoperatively.

No postoperative complication seen in 62.5% of study patients while 37.5% had complication which was AVN, coxa-vara, transient foot drop, (12.5% for each complication). Table 2 Transient foot drop was recovered within six weeks.

Table 2: Distribution of study patients by postoperative complication.

Postoperative Complication	No. (n=8)	Percentage (%)
No Complication	5	62.5
AVN	1	12.5
Coxa Vara	1	12.5
Transient foot drop	1	12.5

Table 3 shows the association between postoperative complication and certain variables. We noticed that there was no significant association ($P \geq 0.05$) between postoperative complication and all these variables.

Table 3: Association between postoperative complication and certain variables.

Variable	Postoperative Complication		Total (%) n=8	P- value
	NO (%) n= 5	YES (%) n= 3		
Cause of Fracture				
FFH	3 (75.0)	1 (25.0)	4 (50.0)	**0.376**
Slip while walking	2 (66.7)	1 (33.3)	3 (37.5)	
RTA	0 (0)	1 (100.0)	1 (12.5)	
Side of Fracture				
Right	2 (50.0)	2 (50.0)	4 (50.0)	**0.465**
Left	3 (75.0)	1 (25.0)	4 (50.0)	
Type of Fracture				
Sub-Capital	3 (60.0)	2 (40.0)	5 (62.5)	**0.85**
Trans-Cervical	2 (66.7)	1 (33.3)	3 (37.5)	

CONCLUSION

We conclude that muscle pedicle bone grafting with internal fixation is a very rewarding method of treatment of displaced fracture of femoral neck with late presentation.

Treatment of Non-United Femoral Neck Fractures in Adults by Internal Fixation Combined with Muscle-Pedicle Bone Graft.

S. AL - Khaidhuire, P.R.C.S, Ed, Mch, Orth, L' poo!.

ABSTRACT l

Six patients, (16-31 years old), with ununited intracapsular fractures of the femoral neck were treated by internal fixation and quadratus femoris muscle-pedicle bone grafting. Satisfactory union occurred in all, with return of near-normal hip function. One patient developed secondary fracture, treated conservatively, and 2 patients were left with 1.5, and 2cm shortening. This method is useful in anatomical and functional restoration of the hip and it shortens the time to union. intracapsular femoral neck fractures may fail to unite be- cause of shearing iforces acting at the fracture site, ln addition the femoral neck may be iresorbed. Sevit, had shown that 85% of dis- placed femoral neck fractures de- veloped total or subtotal ischaemia of the femoral head, an important cause of non-union. In young adults where anatomical restoration of the femoral head and neck is desirable, several types of osteotomies had been de-scribed these operations help to stabilize the hip but union of the fracture does not always occur and sometimes the hip 1'emainS painful with suboptimal function. All of our presented cases showed non-union of their femoral neck fractures. A modified technique was used, "freshening of the fracture sur faces, restoration of the neck length using autogenous cancellous graft, fixation utilizing multi- plelag screws with quadratus femoris muscle pedicle graft applied to the posterior neck surface" Muscle pedicle bone graft based on the quadratus femoris muscle was shown to accelerate union of intracapsular femoral neck fractures.

MATERIAL AND METHODS

Six patients with Garden grade IV subcapital fractures presented with non—union (6-12 months) after injury. Age ranged between (16-32 years) 4 females and»2 males (Table - 1). Clinical evaluation was based on pain, ability to walk, range of movement, muscle power, before and 6 months after internal fixation and muscle pedicle bone graft.

Union confirmed rodiologically, Tc methylene diphosphonate bone scan determine femoral head viabel-was utilized toity.

COMPLICATIONS

One patient developed subtrochanteric fracture at the3rd post operative week. "Patient No. 6" She refused P.O.P. hip spica application, as she was suffering from neurotic depression and was on antidepressant therapy. This patient was treated conservatively for her secondary fracture, subsequently she developed shortening of 3cm and de- creased range of movement of the hip. Two patients had shortening of 1.5cm and 2cm (patient No.3, patient No.l).

RESULTS

Fracture union was obtained in all patients at (3-5) months. This was graphically and by Tcscintigra confirmed roengenophy.

Functional results were evaluated by gait assessment, range of movement, discrepancy, and pain. limb length.

• Pain: was reported only by patient No.6. on ambulating be- cause of the immobilization needed to treat extended period of her subtrochanteric fracture.

• Range of movement: only patient No.6 had decreased range of tients had full range of movemovement, all other pament and normal gait pattern developed gradually as their surrounding hip musculature.

DISCUSSION

Retaining a life lasting functional hip joint in young active adult patients with nonunited intracapsular femoral neck fracture is the ultimate goal in treatment. The results of total hip replacement in these patients is still disappointing and suboptimal. Our method utilizing

open reduction via a postero lateral approach reveals the pathology at the fracture site clearly, in addi- tion il allows placement of a vascularized cortical graft at the posterior neck region, at which comminution leads to fracture instability and posterior head fragment tilting. Accurate anatomic reduction, restoration of neck length and inter trochtroctic distance with stable rigid fixation augmented with the quadratus femoris muscle pedicle bone graft to improve fracture stability and invite important vascularity to the fracture as well as to the ultimate goals in managing our patients. Muscle pedicle bone graft proved useful in treating difficult non-union, as our patients get nearly normal function with anatomical preservation of their hip-joint.

CONCLUSION

Muscle pedicle bone graft is useful in treating non-united in- tracapsular femoral neck fractures in young active adults. It improves the local vascularity of the fractured fragments, restores stability and shortens the time.

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