



STUDY OF ETIOLOGY AND MANAGEMENT OF INFECTED DISTAL FEMUR NON-UNION

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ABSTRACT **BACKGROUND:** Incidence of distal femur fractures is approximately 37/ one lakh person-years. Distal femoral fractures mainly arise from two different injury mechanisms by high energy trauma and low energy trauma.

OBJECTIVE: To find out the causes of Non Union of distal femur and progress of such nonunion.

METHODOLOGY: Total 35 cases of distal femur fracture nonunion satisfying inclusion and exclusion criteria treated and followed up from May 2016 to September 2018 in the study and all patients were followed up according to post-operative follow up protocol.

RESULTS: Among the 35 cases 31 were male and 04 were female. The mean age of case presenting to us at the detection of Non Union was 38.5 years. Symmetrical distribution of cases in the age group from 20-49 years which accounted for 29 cases (82.85%). Right limb was involved in more number of cases. Accidents were noted to be the main cause of primary fractures. Most of the cases had a compound injury initially. Aseptic Non Union was seen in 60% and infected Non Union in 40% of cases. The most common cause of non-union was found to be infection

CONCLUSION: Commonest cause of non-union was found to be infection and most common injury associated was found to be Ipsilateral lower limb injuries.

KEYWORDS : Non-union, distal femur, Road traffic accident, domestic fall

INTRODUCTION

Distal femur non- unions are difficult to treat and associated with patient disability. The distal femur or the supracondylar area of the femur is defined as the zone between the femoral condyles and the junction of metaphysis with the femoral diaphysis. In diaphyseal fractures of major long bones in adults, the diagnosis of nonunion should not be made until 6 months after the fracture. ^(1, 2) Radiographically, a nonunion shows no evidence of bone bridging the fracture site. Finally, the diagnosis of nonunion infers that the fracture will not go on to union without some type of therapeutic intervention, either nonoperative or surgical. The objective in the treatment of non-unions is to achieve solid union of the fracture site, one that will ensure and allow the patient to regain a good level of function. The latter requires that the limb be left with little or no shortening or malalignment, and that sufficient joint range of motion, muscle strength, and neurovascular function be restored that the limb is useful to the patient. If these objectives are reached, but the patient continues to have chronic disabling pain, then treatment may have been fruitless. The primary source of pain in most cases, however, is the nonunion itself. Healing of the nonunion usually resolves any pain problems. Non-unions can be broadly divided into aseptic and infected nonunion. However the treatment of both is different, the principle of the treatment is to provide a painless limb with good functional outcome. Henceforth this study aims to evaluate the different causes of Non unions of distal femur, the progress of such nonunion (both aseptic and infected).

MATERIALS & METHODS

This is an observational study. Consent was taken from all study population.

We studied 35 patients of distal femur fracture non-union satisfying inclusion and exclusion criteria treated and followed up according to post-operative follow up protocol from May 2016 to September 2018. The mean follow up period was fourteen months and patients were assessed for functional capacity and radiological fracture healing capacity per month.

Protocol was observed for patients with nonunion lower end of femur on arrival-

1. Local and systemic examination, thorough assessment of patient to rule out any injury.
2. Evaluation of patients in terms of age, sex, mode of primary trauma, period between injury and primary surgery, to rule out associated fractures, to know neurovascular status.
3. Radiological assessment: AP& lateral views of injured limb,
4. Sinogram with Urograffin dye in cases of infected nonunions with discharging sinuses.
5. CT Scan is necessary to diagnose a missed Hoffa's fragment.

INCLUSION CRITERIA

1. Patients > 18 years age and managed surgically
2. Distal femoral fractures non unions with or without osteoporotic changes patients.

Exclusion criteria

1. Children with distal femoral fractures and growth plate is open.
2. Cases lost in follow – up.

Implant Used

The 5- 14 holed Anatomically precontoured plate locking compression plates are available.

Surgical Procedure

In the old operated cases, the approach is taken through the fibrous tissue carefully using an electrocautery to reach the nonunion site. When the dye is injected through the sinus, the dissection is done in the plane of the dye to reach the non union site. In an untreated case, the fascia overlying the vastus lateralis is incised, the muscle reflected anteriorly off the intermuscular septum and perforating vessels are identified and ligated or coagulated.

After reaching the non union site, the old implants are removed carefully making sure that no screw or part of plate remains intact inside. A thorough wash is then given using normal saline. The fracture site mobility is checked. Soft tissue if any is removed from the fracture site. Freshening of the fracture site is performed. This is followed by shingling using a small osteotome and a hammer to remove the sclerosed bone till punctuate bleeding is visible. A small drill can also be used to drill at the fracture site. It is necessary for the tourniquet to be deflated during this step. Minimal Stripping of soft tissue is done. Vascularity is preserved.

Results

Among the 35 patients 31(88.57%) were male and 04(11.43%) were female. Right limb (51.43%) was involved in marginally more number of patients than the left limb (48.57). Road traffic accidents were noted to be the main cause of primary fractures (82.85%) and the rest being Domestic fall (17.15%).

Most of the cases (21 cases; 60%) of non union had a compound injury initially. Aseptic non union was seen in 21 cases (60%) and infected non union in 14 cases (40%) in our study.

In majority of cases, the primary treatment was plating (24 cases; 68.57%) followed by nailing in 5 cases (14.29%), untreated in 4 cases (11.43%) and external fixator in the remaining 2 cases (5.71%). The most common injury associated with the primary fracture was found to be Ipsilateral lower limb injuries in 10 cases (28.57%) and were dealt with accordingly during the initial surgery.

Infection was the commonest cause of non-union (82.85%) in 11 cases (31.4%), followed by Improper reduction, mechanical failure, Missed Hoffas, Non compliance and untreated in 25.7%, 22.9%, 8.6%, 2.8% and 8.6% respectively. Although there may be multiple causes of non union in a single case, we have taken into account the single most relevant cause for each case.

Table 1: Causes of Non union

Causes	Number	Percentage
Infection	11	31.4
Improper Reduction	9	25.7
Mechanical Failure	8	22.9
Missed Hoffas	3	8.6
Non compliance	1	2.8
Untreated	3	8.6
Total	35	100

In all the cases of aseptic non unions, incision was taken over the previous scar mark. A standard LCP (SYNTHES and Indian made) was used for plating. On the basis of type of fracture the size of plate (7 & 9 holed)/implant was selected.

All cases of infected non-unions were primarily treated with implant removal and thorough debridement. Antibiotic cement beads (Vancomycin + Supacef) were kept and antibiotic cement spacer was used if the defect was found to be huge.

DISCUSSION

Comparing our results with standard studies, in a study by Ebraheim NA *et al*^[3], Researcher reviewed 19 studies published over the last 12 years in which there were patients with nonunion of the distal femur and treatment. Bellabarba C *et al*^[4] researched results of indirect reduction and plating of distal femoral non-unions.

Chapman MW *et al*^[5] found the results of single and double-plate fixation combined with bone grafting

Prasarn ML *et al*^[6] studied Management of infected femoral nonunions with a single-staged protocol utilizing internal fixation in 13 patients. All patients had united and resolved their infections.

Wang JW *et al*^[7] performed a retrospective study to analyze the results of treatment of nonunions of the distal part of the femur with internal fixation combined with cortical allograft struts and autogenous bone-grafting in 13 patients. In their study, all nonunions united, at an average of five months.

Gardner MJ *et al*^[8] performed a study and noted that at final follow-up the union rate was 97%, and the average time to heal was 15.9 weeks. In our study we treated 35 cases of distal femur fracture non union with an average age of 38.5 years. The average union time was 22.6 weeks with persistence on non union in 11.4% cases, 11.4% showing deep infection, 8.6% with superficial infection, 8.6% with varus malalignment.

Thonse and Conway^[9] have studied cases of INU with bone defects in 20 patients. They were able to achieve primary union by primary use of ABN in all cases, Babhulkar and colleagues^[10] achieved 100% union in their series of 29 cases with a two-staged procedure. There were no patients with persistent infection.

Shahcheraghi and Bayatpoor^[11] also noted 100% union in their series of 58, especially those treated with intramedullary nail and bone grafting. They have also had 33% of persistent infection in their series. In our series, we noted persistent infection in 5 (3.04%) patients. Shyam and coworker^[12] in their series of 25 patients treated with antibiotic nail, had only three patients of type 1 who did not require a secondary procedure and none of the cases with type 3 INU achieved infection controls.

CONCLUSION: It was concluded that the most common cause of non-union was found to be infection, Improper reduction, mechanical failure, Missed Hoffas, Non compliance and untreated in 25.7%, 22.9%, 8.6%, 2.8% and 8.6% respectively. The most common injury associated with the primary fracture was found to be Ipsilateral lower limb injuries. All cases of infected non-unions were primarily treated with implant removal and thorough debridement. Antibiotic cement beads (Vancomycin + Supacef) were kept and antibiotic cement spacer

was used if the defect was found to be huge. The operative time ranged from 90 min to 240 min with an average of 140 min.

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