

AUGMENTATIVE PLATE FIXATION FOR THE MANAGEMENT OF FEMORAL NON-UNION AFTER INTRAMEDULLARY NAILING

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ABSTRACT

Objective: To evaluate the results of augmentative plate fixation for femoral non-union after intramedullary nailing.

Material and Methods: This study was conducted in the department of orthopaedic and Trauma Khyber Teaching hospital Peshawar from December 1995 to December 2003.

Twenty-three cases of non-union femur shaft fracture after intramedullary nailing was included in the study. Non-union of femur treated with other mode of treatment was excluded. Leaving the intramedullary nail in situ, an augmentative plate fixation was applied to the fracture site to counter the rotational and axial instability. Simultaneous bone grafting was performed in some cases.

Results: All these patients started walking with partial weight bearing with crutches at 4 months, and full weight bearing without crutches at 6 months. We obtained bony union within 6 months in all these cases.

Conclusion: We have found this method a useful treatment for the non-union of femoral shaft fracture after intra medullary nailing. The technique is simple and does not require any special instrument. It facilitates an early weight bearing and gives a quick recovery from non-union.

Key words: Femur diaphysis, Non-union, Augmentative plate fixation.

INTRODUCTION

Fractures of the shaft of the femur represents about 5-10% of all fractures presenting in emergency.¹ Most mid-diaphy-

seal fractures of the femur heal with intramedullary nailing. In certain circumstance this fracture fails to unite in spite of intramedullary nailing, because of some known risk factors. These include the severity of initial injury, oblique or spiral

pattern of the fracture, site of the fracture above or below the isthmus and narrow size of the nail, which are responsible for rotational instability at the fracture site.^{2,3,4,5,6,7,8}

The treatment of non-union femur shaft fracture after intramedullary nailing is not uniform. It can be successfully treated by various surgical methods. These include interlocking nail, change of the nail with wider one, plating and bone grafting after removal of the nail, and augmentative plate fixation over the previous nail.^{9,10,11,12} The last procedure is simple, cheap and safe, but not in common use. The objective of the study was to determine the efficacy of augmentative plate fixation in non-union femur after intramedullary nailing.

MATERIAL AND METHODS

In this study we included all cases of the non-union of femoral shaft that had been presented for at least 8 months after intramedullary nailing.

Cases with the following criteria were excluded from our study (a) infected non-union, (b) Non-union resulting from other treatment modalities. From December 1995 to December 2003, twenty-three patients met these criteria.

All the operations were performed under general anesthesia. First generation cephalosporin was given at the time of induction. The femur was approached after excision of the previous scar. Fracture site was exposed and cleaned. Any hypertrophic callus was shaved. The lateral surface of the bone was prepared for even seating of the plate. The shaved callus was later used as a bone graft. In case of atrophic non-union, bone ends were cleaned by removing all the intervening fibrous. In such patients, bone graft was obtained from the iliac crest.

A six to eight hole broad DCP (Dynamic Compression Plate) was applied across the

site without removal of the nail. Cortical screws were put while skirting the margins of the nail. After fixation, the non-union site was packed with bone graft. At the end of the procedure, the wound was closed with a suction drain. Postoperative antibiotics were continued for ten days. Range of motion exercises at the hip and knee were started as soon as the patient became pain free. They were mobilized non-weight bearing on the operative side and discharged from the hospital once mobilizing comfortably. Stitches were removed after 14 days. Follow up examination and x-rays were performed at one, three, six and twelve months. Weight bearing was gradually increased to full weight bearing once signs of early healing appeared on x-rays. The end point of study was a healed fracture judged on radiographic examination. Four cortices (two on the antero-posterior and two on the lateral radiograph) were evaluated for the amount of bridging. The fracture was considered healed when three of the four cortices had bridged.

RESULTS

There were 15(65%) male and 8(35%) female (Table 1). The average age was 38 years (range 16-65 years) (Table 2 and Fig

SEX DISTRIBUTION

MALE	FEMALE
15 (65 PERCENT)	8(35 PERCENT)

TABLE - 1

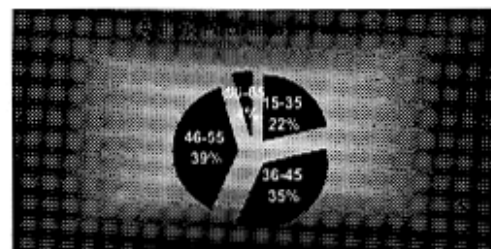


Fig. 1

AGE DISTRIBUTION

AGE	NO. OF PATIENTS
15-35	5 (23 PERCENT)
36-45	8 (35 PERCENT)
46-55	9 (39 PERCENT)
56-65	1 (4 PERCENT)

TABLE - 2

1). The initial injury was from motor vehicle accident in 16(70%) patients, from a fall in 7(30%) patients. The right femur was involved in 13(57%) and the left femur in 10(43%). Fracture site was isthmal in 6(26%), supra isthmal 9(39%), and infra isthmal 8(35%). (Table-3). Intramedullary nail used in all cases found comparatively thinner than the intramedullary cavity.

According to table 4 in 20(86%) cases non-union was classified hyper tropic and it was atrophic in 3(14%) cases according to the criteria of Weber and Chech.¹³

Post op recovery was unremarkable in all the patients. None of our patient had any restriction of motions in hip and knee joints at the time of final follow up. There was no case of wound infection or other complication. We got solid union in all these cases.

DISCUSSION

Non-union of the femur is defined as failure of the fracture to unite within the expected period of time, which varies from three months to six months. Non-union is

DISTRIBUTION OF FRACTURE ACCORDING TO THE SITE OF NON-UNION

SITE	NO.	PERCENT
ISTHMAL	6	26
SUPRA ISTHMAL	9	39
INFRA ISTHMAL	8	35

TABLE - 3

DISTRIBUTION OF FRACTURE ACCORDING TO THE TYPE OF NON-UNION

TYPE	NO.	PERCENT
HYPERTROPIC	20	86
ATROPHIC	3	14

TABLE - 4

established when a fracture shows no visible progressive signs of healing for 3 months.¹³ The incidence of non-union of the shaft of femur changed substantially in the past 25 years with the introduction of interlocking nail (1). The incidence of non-union has dropped to 2% or less in non-pathologic fractures.^{1,4,8}

Non-union of the femur shaft after intramedullary nail has been treated, using interlocking nail, replacement of the nail with larger one, insertion of a screw at the right angle to the longitudinal axis of the femur just distal to the fracture and force the nail in wedging against the opposite cortex, replacement of the nail with plate and bone graft.^{2,3,4,5,7,9,10} Interlocking nail has been mentioned in literature as treatment of choice in such cases.¹ Interlocking nailing is not possible everywhere due to non-availability of the image intensifier, and flexible reamer. In major hospitals due to heavy workload and poor financial condition of the patients, it is not possible to interlock each and every case.

Most of the patients in our study were male, with male to female ratio of 2:1, which is the same as reported by other workers.^{11,12,14} The initial injury was from motor vehicle accident in 16(70%) patients and from a fall in 7(30%) patients, Ueng et al and Yu et al reported similar results. In this study the nonunion was hypertrophic in eighty-six percent of cases after intramedullary nailing. Bungero et al reported similar results. We got almost 100% good results with the augmentative plate fixation, which is as good as interlocking nail. The results of this study is identical with Chao et al and Ueng et al.^{13,14}

All these patients obtained bony union within 8 months. All these patients walk with full weight bearing without adding support. Similar results were reported by Ueng and Chao.¹⁴

From our experience, we have found this method to be a useful treatment. The technique is simple, less time consuming and does not require any special instruments. It facilitates an early weight bearing and gives a quick recovery from non-union.

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