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Management of non union of diaphysis of long bones by dual fixation technique

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Abstract
Background: Failure of fracture union occurs most commonly due to instability at the fracture site. Improving the mechanical stability of fixation is the key to achieve good fracture union. Accurate fracture reduction and absolute stability can be achieved in difficult fracture patterns by using an unique fixation technique. Dual fixation with plates or intra-medullary nailing with augmentation plating can give good union rates when compared to fixation with a single implant. This study is aimed at analysing the functional outcome following dual plating for non union of long bones
Materials and Methods: This Study is a prospective study conducted in Government mohan kumaramangalam medical college hospital, Salem from year 2019 to 2021. A total of 12 patients with fracture non union of long bones diaphysis were included in the study. All the patients underwent dual fixation (either with two plates or interlocking nailing with augmentation plating)
Results: All patients were followed up at regular intervals for a period of two years. The average time for union was 5 months. One patient had infection which was treated with antibiotic bone cement spacer. 2 patients developed postoperative stiffness of the knee joint. Active range of movements improved after a month of Physiotherapy. No other major complications were encountered in this study
Conclusion: Dual fixation technique can provide excellent mechanical stability to the non union site and achieve good union.Out of 12 patients who were treated with dual fixation, we had been able to achieve proper union in almost all cases within average time of 5 months. It can be concluded that dual fixation is an unique and effective technique for the treatment of non union of diaphysis of long bones

Keywords: non-union, diaphysis, dual fixation

Introduction
Failure of fracture union occurs most commonly due to instability at the fracture site. Improving the mechanical stability of fixation is the key to achieve good fracture union. Accurate fracture reduction and absolute stability can be achieved in difficult fracture patterns by using an unique fixation technique. Dual fixation with plates or intra-medullary nailing with augmentation plating can give good union rates when compared to fixation with a single implant**.**

Aims and Objectives
This study is aimed at analysing the functional outcome following dual plating for non union of long bones.The mechanism of non union of long bones is multi-factorial. A successful treatment strategy should be based on the following three main goals (1) achieving mechanical stability (2) augmenting the potential for bone healing (3) correcting any alignment deformity. Dual fixation technique can achieve angular and axial mechanical stability. It can act as a three dimensional fixation construct that can provide sufficient multi-planar stability and is suitable for patients with non union of long bones. The most commonly used plate for augmentation is the broad DCP, with the advantage of having an alternating screw holes in staggered pattern which enables the insertion of the screws in front or behind the nail (inserted obliquely to side step the nail) .The plate provides additional stability when there is excessive motion at the nonunion site. The retained nail acts as a load-sharing device, neutralizing shear forces on the nonunion site and maintaining alignment of the fracture.

Materials and Methods
This Study is a prospective study conducted in Government mohan kumaramangalam medical college hospital, Salem from year 2019 to 2021. A total of 12 patients with fracture non union of long bones diaphysis were included in the study.

Inclusion criteria
- Age > 18 years
- Defects less than 2 cm
- Established cases of non union

Exclusion criteria
- Infected non union
- Pathological non union
- Patients with neurological illness

Surgical procedure
There are 2 techniques-dual plating or interlocking nailing with

augmentation plating.All the patients already underwent a one stage definitive procedure. Pre-operative radiographs and CT scans were done to assess the degree of deformity and bone defect .For patients in whom DUAL PLATING was done, the fracture site was fully exposed and fracture ends were freshened. The deformity was corrected and fixation was done with two locking plates.

Dynamic compression is not required in plate application, since we planned to fill the fracture gap by autologous bone graft. In patients where a NAIL AND PLATE fixation was planned, an intra-medullary nail of appropriate size was inserted after serial reaming of the medullary canal so that it snugly fits in. Once the fracture is reduced and stabilized it is augmented by applying a locking compression plate. Autologous anterior superior iliac crest (cancellous bone) graft is applied between the fracture ends.

Post-operative care

- All patients were allowed to perform non weight bearing exercises immediately to avoid joint stiffness.
- Partial weight bearing with a crutch was permitted after 6 weeks.
- Once the fracture healing was confirmed full weight bearing was allowed.
- Follow up at 1 , 3 & 6 months

Results

All patients were followed up at regular intervals for a period of two years. The average time for union was 5 months. One patient had infection which was treated with antibiotic bone cement spacer. 2 patients developed postoperative stiffness of the knee joint. Active range of movements improved after a month of Physiotherapy. No other major complications were encountered in this study

Case illustrations

Case I: pre op

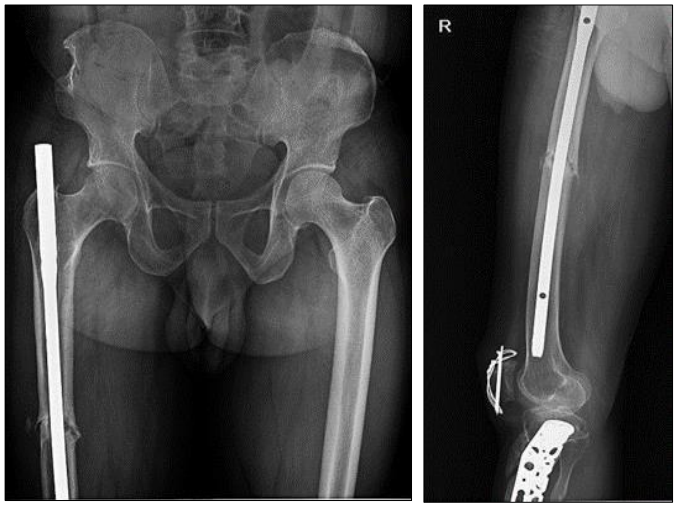

Fig 1

6 months follow up

Fig 2

Case no 2

Pre op

Fig 3

6 months follow up

Fig 4

Discussion

All patients were followed up at regular intervals for a period of two years. The average time for union was 5 months. One patient had infection which was treated with antibiotic bone cement spacer. 2 patients developed postoperative stiffness of the knee joint. Active range of movements improved after a month of Physiotherapy. No other major complications were encountered in this study

Conclusion

Dual fixation technique can provide excellent mechanical stability to the non union site and achieve good union.Out of 12 patients who were treated with dual fixation, we had been able to achieve proper union in almost all cases within average time of 5 months. It can be concluded that dual fixation is an unique and effective technique for the treatment of non union of diaphysis of long bones.

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