

**VOLAR LOCKING COMPRESSION SYSTEM DISTAL AND
RADIUS FRACTURE**

DISSERTATION

**A COMPARATIVE STUDY FOR MANAGEMENT OF DISTAL
END RADIUS FRACTURE WITH VOLAR LOCKING
COMPRESSION SYSTEM**

UNIVERSITY OF SEYCHELLES

AMERICAN INSTITUTE OF MEDICINE (USAIM)

M.Ch(ORTHOPAEDICS)

JUNE 2011

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MASTER CHART

Names	Age	Sex	A.O. type	Treat	F/U Years	F/U Months	Sub. Asse	I.G.	A.G.	R.S.(mm)	V.T. degree	R.A. degree	Demerit score	Result
Ganesh	28	M	A2	Cast	0	8	E	0	0	0	8	22	0	E
Ranganath	28	M	A2	Cast	0	8	E	0	0	1	10	21	2	E
piyusha	30	F	A2	Cast	0	8	E	0	0	2	12	22	1	E
Kobara	28	M	A2	Cast	1	8	E	0	0	0	4	24	0	E
Jitendra	40	M	A2	Cast		8	E	0	0	2	4	19	2	E
Surendra	50	M	A2	Cast		8	E	0	0	1	0	20	0	E
Geru	40	M	A2	Cast	0	8	E	0	0	0	10	18	0	E
Saritri	29	M	A2	Cast	0	8	E	0	0	2	8	22	1	E
Sakharam	30	F	A2	Cast	1	2	E	0	0	6	6	17	2	E
Mahadev	42	M	A2	Cast	1	0	E	0	0	2	4	21	1	E
Chanda	56	M	A2	Cast		8	E	0	0	5	8	22	1	E
Prtibha Chandra	60	F	B1	Cast	1	6	E	0	0	0	2	24	0	E
Sarandas	64	F	B1	Cast		8	G	0	0	0	0	15	3	G
Bramlisa	50	M	B1	Cast	1	0	G	0	6	2	-4	14	4	G
Yaswa	34	M	B1	Cast	1	2	G	0	0	0	-10	16	7	E
Kamat	36	M	B1	Cast	1	4	G	0	0	0	-8	15	8	G
Ladkat	42	M	B1	Cast	0	8	G	1	0	2	-4	14	6	G
Ayesha	61	F	B1	Cast	1	6	G	1	0	0	-2	14	8	G
yashmina	49	F	B1	Cast	1	2	G	0	0	2	-4	14	7	G
Mahadev	29	M	B1	Cast	1	1	G	1	0	2	-4	14	5	G
gaga	47	F	B1	Cast	1	2	G	0	0	1	-8	16	8	G
Malvika	51	F	B1	Cast	1	2	F	1	0	2	-12	14	11	F
Nanaga	28	F	C1	Cast	1	0	F	0	0	6	-10	13	15	F
Yashvawani	30	M	C1	Cast	1	0	F	1	0	3	-12	18	18	F
Pradeep	40	M	C1	Cast	1	2	F	1	0	10	-16	18	10	F
Nertion	48	M	C1	Cast	1	4	F	2	1	3	-21	10	12	F
Yalin	52	M	C1	Cast	1	8	F	0	0	6	-10	12	14	F
Ekata	62	F	C1	Cast	1	0	F	1	0	3	-8	10	16	F
Milkar	29	M	C1	Cast	1	2	F	3	2	3	-10	10	14	F
Narmada	34	F	A3	Ex.Fix.	1	4	E	0	0	3	8	22	0	E
Eknath	42	M	A3	Ex.Fix.	1	0	E	0	0	2	4	20	1	E
Devidas	32	M	A3	Ex.Fix.	1	2	E	0	0	2	0	24	2	E
Ashish	62	M	C2	Ex.Fix.	1	2	E	1	0	2	6	20	0	E
Mehimal	58	F	C2	Ex.Fix.	1	4	E	1	0	2	4	18	2	E
Tousif	59	M	C2	Ex.Fix.	1	4	G	2	0	3	-2	16	8	G

Chandaben	60	F	C2	Ex.Fix.	1	2	G	1	0	2	-4	16	6	G
Anand	32	M	C2	Ex.Fix.	1	4	G	0	0	2	-8	18	4	G
Abdul	34	M	C2	Ex.Fix.	1	2	G	1	0	3	-6	16	6	G
Vimyay	42	F	C2	Ex.Fix.	1	2	F	0	0	2	-20	18	10	F
Pravin	51	M	C2	Ex.Fix.	1	2	F	1	0	3	-18	14	20	F
Shivaji	61	M	C2	Ex.Fix.	1	4	F	0	0	6	6	-22	10	F
Tarabai	63	F	C2	Ex.Fix.	1	6	F	1	0	8	-21	12	16	F
Taraji	37	F	C2	Ex.Fix.	1	2	F	3	2	10	-20	10	14	F
Tapi	41	F	B2	Ellies	1	2	E	0	0	3	12	18	1	E
Merra	59	F	B2	Ellies	2	0	E	0	0	2	14	22	0	E
Yogesh	58		B2	Ellies	1	4	E	0	0	2	10	24	2	E
Kamlesh	28		B2	Ellies	1	2	E	1	0	2	8	22	2	E
Niyali	31	F	B3	Ellies	1	2	E	0	0	3	4	22	1	E
Bhayanbhai	43	M	B3	Ellies	1	0	G	0	0	3	0	20	8	G
Teshvini	47	F	C1	Ellies	1	2	G	1	0	3	-4	18	6	G
Gayal	51	M	C1	Ellies	1	4	G	1	0	3	-2	18	5	G
Kisum	43	F	C2	Ellies	1	2	F	1	0	6	-12	12	11	F
Panati	47	F	C2	Ellies	1	0	F	1	0	3	-14	10	14	F
Anna	53	M	A2	PNG	1	0	E	0	0	3	6	24	10	E
Barati	38	F	B2	PNG	1	2	G	0	0	2	-2	16	8	G
Hemraj	42	M	C1	PNG	1	0	G	1	0	10	-4	16	6	G
Baliyam	29	M	C1	PNG	1	2	F	2	1	6	-20	12	19	F
Narayan	32	M	C1	LCP	1	4	E	0	0	4	10	24	2	E
Pankaj	42	M	C1	LCP	1	6	E	1	0	3	8	24	1	E
Priyandas	49	F	A2	LCP	1	6	E	0	0	2	8	21	1	E
Anuradha	51	F	A2	LCP	1	8	E	0	0	0	6	23	0	E
Shyam	29	M	A2	LCP	1	4	E	0	0	2	8	21	1	E
Sapanali	62	F	A2	LCP	1	2	E	0	0	2	10	21	1	E
sakheri	32	F	B2	LCP	1	1	E	0	0	1	8	21	0	E
Mangalsingh	41	M	B2	LCP	1	6	E	0	0	2	6	19	2	E
Manglabai	29	F	B2	LCP	1	6	E	0	0	1	8	22	1	E
Yousf	31	M	B3	LCP	1	2	E	0	0	0	8	21	1	E
Mhd.Arif	33	M	B3	LCP	1	2	E	0	0	0	8	21	1	E
Najiya	41	F	C1	LCP	1	6	E	1	0	2	8	19	2	F
Vatsalabai	53	F	C!	LCP	1	2	E	0	0	2	6	18	2	E
Bhanjand	37	M	C!	LCP	1	4	G	1	0	3	2	16	4	G
Bishomisingh	42	M	C1	LCP	1	0	G	0	0	3	0	14	4	G
Omnil	39	M	C1	LCP	1	8	G	1	0	2	-2	15	6	G
Venu	51	F	C2	LCP	1	6	G	1	0	3	-6	16	6	G
Desdas	29	M	C2	LCP	1	6	F	0	0	2	-4	13	8	G
Shankar	21	M	C2	LCP	1	6	F	1	0	2	-14	12	12	F

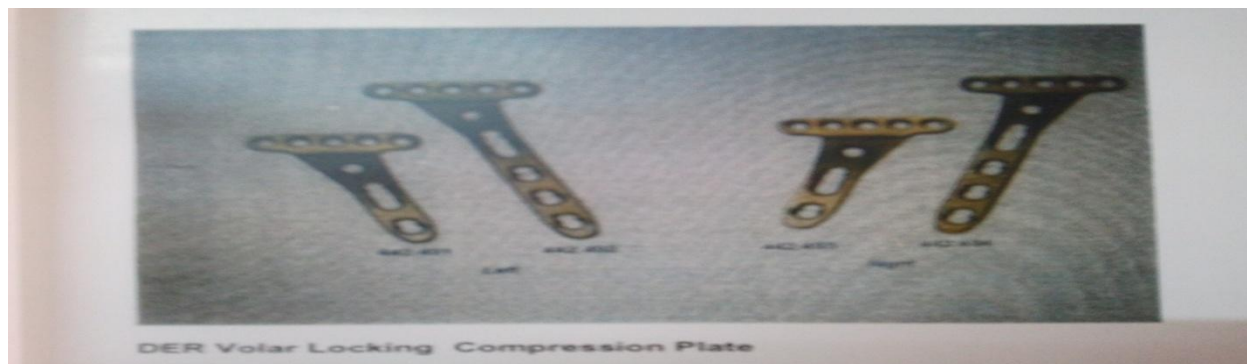
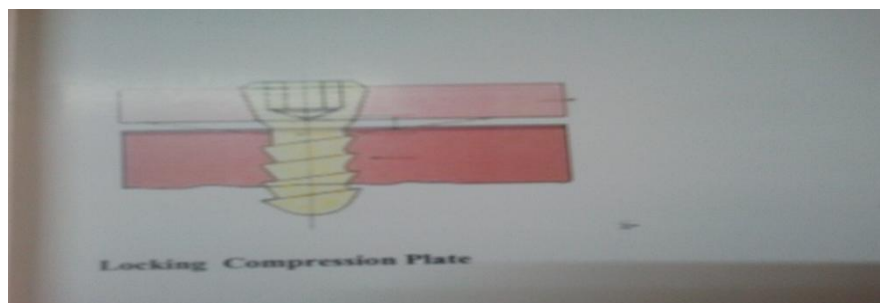
Geeta	29	F	C2	LCP	1	8	F	0	0	3	-16	10	14	F
Madhav	41	M	C3	LCP	2	0	F	2	0	3	-14	10	16	F
Tai	53	F	B2	LCP	1	4	E	0	0	1	4	24	2	E

VOLAR LOCKING COMPRESSION SYSTEM DISTAL RADIUS FRACTURE

- To study fracture patterns of distal radius fractures.
- To compare results of different methods of treatment of fracture of distal end radius with volar LCP system.
- To find out the best method of treatment of fracture of distal end radius .

HISTORICAL ASPECT AND REVIEW OF LITERATURE

- Abraham Colle published : No other fracture has been discussed about as much as Distal End Radius Fracture
- Principal treatment of Colle's fracture : Forceful traction, manipulation and immobilization in wrist flexion and ulnar deviation.
- 1929 Bohler : transfixation with skeletal pins and incorporation in plaster cast to maintain reduction of fracture.
- 1957 Brian Thomas : Smith's fracture a supination injury and advised immobilisation in full supination.



- The dorsal Barton fracture showed better results with wrist in slight dorsiflexion.
- 1981 Van der Linden : with forearm in pronation or supination and wrist in ventral or palmar flexion with or without ulnar deviation.
- 1965 Ellis : Open reduction and internal fixation of unstable Smith's or volar Barton fracture. He devised a T shaped plate which plated as an excellent volar buttress preventing the deformity.
- The advantages of open reduction and internal fixation are :
 - Early and Better mobilisation and function of hand.
 - Low incidence of post traumatic radiocarpal and radioulnar arthrosis, and hence less residual pain, stiffness and restriction.
 - Concomitant repair of ruptured tendons if any.
 - Superlative results of nerve recovery in cases complicated with nerve injury especially if procedures like epineurolysis for subepineural haematoma are done.
 - Very low incidence of complications like post traumatic dystrophy.
- As technology advances and we increase our knowledge of bone healing from a variety of perspectives, newer designs in internal fixation devices have emerged to provide enhanced rigidity and stability to the osteoporotic and cancellous bone site. Like locking screw implants.
 - Dorsal locking system
 - Volar locking system
 - Double plating system

Are available for DER # depending upon direction of the displacement of the distal fragment.

EMERGING LOCKING PLATES:

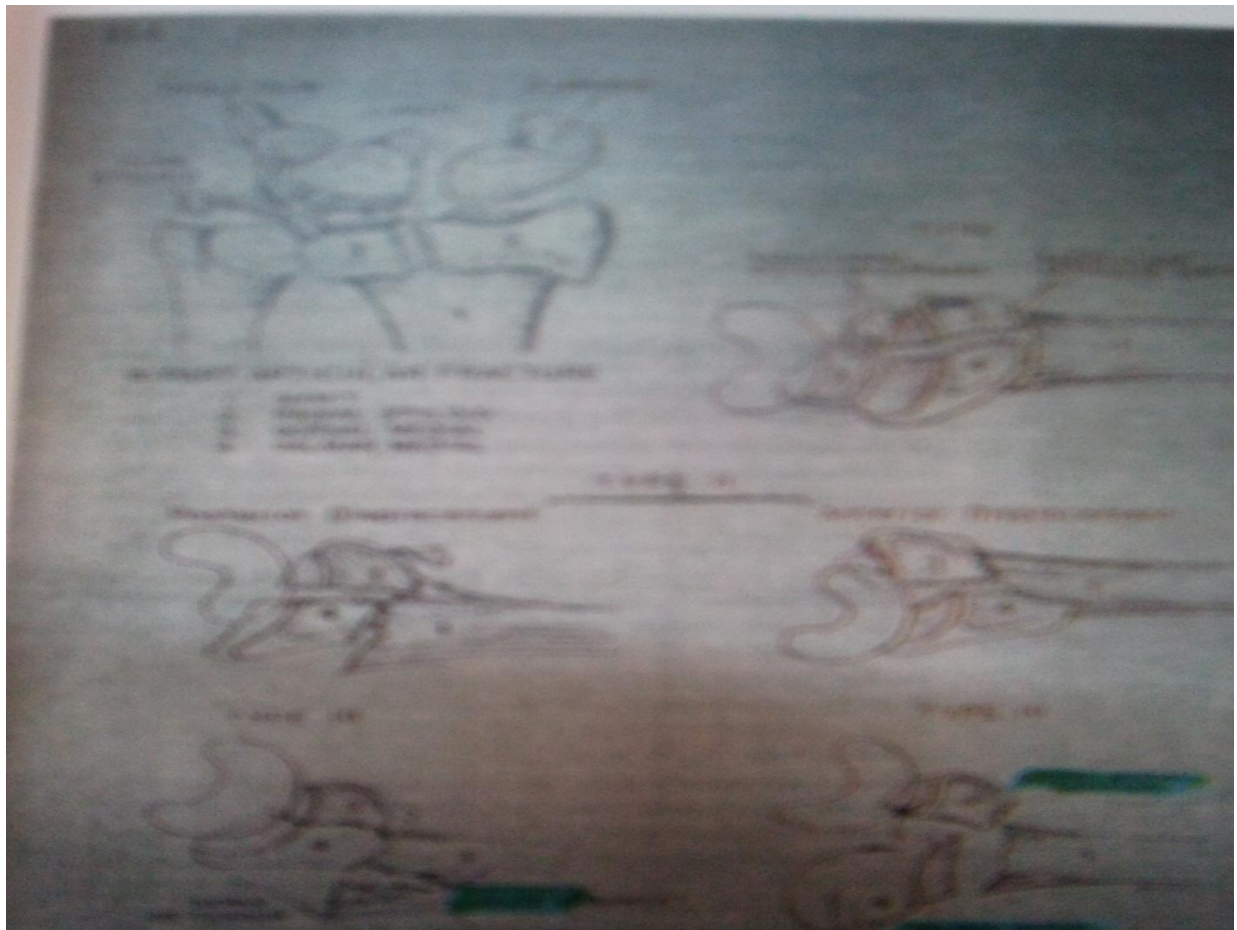
- Locked internal fixation devices such as a plate with locking screws offer an innovative solutions. They are designed to provide an enhanced rigidity and stability to the bone site.
- Conventional plating serves to resist bending tortional and axial loading by transferring these loads to the bone interface in the form of shear stresses that friction forces resist between the plate and the bone.
- Locking plates and screws create a “single-beam construct” by eliminating motion between the beam components specifically the plate, screws and bone.

It is similar to the principles of external fixation in that axial stability and strength are determined by the sum of locked screws instead of single screw as in the case with traditonal plating technique

- Since lock plates do not rely on frictional forces for stability, direct plate to bone compression is not required, so one can preserve periosteal blood supply, can be used in osteoporotic bones or communited fractures.

Fracture	Distal ulnar # absent	Distal ulnar # present
Extra-articular	I	II
Intra-articular		
Radiocarpal joint	III	IV
Radioulnar joint	V	VI
Radiocarpal & Radioulnar Joint	VII	VIII

Melone’s Classification of intrarticular Fractures:

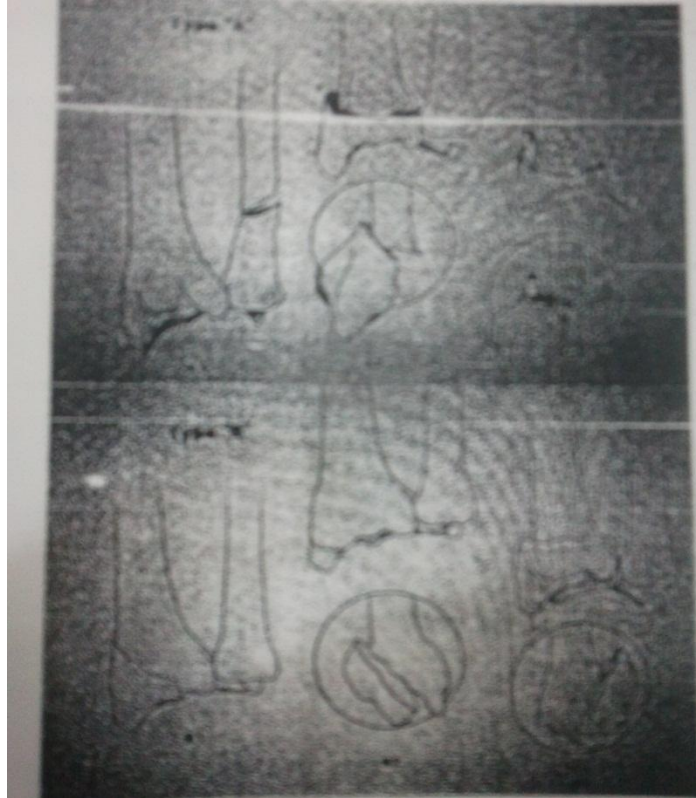


A.O. CLASSIFICATION

Type A : Extra articular fracture

Type B : Intra articular Fracture

Type C : non communited intra articular Colles and Smith fractures.



- **Techniques used :**

1. Conservative – Cast immobilisation
2. Operative
 1. External Fixation
 2. Internal Fixation –Volar ellis plate

Volar locking plate fixation

Percutaneous pinning and plastering immobilisation

SELECTION OF TREATMENT:

Treatment method	AO classification	No. of patients	Percentage (%)
Cast immobilisation (30 pt.)	A2	11	36%
	B1	12	

	C1	7	
External Fixation (14 pt.)	A3 C2 C3	3 8 3	18%
Internal fixation volar elli's plates (10 pt.)	B2 B3 C1 C2	4 2 2 2	14%

Treatment method	AO Classification	No. of patients	Percentage (%)
Percutaneous pinning and cast (4 pt)	A2 B1 C1	1 1 2	4%
Internal fixation with Volar LCP system (22 pt.)	A2 B2 B3 C1 C2 C3	4 4 2 7 4 1	28%

Close reduction with cast immobilization :



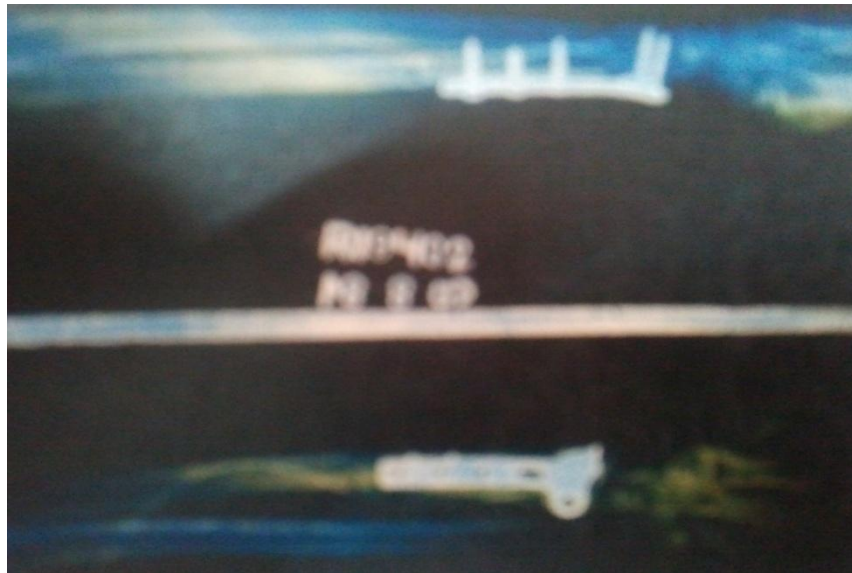
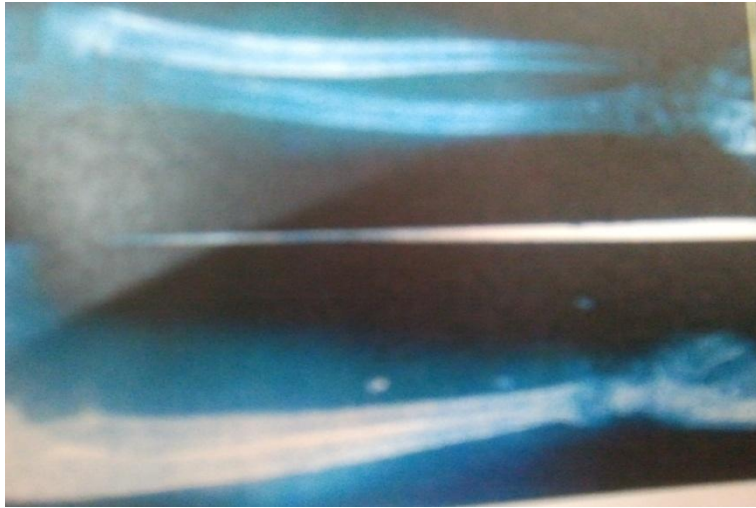
Close reduction with percutaneous cross K-wires



External Fixation with K wire:



Volar LCP system:



Volar LCP systems:





RESULTS:

- At follow up assessed for
 - Functional outcome
 - Radiological healing and arthrosis
 - Mean follow up of 14 months
 - Patient followed up at 6 weeks, 12 weeks, 3 months and then every 6 monthly.
 - We used Gartland and Werley scores for assessment.

RESULTS:

Treatment method	Results	No. of patients	Percentage (%)
Cast immobilisation (30 pt.)	Excellent	12	38%
	Good	10	32%
	Fair	8	30%
	Poor	0	0
External Fixation (14 pt.)	Excellent	5	35%
	Good	4	30%
	Fair	5	35%
	Poor	0	0
Internal fixation volar elli's plates (10 pt.)	Excellent	5	50%
	Good	3	30%
	Fair	2	20%
	Poor	0	0

Treatment method	Results	No. of patients	Percentage (%)
Percutaneous pinning and cast (4 pt)	Excellent	1	25%
	Good	2	50%
	Fair	1	25%
	Poor	0	0
Internal fixation with Volar LCP system (22 pt.)	Excellent	14	62%
	Good	5	24%
	Fair	3	14%
	Poor	0	0

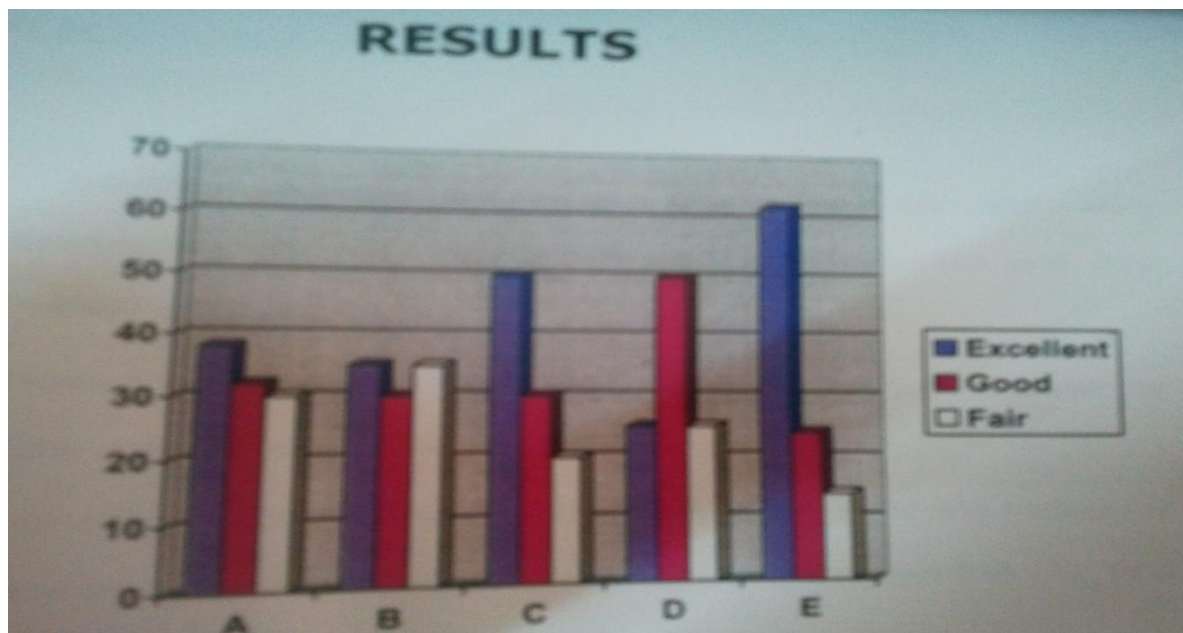
A – Cast immobilisation

B – External Fixation

C – Internal Fixation – Ellies Plate

D – Percutaneous pinning & cast

E – Internal Fixation – Volar LCP system



CONCLUSION :

- For full functional results patients often surgical intervention.
- Volar Compression plating is a safe and effective treatment for unstable fractures of distal radius. It can also stabilize dorsally unstable distal radius fractures with least complication.
- Specially locking compression implants provide advantages in the treatment of distal radius fractures with metaphyseal comminuted zones (A3 and C2 fractures).

MASTER CHART ABBREVIATIONS

A.O. TYPE	A.O.Classification type
I.G.	Incongruity in millimeter
A.G.	Arthritis grade
R.S.	Radial shortening
V.T.	Volar Tilt
R.A.	Radial Angulation
Ex.Fix.	External Fixation