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Different Modalities of Distal End Radius Fracture Treatment

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ABSTRACT
Distal radius fractures are the most common long bone fracture. These were randomly treated by different methods. This retrospective study was conducted in the department of orthopaedic surgery in Mahatma Gandhi Memorial Hospital,Warangal, Telangana state, India. Over a period of 4 years data of all the patients with fracture of distal end radius who were admitted were recorded from case files, casuality admission register and operative records. A total of 412 patients were included in our study and mode of treatment was compared among the various available treatment modality such as cast/slab; percutation fixation with k-wire, external fixation & plate osteosynthesis. Out of the total number of cases (n=412) for fracture distal end radius, nearly 12% case were managed with cast , 22% with percutaneous fixation with k-wire , 24% with external fixature, 19% with both external fixator and k-wire and 23% with plate osteosynthesis. This study concludes that incidence of distal end radius fracture plating had increased over a span of time and plating was increased over a period of time as compared to cast, percutaneous k -wire fixation and external fixator.
Keywords: *Distal radius, Fixation, Fracture, osteosynthesis.*

INTRODUCTION

Distal radius fractures are the most common fractures of the upper extremity and constitutes of nearly one sixth of all fractures treated in emergency [1] and are the commonest bony injury around the wrist. The distal end of the radius is being exposed to increasingly severe trauma in younger patients. The carpus is drawn into the distal end of the radius like a die punch resulting in comminution of its articular surface. The reports of treatment methods and results are different. Treatment of such injuries is often difficult and demanding, particularly when the fracture is severely comminuted or displaced. Varying patterns of intra-articular radius fractures are common in adults. They are commonly referred to as Colle's, Barton's or Smith's, depending upon the pattern of involvement of the distal radio ulnar and radio carpal joint surface and the displacement.

The fracture of distal end radius can be treated conservatively using a plaster cast or by other

methods such as external fixation, percutaneous fixation with K-wires or plates osteosynthesis or combination all above. Treatment is based on fracture type, patient's demand and characteristics, financial status and on treating surgeon's experience and preference.

Treatment of distal end radius fracture is still controversial despite continue refinement in the treatment. There are no customised solutions for all the fracture of distal end radius. Keeping this in view the present study was conducted with an aim to compare the changing trends in different modality of treatment of distal end radius over the time for four years.

MATERIALS &METHODS

This study consist of all the patients admitted to Mahatma Ghandi memorial Hospital, Warangal, Telangana state, India for treatment of fracture of distal end radius with or without ulna bone fracture. The retrospective study was conducted over a period of about 4 years and detailed analysis of different modality of treatment of distal end radius was conducted at our centre. Data of all the patients of distal end radius fracture were extracted from case records, casuality admission register and operation records. All the data were then analysed with reference to various modality of distal end radius fracture treatment ie, conservatively managed by cast/slab; per-cutation fixation with k-wire, external fixation, locking compression plate.

RESULTS

Distal radius fractures are the most common long bone fracture.we assessed the modality of treatment of distal end radius year wise from 2012 to 2015.Out of the total number of cases (n=412) for fracture distal end radius, 50(12%) cases were managed with cast, 91(22%)with percutaneous fixation with k-wire, 98 with external fixature , 78 with both external fixator and k-wire and 95with plate osteosynthesis(Table 1,Fig 1). The incidence of radius fractures was increased year by year. Treatment by cast was decreased and others treatment modalities were increased. There was steep increase in plate osteosynthesis treatment over a span of period in this study (Fig 2).

Table-1: Yearly pattern of modality of management ofradius fractures by different methods

Year	Cast	K-wire	Ex-fix	Ex-fix + k-wire	Plating	No of cases
2012	18	16	17	19	10	80
2013	10	19	22	16	19	86
2014	12	24	28	17	28	109
2015	10	32	31	26	38	137
Total no.	50	91	98	78	95	412

Fig 1: Different treatment modalities

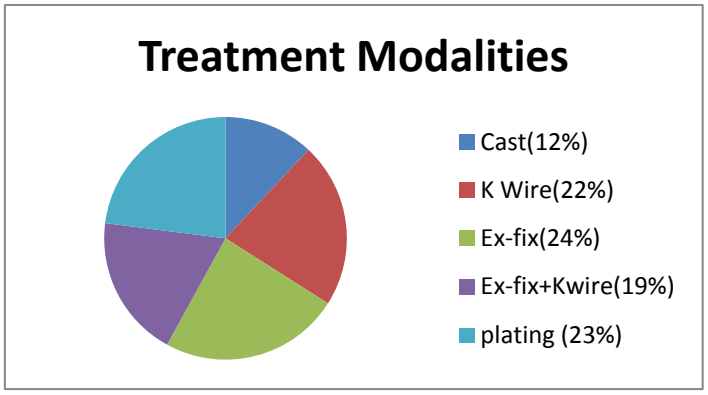
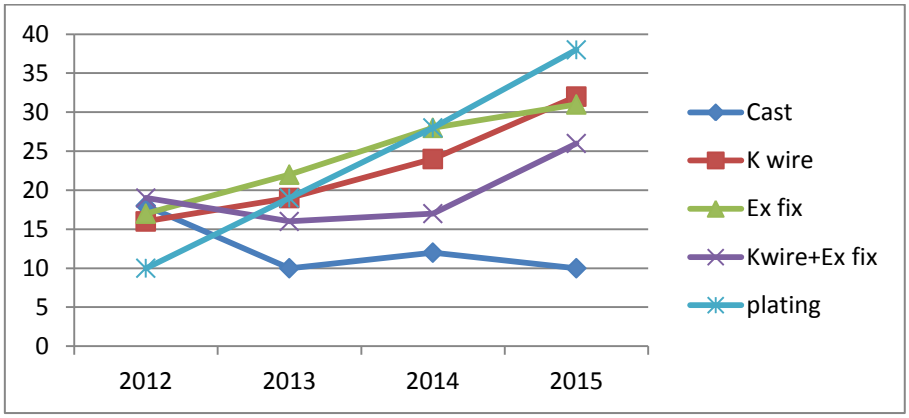


Fig.2: Change in the pattern of modalities from 2012-2015



DISCUSSION

Fractures of distal end radius represent approximately 16 % of all fractures treated by orthopaedic surgeons [2]. It is a common injury of upper extremity. Fractures of distal radius usually occur as a result of high energy trauma in younger individual with good bone density and are associated with substantial articular and periarticular tissue injury. Besides, these fractures are also reported in elderly osteoporotic patients [3] and primarily extra articular injuries of elderly females.The goal of distal radius fracture treatment is to achieve healing at the fracture site while preserving the anatomical alignment of the bone and restoring normal wrist range of motion.If these fractures are not assessed properly and not treated on time, angulation, shortening and articular incongruity may lead to permanent deformity and loss of function. Degree of disability latter correlates with degree of residual deformity. Management of this fracture has undergone extraordinary evolution over the preceding few years [4].

Treatment for the fracture of distal radius varies from most common traditional method of close reduction and immobilization in a plaster cast to other invasive procedures such as External Fixation/ distractor and Percutaneous Fixation with K-wires and relatively more complex operative maneuvers with Locking Compression Plate.

Radius fractures are often treated non-operatively with the use of rigid immobilization. Non-operative management often includes the acceptance of some degree of displacement and emphasis is placed on function. This remains the accepted treatment method for 75% to 80% of distal radius fractures that are minimally displaced and judged inherently stable [5]. Well fitted cast with three point fixation is must for adequate immobilisation. Although cast application can avoid surgery and other complication related to it, it is been associated with inadequate fixation and loosening of the reduction [6,7]. It cannot maintain the distraction to correct length or control the rotation of distal fragment in case of communication. Previous studies have observed a high incidence of displacement deformity in plaster cast treatment [8].

Percutaneous pinning, external skeletal fixation, or open reduction and internal fixation (ORIF) may be necessary for comminuted or unstable fractures [9,10].

External fixation was considered as one of the better treatment option. Better restoration of normal wrist anatomy can be achieved by external fixation in case of severely comminuted fracture [11]. External Fixator was found to maintain the radial length best due to the sustained counter-traction utilising the principle of ligament taxis. Cooney et al. [12] had stressed the importance of anatomical correction and chose various methods of external fixation to achieve it. Kongsholm and Olerud [13] who in their comparative study between plaster cases and fixator found high loss of range of motion with the use of a cast.

Pronation and supination was best restored with the use of an external fixator. Hence a better range

of motion is observed with the fixator. The better grip strength in the wrist treated by external fixation is probably due to a combination of decreased pain and better joint and muscle mechanics [13]. Aro and Koivenum [14] in a study on axial shortening of radius had reported similar findings and suggested that external fixation should always be considered if there are any signs of persistent axial shortening.

The procedure of external fixation is often accompanied with percutaneous fixation with K-wires to maintain the reduction of articular fragments. However, these are frequently associated with pin-track infections, loss of reduction, complex regional pain syndrome and stiffness of joints [15].

Open reduction and plate fixation as a treatment for fracture distal end radius has gained popularity over the years. This surgical technique involves either a volar or a dorsal incision. A combined volar and dorsal approach has also been used in the treatment of fracture distal radius depending on the extent of displacement and comminution of fracture [2]. In cases of fracture of distal radius, open reduction and internal fixation with volar T-plate radius locking and unlocking in adults is shown to restore articular congruity and restore excellent wrist function [1] Open reduction and plate fixation is often considered as the treatment of choice for fracture of distal radius especially in mild comminuted fractures and intra-articular involvement.Open reduction and internal fixation is often required in comminuted, displaced intra-articular fractures of the distal radius when closed manipulation has failed to restore articular congruity. Postoperative fracture alignment, articular congruity, and radial length were significantly improved following surgery [16]. Surgical fixation is considered when radial shortening exceeds 3 mm, dorsal tilt is greater than 10°, or intra-articular displacement or step off is more than 2 mm [10]. Open reduction and internal fixation using volar locking plate fixation has become a widely accepted method for treatment of these types of displaced fractures due to the stability of fixation, ease of rehabilitation, and ability to treat comminuted bone However, complications due to volar plating include tendon injury, pain, neurovascular damage, and hardware failure [10]. ORIF provided the best anatomical restoration with patients least likely to develop arthritis.

In retrospective comparative study, found no differences between External Fixator and Open Reduction and Internal Fixation outcomes. However, there were significantly higher rates of postoperative neuritis, infections, pins loosening and hardware failure in the External Fixator group [17].

Despite having pros and cons of each treatment as per the study conducted incidence of distal end radius fracture plating has increased over a span of time. General common population who usually prefer conservative mode of treatment with cast & other cheaper treatment modality.Modality of treatment has shifted from conservative to surgical management and especially plate osteosynthesis. There may be multiple reasons behind increase incidence of surgery of distal end radius with plate osteosynthesis is mainly due to patient awareness and most them want anatomical fracture reduction, early mobilisation, and rehabilitation and final important issue, affordability of patient.

CONCLUSION

This study concludes that incidence of distal end radius fracture plating had increased over a span of time. Modality of treatment had shifted from conservative to surgical management and especially plate osteosynthesis.

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