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POSTOPERATIVE WRIST MOVEMENTS IN PERCUTANEOUS FIXATION BY K-WIRE OF COLLES' FRACTURE.

1. **M. PERVAIZ ANJUM**
MS
2. **FAISAL NAZEER HUSSAIN**
MS
3. **AHMAD ALI**
MS
4. **IRFAN MEHBOOB**
FCPS

1. ***Associate Prof***
Department of Orthopaedic
DOW UNIVERSITY OF HEALTH SCIENCES, KARACHI
2. ***Associate Prof***
Department of Orthopaedic
GANGA RAM HOSPITAL LAHORE
3. ***Orthopaedic Surgeon***
DOW UNIVERSITY OF HEALTH SCIENCES, KARACHI
4. ***Professor***
GANGA RAM HOSPITAL LAHORE

Mailing Address:
DR M PARWEZ ANJUM
Associate Prof (orth)
DUHS
B-156 BLOCK –H
NORTH NAZIMABAD
KARACHI
0334-3264286

ABSTRACT

INTRODUCTION: *Three hundred patients of Colles' fracture were treated at two different teaching hospitals of Pakistan from 2005-2008, by closed reduction and per cutaneous K wire fixation. The movements of wrist joint were noted post operatively along with many other parameters.*
METHODS : *During the period from July 2005-September 2008, 300 patients of Colles' fracture were operated by closed reduction and percutaneous K Wire fixation. These patients were followed prospectively with use of the modified hospital score for wrist surgery score and a patient administered questionnaire. Radiographic evaluation was performed according to previously established criteria.*
RESULT : *The post operative movements of wrist Joint at the time of follow up ranged from 65 to 80 degrees both in flexion and extension, with two hundred and Forty excellent, 50 good, 10 fair and no poor results.*
The radial height was maintained in two hundred and thirty cases and was five mm less than normal in 60 cases and more than one cm collapsed in ten cases. The range of movements of flexion and extension was 80° in two hundred and forty cases, 70 in fifty cases and 65°in ten cases. Radiographically there were two hundred seventy good, thirty fair and no poor results.
CONCLUSIONS : *With closed reduction and percutaneous K Wire fixation excellent movements are achieved with no stiffness of wrist and fingers.*

KEY WORDS: Colle's Fracture, percutaneous K-wire, C-Arm, Wrist movement

INTRODUCTION

Fracture of the distal radius have been discussed in surgical literature for over 200 years. Initial description of the fracture mechanism and treatment was described prior to the advent of radiography. The history of the fracture of distal radius is unusual in that the injury was only recognized as a fracture during the eighteenth century.[1]
The first surgeon who recognized that these injuries were fractures at the distal end of radius with dorsal displacement was Pouteau. His work was not widely publicized.
Sir Abraham Colles' who was working in Ireland, unaware of pouteau's work, published his article in Edinburgh Medical and Surgery Journal mentioning "The injury to which I wish to direct the attention of surgeons, has not, as far as I know, bee described by any author; indeed the form of the carpal extremity of the radius would rather incline us to question its being liable to fracture.
In 1814, long before radiography was Available, Abraham Colles report from Dublin on a fracture of lower end of the radius with dorsoradial angulation and dorsal displacement, the typical "dinner fork" deformity is readily recognized clinically. As Colles wrote. "…. a depression is seen in the forearm about an inch and half above the distal end of radius, while a considerable swelling occupies the wrist and metacarpus appear to be thrown backwards as much as on first view to excite a suspicion that the carpus has been dislocated backward. [1,2]
The basic principles in management of such fractures are anatomical reduction and effective immobilization and vary from wooden splint, pin and plaster, external fixation, percutaneous Kirschner wire fixation, early open reduction, bone grafting and bone graft substitute, bone cementing, to percutaneous k wire fixation and limited open fixation. [2,3]
Distal radius fractures are common injuries usually sustained either by elderly patients

as a result of a fall, or younger patients, as a result of trauma. Particularly at risk are middle aged and elderly women who suffer from bone weakening diseases like osteoporosis. Complaints of patients with Colles' fracture include pain and swelling just above the wrist, and inability to hold or lift objects of any significant weight. The wrist may be pushed back over the broken bone resulting in a "dinner forked" appearance of the hand.[3]

MATERIAL AND METHODS

A total no of 300 patients were included in this study from two different hospitals Lyari General Hospital Karachi and Ganga Ram Hospital Lahore .

All procedures were done in the operation theater under aseptic technique. Under General Anaesthesia the reduction was accomplished by using handshake technique to distract the fracture while counter-traction was applied proximal to the elbow by the assistant. The surgeon's contra lateral thumb was used to restore the normal volar tilt once reduction of the fracture was adequately achieved. Gravity was used to maintain the reduction while supporting the proximal part of forearm and allowing the hand to hang free.

Once the length, the dorsal and radial angles and the joint surface of the radius were restored, reduction was checked under image intensifier, on satisfactory reduction, fracture was fixed by two smooth Kirschner wires of 1.5mm diameter, inserted percutaneously with a power drill. The first Kirschner wire was inserted at the tip of the radial styloid process just dorsal to the first extensor canal, in the anatomical snuffbox proximal to the radial artery, aiming to cross the fracture line in both planes. It required about 45-degree angle with the long axis of the antro posterior view and making angle of 10-degree with dorsal surface on lateral view. The second Kirschner wire was inserted parallel to the first Kirschner wire. Both Kirschner wires were advanced to just penetrate the opposite cortex of proximal fragment under image intensifier. Both Kirschner wires were bent and cut. K-wire were not buried under the skin so that they could be easily removed. Sterile dressing was done. Plaster of Paris back slab was applied after padding with cotton from the level of the metacarpophalageal joints to the proximal part of the forearm. Immediate after operation check X-Rays were done to document the accuracy of reduction. All patients were kept under observation for pain, swelling of the hand and recovery from anaesthesia for 24 hours. Forearm was elevated in green sheet with I/V stand.

TABLE 1

MODIFIED CLINICAL SCORING SYSTEM OF GREEN'O BRIEN

Category	Score (Points)	Findings
Pain	25	None
	20	Mild occasional
	0	Severe intolerable

TABLE 2

Range of motion (25points)	% of normal side
25	100%
15	75-99%
10	50-74%
05	25-49%
0	0-24%

TABLE 3

Functional status		
	25	return to regular employment
	15	Restricted employment
	15	Able to work but unemployed.
	0	Unable to work due to pain

TABLE 4

Grip strength (25 Points)		
		%age of normal
	25	100%
	15	75-99%
	10	50-74%
	05	25-49%
	0	0-24%

TABLE 5

Final result score	
Excellent:	90-100%
Good:	80-89%
Fair:	65-79%
Poor:	<65%

After 24 hours of operation patient was discharged.

RESULTS

Three hundred patients were available prospectively to evaluate the palmar flexion and dorsiflexion of the wrist. The patients were given a questionnaire and Modified Hospital score was used to evaluate the results.

Out of three hundred, two hundred and forty patients (80%) had palmer Flexion and dorsiflexion of wrist joint form 70° to 80° which was graded as excellent. According to Green O Brien scale on self assessment scoring and patient satisfaction chart 80% of patients (two hundred and forty) were highly satisfied and on scale their satisfaction index was more then seven.

Post operative pain was assessed according

to the modified clinical scoring system as mentioned in table 1 , the satisfaction index of two hundred and eighty (80 %) was noted as twenty five , that is they had no pain at the time the study was conducted .

Sixty cases 20% had range of movements at the wrist joint from 65° to 70° which was graded as good according to the accept scale for evaluation.

The range of movement at the time of study was assessed to the criteria in table 2 as mentioned .

Out of three hundred patients, ten patients(3.3%) had range of movements at wrist joint less than 65° and were granted poor on accepted scale for evaluation. On self assessment scale of satisfaction these patients were below 4 which showed they were not happy with the procedure other parameters like stiffness of hand and wrist, the redial height, pain at the wrist joint, protrusion of head ulna, supination, pronation, grip strength and key pinch were also noted and recorded in the chart for comparison.

The functional status of the patients at the time of study was assessed by the criteria in table 3 and two hundred and eighty (93.3%)returned to regular work and twenty patients (6,7%) had restricted employment .

The grip strength was an important finding and was concern o f most of the patients , the grip strength of two hundred and forty (80 %) was near normal and were awarded twenty five points on the scale selected for assessment . Sixty patients (20%) had fifteen points on the scale .

There were two hundred and seventy patients (90%) with good results and thirty (10 %) had fair results.

STATISTICAL ANALYSIS

Date was analyzed with the help of computer program SPSS version 10, the two groups were analysis using student's t/test for continuous variables. All test of significance were two-tailed. Statistical significance was defined as $P<0.05$.

On limited scale study regarding treatment of Colles' fracture using percutaneous k-wire fixation has been successful in many ways. We have noted the superiority of he procedure as grip strength and hand function are concerned.

DISCUSSION

Different studies proved that the results were significantly better in patients in which the wrist immobilized was for shorter duration.

Radiological parameters of injured distal radius were assessed, in terms of radial height, radial inclination, and volar tilt. The final results were compared with different series.

There was no loss of radial height after reduction and after fracture union. In recent study this result is comparable with the study conducted by MeBirnie et al, he treated 83 patients with bone grafting and k-wire fixation there was no loss of radial height in any patient. The study conducted by Azzopardi, shows better results in the group treated by percutaneous k-wire fixation compared with conservative method.[56,7]

MeBirnie conducted a study; he treated 60 patients with External Fixator and showed decrease of radial height on an average of 2 to 3mm. Dias treated 187 patients with conservative methods which showed loss of radial height up to 2mm. [7,8,,9]

At the end of present study final range of movement of the wrist in terms of flexion, extension, comparable to other studies. The functional out come depends upon [(1)] preinjury level of activity [(2)] displaced versus nondisplaced fractures [(3)] age [(4)] presence of osteoporosis and extent of intra-articular comminution. In the present study all the fractures were extra-articular, and patients above 65 years were not included. That may be the reason of better results.

The satisfaction level of patients on self assessment scale was between 4-6 ,that is why they were happy with the procedure

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