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A study to observe the functional outcome of surgical management of distal femur fractures using locking compression plate by minimally invasive plate osteosynthesis technique

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Abstract---Background: Fractures of the lower end of the femur are very tough to cure and linked to various consequences. Because of the high frequency of infection, non-union, and malunion, poor fixation, and a scarcity of appropriate equipment, implants, and antibiotics in the early 1960s, operational care of these fractures was avoided to a significant extent. Objective: The present study was undertaken to analyze the outcomes of fractures situated at the lower end of the femur, which is managed with CRIF. Materials and methods: A total of 20 patients were part of the study after obtaining the voluntary, written, informed consent. After collecting the basic demographic data, the clinical data were collected from all the participants. All participants underwent, a general clinical examination followed by a systemic examination. X-ray knee joint with distal femur AP and lateral views, CBC, FBG, LFT, RFT, and ECG were performed on all the participants. Results: Table 1 presents the gender distribution of the participants. The majority of the participants were males. Table 2 presents the age-wise distribution of the participants. The majority of

the participants belonged to the age group of 21-30 years of age. Table 3 presents the type of injury of the patients. The majority of patients got injured by RTA. Table 4 presents the side of the injury. The majority of the patients had right-side injuries. Table 5 presents the type of fractures. The majority of patients had Muller's type A fracture. Table 6 presents the type of plate used in the participants for surgery. 7-9 holed pate was used in the majority of patients. Conclusion: The locking compression plate for the distal femur is a safe and effective tool to manage these difficult fractures as we had no incidence of implant failure and delayed union and non-union and revision surgery except that we had knee stiffness as the commonest complication, so its implant of choice in dealing with osteoporotic distal femur fracture as the majority of patients in our study had osteoporotic bones. Our study was limited to its small sample size and time duration but it brings the important message that fixation in osteoporotic bone in a geriatric population does present great difficulty. A randomized controlled study is necessary to address the issue of whether LISS is superior to traditional implants.

Keywords---Femur, Fracture, Surgery, Implants.

Introduction

Rapid industrialization and the encouraging greater of life have brought both conveniences and catastrophes in recent decades, with road fatalities and the paralysis of many young lives being among the most tragic. Fractures of the lower end of the femur are very tough to cure and linked to various consequences. Because of the high frequency of infection, non-union, and malunion, poor fixation, and a scarcity of appropriate equipment, implants, and antibiotics in the early 1960s, operational care of these fractures was avoided to a significant extent. Following the principles established by Watson Jones^{1,2} and John Charnley, traditional therapy of displaced supracondylar fractures proceeded. This consisted of skeletal traction, fracture treatment, and external immobilization in the form of casts and cast bracings, among other techniques. AO blade plates, dynamic condylar screws, intramedullary supracondylar nails, and other implant systems such as locking compression plates have all shown promising outcomes in recent years, demonstrating the growing popularity of ORIF. Patients above 65 years with significant osteoporosis complicate the situation even more. The loss of stable fixation in osteoporotic bones is a major source of concern in elderly people with osteoporosis. When dealing with such situations, locking compression plates is extremely beneficial due to their multiple advantages. The advantage of using an LCP is that it combines the benefits of normal compression plating with the benefits of locked plating procedures, which improves the osteosynthesis of the plate. Soft tissue difficulties are reduced due to anatomically pre-contoured construction, which also serves as an internal-external fixator. As a bonus, because the screw is tightly secured to the plate, a LCP offers the specific advantages of unicortical fixation and the lowest possibility of plate back out. To analyze the outcomes of fracture lower end of femur treated with CRIF utilizing an LCP, the investigators conducted this investigation. The

present study was undertaken to analyze the outcomes of fractures situated at the lower end of the femur, which is managed with CRIF.

Materials and Methods

Study setting: The present study was conducted at the GEMS & Hospital, Ragolu, Srikakulam from the dept. of orthopedics.

Study design: The present study is a cross-sectional, descriptive, prospective study.

Study duration: 18 months: From September 2020 to February 2022.

Study participants: A total of 20 patients were part of the study after obtaining the voluntary, written, informed consent. The following criteria were used in the recruitment of the participants.

Inclusion criteria: Willing patients of age group above 18 years and AO ASIF classification type A, B1, C1.

Exclusion criteria: Patients with pathological distal femoral fractures other than osteoporosis, and distal femur fractures with a neurovascular deficit were excluded from the study.

Methods: After collecting the basic demographic data, the clinical data were collected from all the participants. All participants underwent, a general clinical examination followed by a systemic examination. X-ray knee joint with distal femur AP and lateral views, CBC, FBG, LFT, RFT, and ECG were performed on all the participants.

Ethical considerations: The present study protocol was approved by the institutional human ethical committee of GEMS& Hospital before conducting the study.

Data analysis: Discrete data are presented as frequency and simple percentages. Results were presented in tabular forms and graphs in pie and bar diagrams. Data analysis was done using Microsoft excel -2019 and SPSS software version 23.0.

Results

Table 1 presents the gender distribution of the participants. The majority of the participants were males. Table 2 presents the age-wise distribution of the participants. The majority of the participants belonged to the age group of 21-30 years of age. Table 3 presents the type of injury of the patients. The majority of patients got injured by RTA. Table 4 presents the side of the injury. The majority of the patients had right-side injuries. Table 5 presents the type of fractures. The majority of patients had Muller's type A fracture. Table 6 presents the type of plate used in the participants for surgery. 7-9 holed pate was used in the majority of patients.

Table-1: Gender distribution of the participants.

GENDER	Number of cases	Percentage
MALE	16	80.0%
FEMALE	4	20.0%
Total	20	100.0%

Table-2: Age wise distribution of the participants.

Age group (years)	Number of cases	Percentage
21-30	6	30.0%
31-40	4	20.0%
41-50	4	20.0%

Table 3: Type of injury in the patients

Mechanism	No of cases	%
RTA	16	80.00%
Fall	3	15.00%
Assault	1	5.00%
Total	20	100.00%

Table 4: Side of the fracture

Side affected	No of cases	%
Right	15	75%
Left	5	25%
Total	20	100%

Table 5: Type of fracture

Supracondylar fracture	No of cases	%
Muller's type A	10	50.0%
B1	6	30.0%
C1	4	20.0%
Total	20	100.0%

Table 6: Type of plate used

Plate size	Number of cases	Percentage
4-6 holed	6	30.0%
7-9 holed	12	60.0%
10-12 holed	2	10.0%
>12 holed	--	--
Total	20	100.0%

Discussion

In our study, 20 patients with distal femur fractures are treated by MIPPO. Distal third femur fractures are seen to be closely interconnected with high-energy injury and osteoporosis (elders). Metaphyseal comminution has proven to be challenging in conventional plate fixation. The locking compression plate (LCP) is fixed-angle construct with combination holes i.e compression as well as locking holes and thus provides the surgeon a chance to use any of them depending on individual fracture morphology. 16 fractures are closed and 4 are open. Among them, two patients required emergency debridement and primary closure. The average age of patients was 45yrs. Many injuries were caused due to RTA. Many fractures were on the right side. LCP decreases blood loss, and provides excellent angular stability. LCP is the implant of choice in elderly patients with severe osteoporotic bone. It is a soft tissue-friendly technique. There is no significant differences in fracture healing and weight-bearing. So, LCP is the best tool for many distal femur fractures. In my study 20 distal femur fractures, 10 belonged to muller type A fractures, 6 belonged to type B1, 4 belonged to type C1. The mean surgery duration was 100 minutes. It was 119 minutes in the study by Deepak et al³ The mean time to radiological fracture union was 15 weeks, which was 14.3 weeks in Schandelmaier's study⁴, It was 12 weeks in Fankhauser⁵ et al's study, and 18 weeks in Deepak et al' study. The study helped to treat 20 patients with distal femur fractures. Outcomes were good for most of the patients. All investigations and surgery were done free of cost to all patients. Part other expenses for traveling during follow-up were reimbursed to all patients. The study results are in accordance with earlier studies.⁶⁻⁷

Limitations: The sample size of the study was small hence; generalizations can't be made.

Conclusion

The locking compression plate for the distal femur is a safe and effective tool to manage these difficult fractures as we had no incidence of implant failure and delayed union and non-union and revision surgery except that we had knee stiffness as the commonest complication, so its implant of choice in dealing with osteoporotic distal femur fracture as the majority of patients in our study had osteoporotic bones. Our study was limited to its small sample size and time duration but it brings the important message that fixation in osteoporotic bone in a geriatric population does present great difficulty. A randomized controlled study is necessary to address the issue of whether LISS is superior to traditional implants.

Conflicts of interest: None declared

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