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Comparative Analysis of the outcome between open reduction with plating and Closed reduction in Distal Radius fractures

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Abstract
Introduction:
Fractures of the distal end of radius constitutes a very common injury that is seen and treated in emergency room.It accounts for 20% of all fractures treated in emergency room. The common mechanisms of injury are road traffic accident, fall from height, industrial and sports trauma. Distal radial fractures have a bimodal type of age distribution with high energy trauma contributing to younger and low energy trauma in elderly. Open reduction and volar plating were designed to ensure more consistent correction of displacement and maintenance of reduction.
Aim and Objective:
To analyse and compare the functional outcome in distal radius fractures of 40 patients treated by closed reduction (slab and cast) and open reduction and internal fixation (volar-locking plating).
Method:
40 patients were included in the study with random allocation to study group A and B as they presented to OPD and emergencydepartment of Santosh medical College Hospital, Ghaziabad, Uttar Pradesh over a period of time from 1-05-2019 to 1-04-2020. Old elsewhere managed case of fracture distal end radius and severe co-morbid patients were avoided. All patients managed by closed reduction with plaster were included in group A. And patients managed through volar approach and internal fixation with AO plate were included in group B. The patients were labelled as excellent, good, fair and poor.
Conclusion:
Our findings suggest that open reduction and internal fixation with plating in patients of age group 20-65 years is better, safe and effective treatment modality in comparison to closed reduction and cast application in distal end radius fractures. Early primary fixation of such fractures by volar LCP is essential for good functional outcome and to avoid complication.
Keywords:
Distal end Radius fracture, volar T-plate, closed reduction, cast application.

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I. Introduction

Fractures of the distal end radius constitutes a very common injury that is seen and treated in emergency room. It accounts for 20% of all fractures treated in emergency room. The common mechanisms of injury are road traffic accident, fall from height, industrial and sports trauma. Variations pattern of intra-articular distal end of radius are common in adults. They are commonly referred to as Colle's fracture, Bartonfracture, Smithfracture. The Orthopaedic surgeon has many options in treating such type of wrist injuries[1]. The available options of treatment include closed reduction with plaster(slab and cast), externalfixation-wire fixation and open reduction internal fixation with T-plate[2].The metaphyseal widening of a distal radius is a zone of a lower amount of strong cortical bone and higher amount of weaker cancellous bone. The major risk factors are low bone mineral density (BMD) and a tendency to fall. Consequently, a fracture of the distal radius is typically the result of a fall on the outstretched hand[3,4,5]. Plate fixation holds its merit due to its stability; period of stabilisation is short, and early return to previous active life. Study was conducted in age group of 20-65 years of age in both male and female patients.

Aims and Objectives

To compare the results of treatment modalities in Distal end radius fractures byOpen reduction and Internal fixation and closed reduction. Open reduction and internal fixation always have the advantage over

closed reduction. The available options include Plaster, External fixation, Prefabricated Splintage using Ligamentotaxis, K-wire fixation, and open reduction internal fixation with T-plate[6,7]. If these fractures are allowed to collapse, radial shortening, angulation and articular incongruity may cause permanent deformity and loss of function[8].

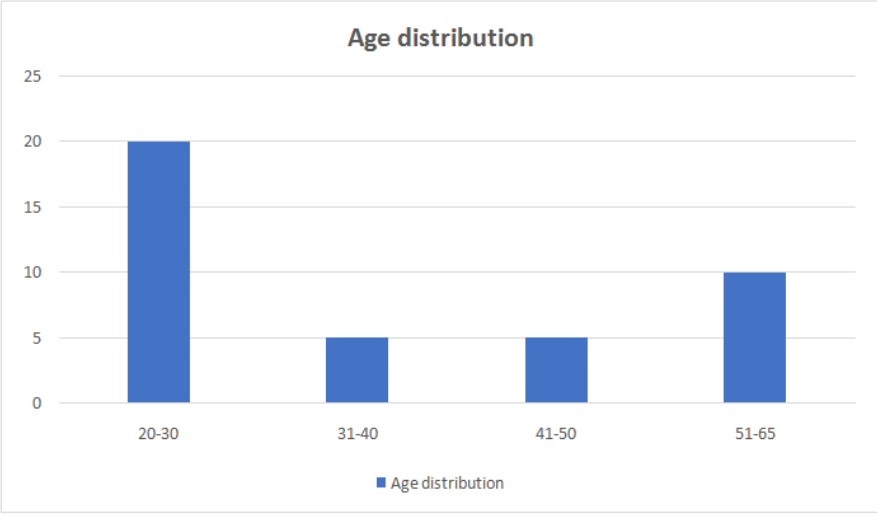
II. Methods

40 patients were included in the study with random allocation to study group A and B as they presented to OPD and emergency department of Santosh medical College Hospital,Ghaziabad,Uttar Pradesh over a period of time from 1-05-2019 to 1-04-2020. The study has been conducted based on AO classification of distal end radius 23 type A1 to C3. Old elsewhere managed case of fracture distal end radius wasavoided. Both group of patients were counselled and informed consent were taken. All patients managed by closed reduction with plaster were included in group A. And patients managed through volar approach and internal fixation with AO plate were included in group B.Stitches were removed after 10 days in group B followed by gentle physiotherapy. Cast were removed after 3-4 weeks in group A patients.Recovery was made on Green O'Brien system. This recovery system was based on pain, functionalstatus, range of motion and grip strength. The patients were labelled as excellent if score was 90-100 points, Good; if a score of 80-89 points, fair; if a score of 65-79 points and poor; if a total score was < 65.**Inclusion criteria**: age more than 20 years, displacedintraarticular and extraarticular classification type 23 a to c. **Exclusion criteria**: age less than 20 and more then 65, neglected fractures more than 4 weeks, severe co-morbidities, history of previous wrist pathology or malunited distal radius fracture. Below mentioned are the acceptable radiological criteria kept in mind during the surgical procedures and were assessed intra operatively after reduction was achieved under image intensifier guidance and on immediate post-operative x rays. Afterdischarged on the first follow up, patients check x-rays were also evaluated for any loss of reduction since discharge.

1.Radial length within 2-3 mm of the contralateral wrist joint.
2.Palmar tilt: Neutral tilt (0 degrees)
3. Intra articular step off of < 2mm
4.Radial angle <5-degree loss
5. Carpal Mal-alignment: Absent
Patients followed up at 6 weeks, 3 months, 6 monthsand 12 months.
Age distribution:
Patients age range from 20-65 years:

Table 1:

Age distribution	
Age in years	No. of patients
20-30	20
31-40	5
41-50	5
51-65	10



Sex distribution:
Male patients – 22
Female patients -18

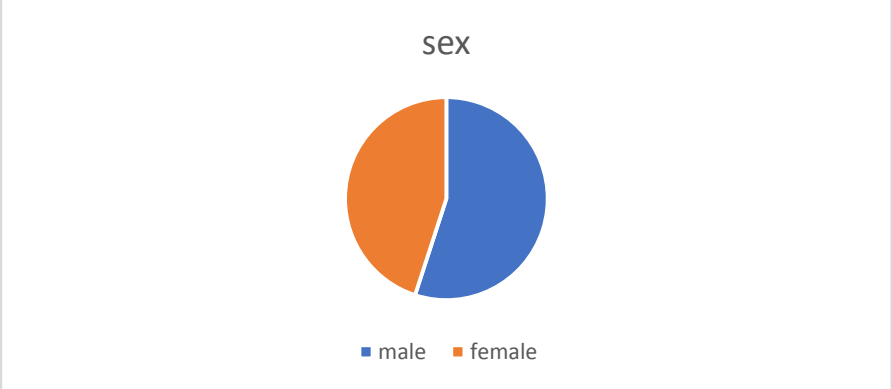
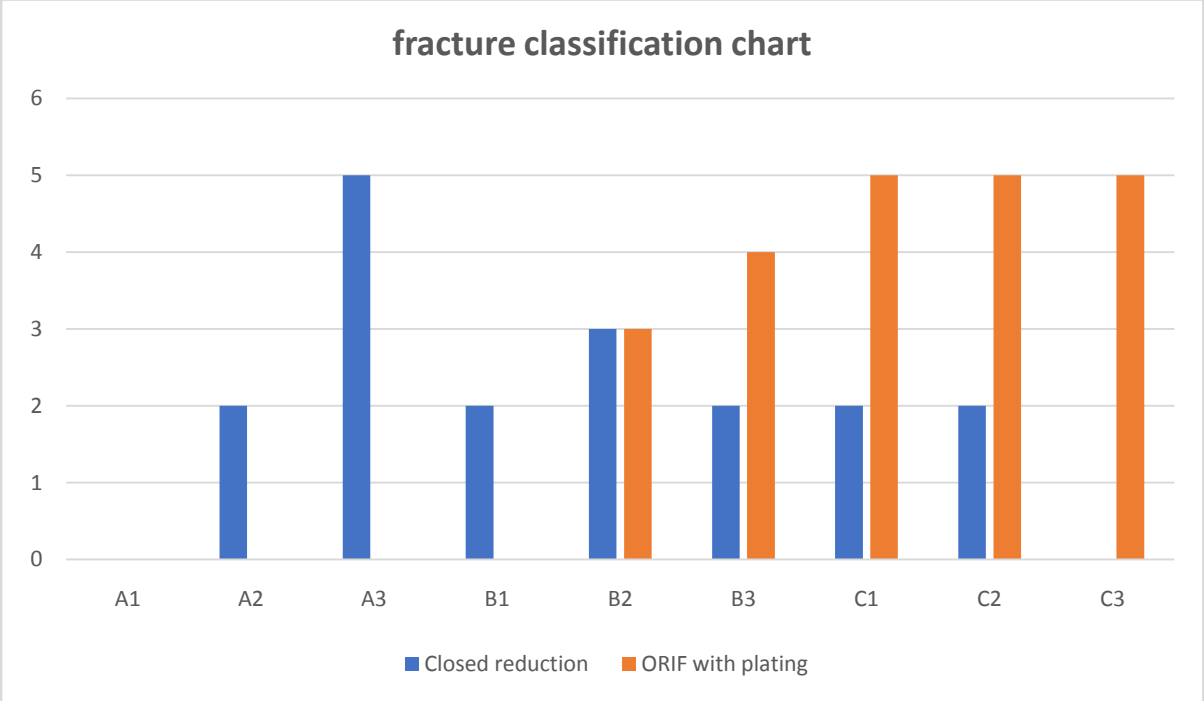


Table 2: Fracture classification

AO type 23	Closed reduction	ORIF with plating
A1	0	0
A2	2	0
A3	5	0
B1	2	0
B2	3	3
B3	2	4
C1	2	5
C2	2	5
C3	0	5



Extra-articular	23-A1 Ulna fractured and radius intact	23-A2 Simple or impacted metaphyseal radial fracture	23-A3 Comminuted metaphyseal radial fracture
Partial- intraarticular	23-B1 Saggital in radius	23-B2 Frontal and Dorsal radius	23-B3 Frontal and Volar radius
Complete-intraarticular	23-C1 Simple joint and simple metaphysis	23-C2 Simple joint and comminuted metaphysis	23-C3 Multi-fragment joint

Table3: AO classification of Distal Radius

Fig 1: distal intraarticular radius fracture before LCP fixation

Fig 2: volar LCP fixation

Table 4:

Green O'Brien system modified by Cooney			
Pain	25	none	
	20	mild, occasional	
	15	moderate, tolerable	
	0	severe or intolerable	
Functional status			
25	return 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	24-49% of normal	
	0	less than 25% of normal	
Grip strength	25	normal	
	15	75-99% of normal	
	10	50-74% of normal	
	5	24-49% of normal	
	0	0-24% of normal	
	Final result	Excellent	90-100
		Good	80-89
		Fair	65-79
		Poor	<65

III. Results:

Out of 40 patients,18 patients were managed conservatively by closed reduction and plaster application and 22 patients were managed by ORIF with T-plate fixation through volar approach. Out of 22 patients operated, 3 patients had type23- B2 fracture, 4 patients had type 23 B3 fracture, 5 patients had C1 fracture, 5

patients had C2 fracture, 5 patients had C3 fracture.Average operating time was 45-50 mins and blood loss wasapproximately 100 ml.Average time to clinical-radiological union was 6 weeks. Average time to wrist mobilisation was 8 days. Out of 18 patients managed conservatively by closed reduction by slab and cast application out of which 13 had acceptable results and 5 patients had malunion.
From the 22operated case 16 had excellent results and 4 had satisfactory results and 2 had complications,1 patient had stitch line infections and 1 had implant failure.

IV. Conclusion

Our findings suggest that open reduction and internal fixation with plating in patients of age group 20-65 years isbetter,safe and effective treatment modality in comparison to closed reduction and cast application in distal end radius fractures.Conservative management for partial and complete intraarticular fractures of distal end radius is not sufficient.Early primary fixation of the distal radius by volar LCP is better for good functional outcome and to avoid complicationslike prolonged immobilisation,which facilitates early return to normal activities of daily living[9,10]. Patient with unstable volar or dorsal displacement intraarticular distal radius fractures when treated with LCP had good radiological and functional outcome with less complications than patients treated with closed reduction[11].

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