



ORIGINAL RESEARCH PAPER

Orthopaedics

EXTRA ARTICULAR FRACTURE OF DISTAL END RADIUS MANAGED BY MULTIPLE INTRAMEDULLARY ANTEGRADE K WIRE

KEY WORDS:

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ABSTRACT

Purpose -Distal end radius comprise of 17% fracture in adults. No other fracture has a greater potential to devastate hand function.The causes of injury are fall on outstretched hand, work related accidents, car accidents, sport injuries. Extraarticular fracture of distal end radius can be managed by multiple intramedullary antegrade k wire. In our experience, multiple intramedullary antegrade K-wire will provide a better purchase in the distal fragment. Severely comminuted intra-articular fractures and Barton's fracture were not included in this study.

Methods-Total 30 cases were included in the study. the cases were treated by multiple intramedullary antegrade k wire and all cases were given below elbow pop slab after for 3 weeks.Patients fracture healing was checked radiologically at 10 day , 21 day and 45 day postoperatively. Patients were reviewed for removal of wire on 45 days. Anatomical and functional outcomes were then evaluated in all the patients.

Results- This study achieved excellent results in 24 patients ,good in 4 patients,fair in 1 patients,poor in 1 patients evaluated as per the criteria suggested by Green and Obrein score (cooney's modification). in this study , 8 pts had wrist pain and stiffness and 6 pts had finger stiffness as their post operative complication. pain and stiffness in wrist and finger stiffness significantly improved after physiotherapy. Our case series attributes to 93% of excellent to good results and 4% of fair 3%of poor results.

Conclusion-1.Treatment of comminuted fractures of the distal end of the radius by with intermedullary antegrade Kirschner wires is an effective method of maintaining reduction
 2.This is simple for fracture xation with preservation of fracture haematoma.
 3.Shorter period of surgery with minimal exposure .
 4. Minimum invasive surgery with minimum expertise.

INTRODUCTION

Distal radius fractures represents most common fractures of all fractures¹. There is an increase in incidence of fracture of distal radius in postmenopausal females which has been linked to estrogen withdrawal. Distal radius fractures in the elderly may represent an insufficiency fracture associated with all of the risk factors for osteoporosis². Distal radius fractures were historically thought of as dislocations of the wrist, from Hippocrates' time until the 18th century, when Petit first posed the possibility that they may be fractures³. A thorough understanding of the pathophysiology and treatment of distal end radius is important as high energy trauma to distal end radius in adults is becoming more common and long term functional results are unclear, these common injuries. The causes of injury are fall on outstretched hand, work related accidents, car accidents, sport injuries. Although for the treatment of unstable distal radial fractures, pin and plaster,^{4,5} percutaneous pinning,⁶⁻⁹ Kapandji pinning,⁹ plating,^{10,11} and external fixation are usually performed to stabilize the fracture,¹²⁻¹³ it is thought that internal fixation, which provides fracture stability and allows early postoperative rehabilitation, is not an ideal surgical treatment because it causes soft-tissue injuries. Because there is no single surgical treatment that is useful for all types of distal radial fractures, hand surgeons choose the surgical treatments according to the age, gender, and occupation of the patient; type of fracture; and surgeon's preference. Sato et al.¹⁴ introduced a technique of fixation for the unstable extra-articular distal radial fractures by manual reduction and antegrade intra-medullary pinning. They found this procedure beneficial in controlling the distal radial angulation with less soft tissue complications. The current

prospective study was conducted to evaluate the clinical and radiological outcomes of management of unstable distal radial fractures in adults by closed manipulation and antegrade intra-medullary K-wire fixation after some modifications to the original technique.

MATERIALS AND METHOD

All patients were briefed about the technique and its possible complications, and an informed consent was obtained to participate in the study A total number of 30 cases of complex extraarticular distal end radius fracture were treated by multiple intermedullary antegrade k wire and all cases were given below elbow pop slab after for 3 weeks.Patients fracture healing was checked radiologically at 10 day ,21 day and 45 day postoperatively. Patients were reviewed for removal of wire on 45 days. Anatomical and functional outcomes were then evaluated in all the patients treated by multiple antegrade k wire . Appropriate test of singnificance applied for data analysis.

INCLUSION CRITERIA

1. Patient who gave consent for this procedure.
2. Extra articular fractures
3. AO classification a

EXCLUSION CRITERIA

- 1) Fracture of the scaphoid or scapho-lunate dissociation of the same wrist
- 2) Pre existing inflammatory or degenerative arthritis of the injured wrist, ipsilateral elbow, or shoulder (which would affect the functional outcome).
- 3) Pathological fracture

OPERATIVE PROCEDURE

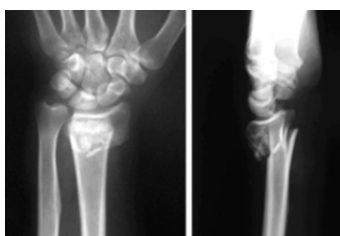
The patient is positioned supine on the operating room table. Anesthesia can be either regional or general. Complete muscle relaxation of the patient is achieved. Dose of prophylactic antibiotic. A preliminary reduction done to align the grossly displaced fracture fragments. , a 3-cm longitudinal skin incision was made on the dorsoradial aspect of the mid-radius about 10–12 cm proximal to the radial styloid. The interval between the extensor carpi radialis brevis muscle and the extensor digitorum communis muscle proximal to the abductor pollicis longus muscle was developed. Then, the cortex of the radius dorsal to the pronator muscle insertion was exposed. One slanting hole was made with a 3.5-mm drill bit in large-size bones, provided that the diameter of the drill hole is less than half the width of bone at the level of drilling. In patients with small-size bones, two drill holes at two different levels were made with 2-mm drill bit to avoid the stress riser effect. At first, the drill bit was directed perpendicular to the bone and then obliquely at an angle of 45°–60° with care to avoid penetration of the far cortex. A drill sleeve was used to protect the soft tissues. Through these holes, two 1.5-mm K-wires were inserted manually into the medullary canal over a T-handled drill chuck. The tip and body of the K-wires were slightly prebent by pliers. During insertion, the prebent wires formed a smooth curve in the medullary canal. At first, the tips of the wires were directed radially and once reached the fracture site; the distal fragment was manipulated while traction was applied in the axis of the second and third digits and counter-traction on the upper arm. The quality of the reduction was then checked with fluoroscopy in anteroposterior and lateral projections by rotating the C-arm around the wrist while the patient's hand was held steadily. In three patients, there was a non-displaced or minimally displaced intra-articular fracture, and a transverse K-wire was used for fixation. One intramedullary K-wire was rotated 180° and pushed towards the ulnar side of the distal fragment, and the other wire was directed to the radial styloid. K-wires were advanced till rested against the subchondral bone. The proximal ends of the K-wires were bent and buried in the subcutaneous tissues. it is then maintained by A/E pop slab for 21 days ,after which the slab is removed and wrist mobilization is started , K wires are removed after 45 days under aseptic precaution on OT table.

Green And O'brien Score (cooney's Modification)¹⁵

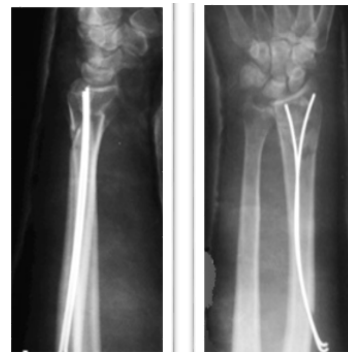
Table 1: Clinical scoring system of Green and O'Brien (1978) modified by Cooney et al. (1980) score

Score	Findings
Pain	
25	None
20	Mild, occasional
15	Moderate, tolerable
0	Severe or intolerable
Functional status	
25	Returned to regular employment
20	Restricted employment
15	Able to work but unemployed
0	Unable to work because of pain
Range of motion	
25	Full
15	75-99% of normal
10	50-74% of normal
5	25-49% of normal
0	Less than 25% of normal
Grip strength	
25	120° or more
15	91-119°
10	61-90°
5	31-60°
0	30° or less
Or evaluating dorsiflexion-palmar flexion arc of injured hand	
25	75-99% of normal
15	50-74% of normal
10	25-49% of normal
5	0-24% of normal
0	
Final result	
90-100	Excellent
80-89	Good
65-79	Fair
≤65	Poor

X- RAYS



PRE OP



POST OP

RESULT

All fractures were classified according to AO classification. Baseline demographics and injury characteristics were recorded. In this study of 30 patients, all sustained type a fracture. In the present study, 30 cases were followed up for average of 10 months. 53% i.e. 16 were male and 47 % i.e 14 were females. The right wrist was involved in 66% i.e. 20 of our cases and left 10 33% of our cases. The dominant hand in 16 ie 53% of cases. The patients in young working age group 20-40yrs were 20 cases representing 66% of our cases. The number of cases in complex extraarticular fractures i.e. Type23 b 63.33% of our cases and 27 % of type 23c . Number of cases due to road traffic accident constituted 60% and fall on outstretched hand constituted 40% .

This study achieved excellent results in 24 patients, good in 4 patients, fair in 1 patients, poor in 1 patients evaluated as per the criteria suggested by Green and O'Brien Score (Cooney modification). In this study, 8 pt had wrist pain and stiffness and 6 pt had finger stiffness as their post operative complication. Pain and stiffness in wrist and finger stiffness significantly improved after physiotherapy. Only one patient developed skin infection and no case of non union and implant breakage.

Our case series attributes to 93% of excellent to good results and 4% of fair and 3% poor results. Thus, it suggests that multiple intermedullary antegrade k wire fixation plays a good role in anatomic restoration in stable extraarticular fractures though surgically demanding procedure.

DISCUSSION

The injuries to the lower end of radius are not only encountered in the emergency department setting, but the mobility and delicate functional requirements of the hand make accurate diagnosis and treatment crucial to avoiding long-term loss of function and disability.¹⁶

Number of studies have proved that there is a strong relationship between the quality of anatomical reconstruction and long term functional outcome¹⁷⁻²³ The most common traditional method is closed reduction and cast immobilization, but this often fails to prevent early radial collapse and is associated with a high risk of malunion, joint stiffness and painful wrist. Hence, this method is for low-demand elderly patients²⁴. External fixators can maintain radial length and radial inclination by ligamentotaxis, but cannot effectively maintain palmar tilt. Also complication rates as high as 60% have been reported with the use of external fixators. These mainly include pin loosening, pin tract infection, reflex sympathetic dystrophy, radial sensory neuritis and delayed union²⁵. In this study we performed antegrade intramedullary nailing with K-wires for the treatment of distal radial fractures to stabilize the fractures and reduce complications. This suggests that the antegrade intramedullary nailing of K-wires is not effective for maintenance of radial length whereas maintenance of volar tilt is as good as other surgical procedures.¹⁴ The nerve

injuries are rare since In our procedure pins are located on the dorsal cortex of the radial diaphysis between the extensor carpi radialis brevis and the extensor digitorum communis muscles where sensory and motor branches of the radial nerve are absent. The site of our pin placement is consistent with that described by Melone. Melone²⁶ described the site of pin placement for the radius to be “just proximal to the abductor pollicis longus muscle in the interval between the wrist and finger extensors.” and skin irritation is not observed frequently as k wires are buried deep inside.

CONCLUSION

1. Treatment of comminuted fractures of the distal end of the radius by Intermedullary antegrade Kirschner wires is an effective method of maintaining reduction
2. This is simple for fracture fixation with preservation of fracture haematoma.
3. Shorter period of surgery with minimal exposure.
4. Minimum invasive surgery with expertise.

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