Original article:

Study of the outcomes of the fixation of distal fibula fractures using locking plate

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Abstract:

Introduction: Fibular fractures, particularly those involving the ankle and the distal shaft, are common. Children and athletes are most likely to have distal fibula fracture. Fibular fractures in adults are typically due to trauma. Isolated fibular fractures comprise the majority of ankle fractures in older women.

Methodology : The study was conducted in Dr.D.Y.Patil Medical College Nerul,Navi Mumbai.A total of 12 patients with distal fibula fracture were included in the study.Inclusion criteria were (1)Male/female patients aged more than 18 years,(2)Closed distal fibula fracture.Exclusion criteria were(1)Open fractures, (2)Polytrauma & (3)Patients medically comorbid or above 75 years of age. All the patients were operated for open reduction & internal fixation with distal fibular locking plate

Results: Total number of patients included in the study were 12.Out of 12, 8 of them were males & 4 of them were females. 6 of them below 60 years sustained injury due to road traffic accident.3 of them below 60 years sustained injury due to fall from stairs.3 of them above 60 years sustained twisting injury of the ankle

Conclusion: Treatment of distal fibula fractures by internal fixation with locking plate was found to be effective by this study in these patients evaluated by Weber's criteria over a period of 1 year of follow up postoperatively.Hence,we recommend usage of distal fibular locking plate in all kinds of fracture of distal fibula.

Background:

Fibular fractures, particularly those involving the ankle and the distal shaft, are common. Children and athletes are most likely to have distal fibula fracture. Fibular fractures in adults are typically due to trauma. Isolated fibular fractures comprise the majority of ankle fractures in older women. Stable undisplaced fractures can be treated with closed reduction and casting. In displaced ankle fractures fixation of fibula is necessary for achieving proper reduction intraoperatively.Fibula fractures that occur predominantly from rotational or tension mechanisms are typically stabilized with one-third tubular plates. Unlike rotational ankle fractures, however, the associated fibular fractures seen with high-energy tibial plafond fractures fail in compression or tension. Manufactured, stiff precontoured anatomical distal fibular plates are particularly advantageous, in that they provide satisfactory stability, while providing a reduction template by virtue of their design. Locking plates act on the principle of angular stability in contrast with other conventional plating techniques[1].

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Similar to external fixators it acts as an internal fixator[1].

Purpose: To Evaluate The Efficacy, Feasibility, Surgical Technique &Functional Outcome For Locking Plate In Distal Fibula Fractures.

Methodology:

The study was conducted in Dr.D.Y.Patil Medical College Nerul,Navi Mumbai.A total of 12 patients with distal fibula fracture were included in the study.Inclusion criteria were (1)Male/female patients aged more than 18 years,(2)Closed distal fibula fracture.Exclusion criteria were(1)Open fractures, (2)Polytrauma & (3)Patients medically comorbid or above 75 years of age. All the patients were operated for open reduction & internal fixation with distal fibular locking plate.

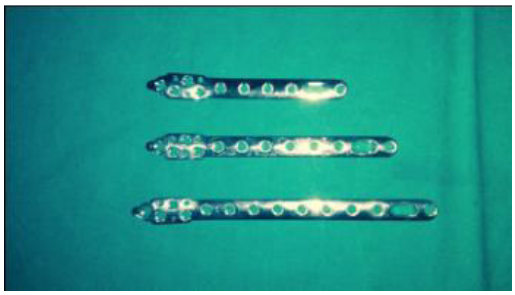

Figure 1

Figure 2

The distal fibular locking plate is a pre-contoured plate designed according to the distal flare of the fibula.It comes in various sizes 4hole,6 hole,8 hole &10 hole(Fig.1) depending on requirement.Distally as well as proximally it is equipped with holes for 3.5 mm locking screws(Fig.2). Patient was admitted in Orthopaedic Ward & thorough pre-anaesthetic work up was done.Patient was posted for surgery. Patient was placed in supine position on the operating table with a sandbag under the buttock of the affected limb.A 10 to 15 cm longitudinal incision centered at the level of fracture is taken along the posterior margin of the fibula all the way to its distal end. The skin flaps were elevated protecting the short saphenous vein &the sural nerve,which lies posterior to lateral malleolus.The periosteum of the subcutaneous surface of fibula is incised & stripped off enough of it to expose the fracture site.Open reduction of the fracture was done.Locking plate was applied & held temporarily fixed with K-wire. Drilling of the holes were done with appropriate drill bits.Locking screws of appropriate length inserted with the help of assessment done by a depth gauge. Fixation construct was checked for stability intra-operatively.Thorough wash was given.Closure done in layers.Sterile dressing done. Patient was immediately started with ankle pumps,static quadriceps exercise post-operatively depending upon pain tolerance.Under proper antibiotic cover,check dress was done on post-operative day 2 followed by suture removal 2 weeks after surgery.Follow-up was done at 4 weeks,8 weeks & 12 weeks after surgery.Patients were mobilized with nil weight bearing walking with a walker until fracture union was evident clinically & radiologically following which patients were made to walk with full weight bearing as well as resume their normal activities of daily living.

Results:

It was a retrospective study.Total number of patients included in the study were 12.Out of 12, 8 of them were males & 4 of them were females. 6 of them below 60 years sustained injury due to road traffic accident.3 of them below 60 years sustained injury due to fall from stairs.3 of them above 60 years sustained twisting injury of the ankle. Post surgery the patients were followed up regularly with detailed clinical evaluation at the interval of 2

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weeks, 6weeks,3 months, 6 months and 1 year. The patients were evaluated as per the rating of the Weber's criteria which included objective criteria, subjective criteria and radiological evaluation. These were graded into good, fair and poor categories. The objective criteria included the movements of the ankle joint and subtalar joint function together which was deemed good when the rating was 0-1, fair when the rating was between 2-4 and poor when it was 5 and above. The subjective criteria involved the rating of pain, walking and return to activity. These were graded as good when the rating was 0-2, fair when it was between 3-6 and poor when it was above 6. The radiological rating was good when it was 0, fair when it was 1-2 and poor when it was 3 and above. The removal of implants was done after the union of the fracture at patient's convenience at an average period of 1 year(Table1).

Criteria	Good	Fair	Poor
Objective	**9**	**2**	**1**
Subjective	**10**	**1**	**1**
Radiological	**11**	**1**	**NA**

Table 1

70 year old male Pre operative X-rays Figure3

70 year old male post operative X-rays fixation with locking plate Figure 4

55 year old female preoperative Xrays

Figure 5

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55 year old female postoperative xrays fixation with locking plate Figure 6

Clinical photo of post-opertive follow-up after 1 year of surgery Figure 7

Clinical photo of post-opertive follow-up after 1 year of surgery Figure 8

47 year old female pre-operative X-rays

Figure 8

Intra-operative image

Figure 9

47 year old female post-operative x-rays fixation with locking plate

Figure 10

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38 year old male pre-operative X-rays

Figure 11

38 year old male post-operative X-rays fixation with locking plate

Figure 12

Discussion

Usage of locking plates for open reduction & internal fixation of fractures has gained popularity since last decade[2].Certain studies strengthen the indications for the use of distal fibula locking plates."Minimally Invasive Plate Osteosynthesis of the Distal Fibula with the Locking Compression Plate'' by Florian Hess et al. concluded that the scope of minimally invasive plate osteosynthesis of the distal fibula as compared to femur or tibia is difficult due to small size of bone.However we have done open reduction & internal fixation with distal fibular locking plate and minimally invasive technique was not used.In certain cases,we have delayed the surgery for 2-3 weeks until skin condition was favorable especially those with extensive soft tissue injury. In another biomechanical study''Comparison of Lateral Locking Plate And Antiglide Plate For Fixation of Distal Fibular Fractures in Osteoporotic Bone:A Biomechanical Study'' by Keith.P.Minihane et al. found antiglide plate to be biomechanically superior to lateral locking plate in experimental bone models in cases of simple oblique distal fibular fracture.In our study,we have included each & every pattern of fracture of distal fibula .As per our findings, age and sex are non-significant confounding variables in the study.By using distal fibular locking plate in our 12 patients we have found it to give stable fixationeven in simple oblique fracture.The advantages of this fixation modalityover non locking plates are (1)The locking plate is anatomically contoured to the distal flare of fibula enabling anatomical reduction of the fracture site. (2)The locking head of the screws snugly fit on the thread on the locking holes leading to less chances of wound dehiscence/breakdown as well as hardware irritability or prominence. (3)It acts as an internal fixator & there are less chances of screw backing out or loosening. (4)There are more holes available to secure fixation of distal fragment. (5)The scope of usage of locking plate can be extended in cases of osteoporotic bone[3].

Conclusion

Treatment of distal fibula fractures by internal fixation with locking plate was found to be effective by this study in these patients evaluated by Weber's criteria over a period of 1 year of follow up postoperatively.Hence,we recommend usage of distal fibular locking plate in all kinds of fracture of distal fibula.

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