

Section **Orthopaedics**

Original Article

Fracture of Distal 3rd of Femur Operated with using Rush-pin (Eiffel Tower Fixation)

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ABSTRACT

Background: The goal of this study is to determine functional outcome of Rush-pin fixation for fracture distal third of femur. **Methods:** 30 Patients of fracture of distal third of femur treated with Rush-pin fixation. Majority of patient belong to 21-40 yr age group (range 8-74 yr.). Out of 30 patient 22 were male and 8 were female. 70% got their injury in road traffic accident. According to Donald classification based on radio-analysis out of 30 patients, 11 were type I, 13 were type II, 6 were type III, 5 were type IV & 5 were type V. All fracture fixed with Rush-Pin, intercondylar fracture fixed with cancellous screw. **Results:** Majority of patients start full weight bearing at 4 to 5 months. Bursa formation at ends of pin formed in one case. Non-union, delayed union were not found. Flexion more than 100° achieved in 76.6% cases. Two patient had restricted knee movement. 56.6% patients had excellent result, 26.6% had satisfactory result & 6.6% were failure. **Conclusions:** Patient having transverse fracture of distal third of femur (Donald type II) had better result with rush pin fixation (Eiffel tower fixation) as compared to comminuted fracture or spiral or fracture with intercondylar extension.


Keywords: Fracture distal third femur : Rush-Pin

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INTRODUCTION

Fracture of distal third of femur constitute 10% of total femoral fractures. Fracture of distal third of femur is difficult to treat because of thin cortex, broad medullary canal, severe soft tissue damage, proximity of these fractures to knee joint, communiton, injury to quadriceps mechanism, this lead to unsatisfactory results in many cases regardless of treatment. In present study all fracture of distal third of femur including intercondylar fractures were treated by internal fixation with rush-pin, in some cases intercondylar facture were fix with cancellous screw. The main objective of management of these fracture with Rush-pin (Eiffel tower fixation) is to provide dynamic intramedullary fixation by 3-point pressure. Fracture stabilization obtained by a cast employing 3-point pressure

follow the dynamic fixation principle. Rush-pin method follow the same principle as a so-called internal cast. A properly placed curved pin a straight bone or a straight pin a curved bone can both give a 3-point fixation. The presupposition for obtaining a successful result of dynamic intramedullary fixation by Rush-pin in a fracture of distal third of femur is that the pin is sufficiently long and curved in such a way which affords a three-point fixation. The medially convex curvature of the flexible pin in medullary canal opposes the femoral adductors which would other-wise displace the fracture into varus, and the fairly solid contact of the pin with the cortical bone at both ends prevent rotation at fracture site.

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As Rush-pin fixation is not absolutely rigid some settling of fracture site with impaction of fracture fragments does occur. We believe that both muscle contraction during early healing and early partial weight bearing allow impaction at fracture site may help the fracture fragment to remain aligned.

AIMS OF STUDY: To study the efficacy and evaluate the results of Rush-pin fixation (Eiffel tower fixation) in the management of fracture of distal third of femur.

METHODS

30 Patients of fracture distal third of femur treated by Rush-pin fixation were included in this study. On the basis of radiological examination patients were divided into DONALD'S type I, II, III, IV, V. Final result were assessed according to the Neer's criteria.

RESULTS

Majority of patients in this study belongs to 21-40 years age group (range 8-74 yr.). Average age 38 year. Out of 30 patients 22 i.e. 73.4% were male and 8 i.e. 26.6% were female. Over all left side was involved little more than right. Majority of patients (70%) got their injury in road traffic accident and other due to slip on floor or fall down. 70% patients had close fracture and 30% patients were open fracture. In road traffic accident cases 72.8% were open fracture. In this series maximum males were injured due to road traffic accident i.e. 77.2% of total male cases. Females were also due to road traffic accident but not as common as males i.e. 50% of total female cases.

In our study, one patient i.e. 3.3% were of Donald type I. 13 patient i.e. 43.3% were of Donald type II.

6 patients i.e. 20% were of Donald type III.
5 patients i.e. 16.6% were of Donald type IV.
5 patients i.e. 16.6% were of Donald type V.

Maximum patient were operated between 4-6 days after trauma i.e. 43.3%. Most of the cases 28 (93.4%) were treated by Rush-pin alone, only 6.6% of cases treated with cancellous screw along with Rush-pin. In only one case (3.3%) superficial infection occurred. 5 patients show complication. Bursa formation at ends of pin in one case, two patient had restricted knee movement. In one case angulation occurred at fracture site. Shortening of 1 cm found in one case. Non-union and delayed union were not found. We start active knee-flexion after 4 weeks, partial weight bearing at 6-8 weeks, range of follow up were 6 month to more than one year. Majority of patient had maximum range of flexion at knee between 6-8 months. Flexion more than 100° was attained in 23 i.e. 76.6% patients, 2 patients i.e. 6.6% attained less than 60° flexion at knee. 11 patients (36.6%) patients had intermittent pain with weather. In our study 56.6% i.e. 17 patients out of 30 had excellent result and 26.6% had satisfactory result and 6.6% (2 cases) were failure. Our result are similar to other studies using Rush-pin. eg - Shatzkar et al, 75% excellent to satisfactory result.

- Donald et al, 84% excellent to satisfactory result.
- Bungaro et al, 80% excellent to satisfactory result.
- In our study, 86% excellent to satisfactory result.

DISCUSSION

Fracture of distal third of femur are difficult to treat because of comminution and poor holding power of osteoporotic bone. As far as management of these fractures is concerned considerable controversy exist, whether conservative or operative management lead to best result. In present study out of 30 patients, 28 patients treated with Rush-pin fixation and 2 patients with RUSH-PIN and cancellous screw.

In our study, post-operative superficial infection occurs in one case (3.3%), majority of patient started full weight bearing between 4-5 months (83.4%), 36.6% patient were having intermittent pain at knee and lower part of thigh. Majority of patients (76.6%) achieved more than 100° flexion at knee, 6.6% patient achieved less than 60° flexion at knee. In one patient bursa formed at lower end of pin. Angulation at fracture site (more than 15°) found in one case. There was no pin migration, delayed union and non-union reported.

Majority of fracture unites between 4-5 months after fixation, average union time was 20 weeks. 56.6% of patient had an excellent result, 26.6% of patient had satisfactory result, 10% of patient had unsatisfactory result and 6.6% of patient had failure result.

CONCLUSION

Patients having transverse fracture of distal third of femur (Donald Type II) had better result with Rush-pin fixation (Eiffel tower fixation) as compared to comminuted/spiral or fracture with intra-articular extension.

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