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OSTEOPOROTIC DISTAL RADIUS FRACTURE: COMPARATIVE STUDY OF SURGICAL OUTCOME TREATED BY EXTERNAL FIXATOR AND VOLAR PLATING

Orthopaedics

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ABSTRACT

Background and Objective: Distal radius fractures are one of the most common fragility fractures among the osteoporotic population. The management of distal radius fracture has evolved so much from cast providing neutralization to bridging external fixator later by buttress plates. There is still no clear consensus for management of distal radius fractures among osteoporotic age group. A randomized comparative study was undertaken to study functional outcome between closed reduction external fixations over volar lock plating. **Methods:** 40 patients of distal radius fracture belong to the osteoporotic age group admitted in Assam medical college, Dibrugarh were selected. The patients were randomized into two groups one group treated with closed reduction external fixation and other group with open reduction and plating, 20 patients in each group. The patients were followed up for 6 months and functional outcome was assessed using Green and O'brien scoring. **Results:** The study comprised of 16 males and 24 females aged between 50 to 75 years, with mean age of 58 years. The functional outcome score using Green and O'brien scoring on follow up we got 40% excellent results, 40% good results, 15% fair results and 5% poor results with plating and 20% excellent results, 30% good results, 40% fair results and 10% poor results with external fixation. **Conclusion:** Open reduction with volar locking plate provided stable anatomical construct, restoration of anatomy, early mobilization and complications were minimal. External fixation provide stable fixation in par with open reduction and plating but had more complications such as wrist stiffness, pin tract infections.

KEYWORDS

Osteoporotic distal radius fracture; Open reduction and internal fixation; Volar lock plate; Closed reduction and external fixation.

INTRODUCTION

In every emergency department 14% of all extremity fractures are distal radius fractures. The distal radius fractures are having bimodal distribution with younger group sustaining high energy trauma and an older age group with low energy falls.[1] The reduced bone mineral density in the older age group is resulting in fractures with intra articular extension and comminution, treatment of such injuries is difficult. It is also known that extra articular malalignment can lead to decreased grip strength, limited motion and carpal instability. With better understanding of various fracture types by classification such as Frykman and AO were developed. The fracture union no longer remains the only goal, as early functional recovery as well as resultant full and painless motion of the wrist, take over as the prime goal of treatment.[2]

There are only few clinical trials comparing treatment regime of closed reduction external fixation and open reduction and plating of distal radius fracture among osteoporotic age group. The results of currently published studies are difficult to compare and are retrospective in nature.

The distal end of radius fracture among osteoporotic age group continue to poses a therapeutic challenge, the purpose of this study was to evaluate the surgical outcome through comparison between both the methods, external fixation and open reduction and internal fixation with plating.

AIMS AND OBJECTIVE

1. To evaluate the surgical management using external fixator and plating in the functional outcome.
2. To compare the results between the external fixation and plating in terms of anatomical reduction of fracture, union of fracture and functional recovery.

MATERIALS AND METHODS

Study Population

Study includes 40 patients belong to osteoporotic age group admitted in orthopaedics ward of Assam Medical college and Hospital, Dibrugarh.

Method Of Data Collection

Prospective follow up has been done for those 40 patients treated in the department of orthopaedics, Assam Medical College and Hospital, Dibrugarh for a period of 6 months from the day of surgical intervention.

Inclusion Criteria

1. All patients having distal end of radius fracture with in the osteoporotic age group (>50 years).

Exclusion Criteria

1. Distal radius fracture associated with carpal or metacarpal fractures.
2. Open fractures.
3. Pathological fractures.
4. Distal radius fractures associated with neurovascular deficit.

Immediate Management

After detailed and systematic history and clinical examination the involved forearm was immobilized with below elbow slab and kept elevated. Pain and inflammation were managed using analgesics.

Preoperative Planning

All preoperative blood investigations, chest x-ray and ECG have been done. Consent for surgery was taken and patients were operated after preanesthetic checkup.

Radiographic Evaluation

Standard AP and lateral views were taken to confirm the diagnosis and also to classify the fracture according to the Frykman's classification.

Surgical Procedure

All the cases were operated within 10 days of trauma. Anaesthesia: regional (Axillary block) or general. Position and Tourniquet: Patient was positioned in supine, affected limb on the side table, affected limb elevated for 2-3 minutes and exsanguinated. Then a mid-arm pneumatic tourniquet was applied. Forearm and hand were thoroughly scrubbed, painted and draped.

Closed reduction and external fixation implants

The static external fixation unit consists of

1. 3mm K wires 2 in number for radius
2. 2mm K wires 2 in number for 2nd metacarpal
3. Connecting clamp 4 in number
4. 4mm Connecting rod
5. K wires of varying size

Post-operative Care and Rehabilitation

Post-operative pain and inflammation were managed using anti-inflammatory drugs and analgesics. Affected limb was kept elevated and asked to perform active finger movements, elbow and shoulder movements from day one. Immediate post-operative x-rays were taken to confirm reduction of fracture in AP and lateral views. The patients treated with external fixator, the pin sites were cleaned with povidone

iodine on alternate days. The patients were discharged with in one week and followed up for pain, swelling, pin tract infection, pin loosening and stiffness in fingers, elbow or shoulder.

On follow up at 6th week, the fracture union was assessed clinically by absence of tenderness and radiologically by bridging callus formation. Then the external fixator and K wire if any were removed under local anaesthesia in minor operation theatre. The patients were advised not to lift weights for further 4-6 weeks.

For patients treated with ORIF, after surgery the operated limb was supported depending on stability of fixation. If distal locking screw purchases were less, these cases were supported with below elbow slab till stitch removal. The stitches were removed on day 10 and advised not to lift heavy weights. The patients were followed on 6week, 12 weeks and then at 24 weeks.

RESULTS

The study is a randomized prospective study which was conducted at Assam Medical College, Dibrugarh and included 40 patients of distal radius fracture in osteoporotic age group, who met the pre-set criteria and gave an informed consent between the time periods June 2021 to December 2022. The following observations were made and available data is analyzed as follows.

Table 1: Age Distribution

Age in Years	External Fixator	Orif + Plating
51-60 years	9	12
61-70 years	8	6
71-80 years	3	2
Total	20	20

Table 2: Functional Outcome

Results	External Fixator	Orif + Plating
Excellent	4	8
Good	6	8
Fair	8	3
Poor	2	1
Total	20	20

Table 3: Type of Fracture

Frykmans	External Fixator	Orif + Plating
Type 1	0	0
Type 2	2	0
Type 3	6	3
Type 4	5	6
Type 5	4	8
Type 6	3	2
Type 7	0	1
Type 8	0	0
Total	20	20

DISCUSSION

The surgical fixation of distal radius fracture among these old age population enables them to carry out their daily activities earlier and independently. However, comminuted and displaced intra-articular distal radius fractures making anatomic reduction and stable fixation difficult and often leads to poor functional outcomes. Closed or limited open reduction with percutaneous pinning and external fixation, which has been traditionally been used in unstable intra-articular fractures, does not always lead to anatomic reductions and can result in residual instability with secondary displacement. Volar plates have shown low complication rates and high stability in osteoporotic bones. This study assesses the functional outcome of operative management of distal radius fractures among osteoporotic age group, using external fixator and open reduction with volar lock plates. Our results are compared with results obtained from various studies.

Age and Gender Distribution

The distal radius fracture is one of the commonest sites for osteoporotic fragility fractures seen commonly after 50 year males and postmenopausal women. The average age in the study was 58 years. Out of 40 patients 24 were women and 16 were males.

Type of Fracture

Based on Frykman's classification we had 50% cases in type 3 and 4, 42.5% in type 5 and 6, 5% in type 1 and 2, 0.5% in type 7 and 8. The other studies have included specifically only two categories.

Type of Fixation

In our study we had 50% patients treated with both ORIF and external fixator methods. The study conducted by Kapoor[4], had equal distribution of patients treated with closed reduction and immobilization with cast, ORIF with plating and external fixator. The studies undertaken by Jupiter et al[3] and Roh et al[5] had underwent more of ORIF with volar lock plates. Although there were no significant differences in grip strength, motion or functional scores between volar plating and external fixator at 12 months, the volar plates shown superior short term results of functional recovery. The volar plating also shown decreased incidence of complications compared with external fixation. The patients with distal radius fracture have high incidence of underlying osteoporosis, associated fracture severity and higher incidence of early instability.

Table 4: Related Studies

Studies	Min age in yrs	Max age in yrs	Avg age in yrs
Jesse B. Jupiter et al	16	76	42
Harish Kapoor et al	30	51	39
Roh et al	50	70	55
Our study	50	76	58

Fig 1: Pre and Post-Operative Images

CONCLUSION

After analyzing the observations and results from the study of distal radius fracture in osteoporotic age group managed by external fixator and open reduction and internal fixation with volar locking plates we conclude following;

- Distal radius fracture is common among osteoporotic age group with female predominance and most common mechanism of injury was slip and falls.
- Open reduction and fixation with volar locking plate created stable anatomical construct, restoration of anatomy, early mobilization, complications were minimal.
- External fixation provide stable fixation in par with open reduction and plating but had more complications such as pin tract infections, reduced grip strength and wrist stiffness.

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