

Mini-plate Fixation for Comminuted Radial Head Fracture

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Purpose: The recommended treatment of displaced or comminuted radial head fracture has been excision with or without prosthesis replacement. Excision of radial head will result in valgus deformity, and proximal migration of radius. Long term follow up of prosthesis also can induce valgus instability, synovitis, dislodging or wearing of prosthesis. This study presents the clinical reports of open reduction and internal fixation with mini-plate and screws.

Materials and Methods: From May 1999 to October 2002, 10 patients with Mason type III (7 cases), type IV (3 cases) were treated with mini-plate and screws. Operative indication were head and neck dissociation fracture, fracture extended to radial tuberosity, children's fracture, dominant side Mason type III, IV injury of highly young active patient. The patients were 7 males and 3 females. Average age was 32 years (14-48 years). Average follow up period was 15.8 months. All fractures were tried to fix at the safe zone with straight, T or L shape miniplate. Extracorporeal reduction of radial head was done in 4 cases. Additional fixation was done in 7 cases. Herbert's screw was used in 3 cases,

mini-screw in 4 cases, buried K-wires in five cases. Only mini-plate and screws was used in one case. Auto distal-radial bone graft to the neck was done in one case. Average duration of immobilization was 4 weeks (3-6 weeks). Removal of internal fixation was done in three cases and second stage arthrolysis was done in two cases.

Results: At the last follow up, average range of motion was 9°-123°, 58° in pronation and 55° in supination. By the functional rating index (Modified after B.F.Morrey et al.), 3 cases were excellent, 4 cases were good, and 1 case was fair, 2 cases were poor. Each case of K-wire migration, nonunion in neck and partial avascular necrosis of head was developed. But there were no discomfort of ADL. The result of Mason type III was better than type IV.

Conclusion: Open reduction and plate fixation of radial head fracture is recommended for head and neck dissociation fracture or extended fracture line to the radial tuberosity, children's fracture and dominant side of Mason type III, IV fracture in highly young active patient

Key Words: Radial head, Comminuted fracture,
Mini-plate fixation

Mason Type III, IV
가

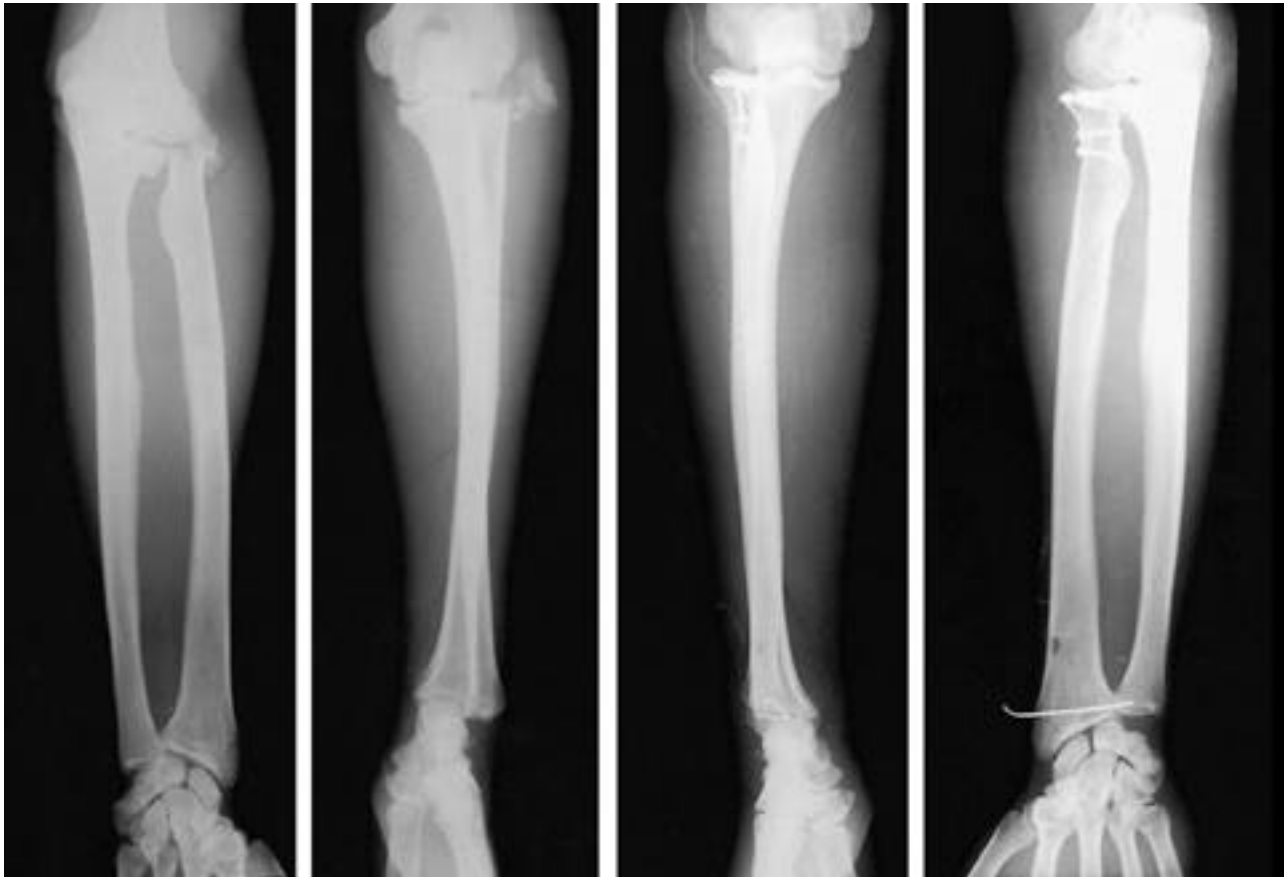


Fig. 1. Preoperative and postoperative forearm anteroposterior and lateral radiographs of Essex-Lopresti injury and Mason type III radial head fracture after out-car traffic accident. Distal radioulnar dislocation was seen and that was reduced after Kirschner's wire fixation



Fig. 2. Nonunion and avascular necrosis, male 48 years old with Mason type III fracture and Essex-Lopresti injury (A) Preoperative and postoperative anteroposterior view fixation with L-shape mini-plate (B) Anteroposterior and lateral flexion and extension view shown avascular necrosis and nonunion after hardware removal. And flexion and extension lateral view shown full range of motion.



Fig. 3. Anteroposterior view of medial epicondyle ossification at postoperative 1 year 3 months after hardware removal (Mason type III fracture)

Table 1. Functional rating index

Variable	Points
Motion	
Degree of flexion 150	30
Degree of extension 10	2
Degree of pronation 80	16
Degree of supination 80	16
Strength	
Normal	12
Mild loss (80% of opposite side)	8
Moderate loss (50% of opposite)	4
Severe loss (limits everyday tasks, disabling)	0
Stability	
Normal	12
Mild loss (no limitation)	6
Grossly unstable	0
Pain	
None	12
Mild(activity normal, no medication)	8
Moderate(with or after activity)	4
Severe (at rest, constant medication)	0

14,16,17).
 Geel²⁾
 , Rene¹⁴⁾ Mason
 Type III
 Kirschner's wire, Herbert screw, titanium
 mini-plate
 Mason Type II Mason Type III

1,2,3,15).



Fig. 4. Preoperative and postoperative anteroposterior view of 14 years old male. Incomplete reduction was done and plate fixation for radial head and neck dissociation

가
 Type III Type IV
 Mason
 1999 5 2002 8
 Mason Type III Type
 IV
 10 가 7 , 가
 3 , 30 (14 48) ,
 15.8 (12 29)
 3.9
 4 (3 6)
 6 가 , 1 ,
 가 1 , 가 1 ,
 1 .
 ,
 45
 , 5 CT
 . CT 가 3
 가
 1 . Mason Type III 7 , Mason
 Type IV 3 , Essex-Lopresti
 Type 4 Type III 2 , Type
 IV 2 .
 가 1 ,
 . T(5 cases),
 L(4 cases), I(1 case)

가 4 , , Mason Type III가 2
 가 4 , 3 1 Essex-Lopresti가 , Mason type
 , 7 가 . 2 IV가 2 Type IV Essex-Lopresti가 1
 Herbert , 2 1.5 mm miniscrew . 37 , 95
 , 5 K- 가 . Mason type III 1 (Case 1)
 . K- 가
 (impact) 가 , 가 ,
 , 가 가
 . 4 2 (Fig. 2). Mason type III 1 (Case 2)
 Essex-Lopresti (Fig. 1). (Fig. 3). Mason type IV 1 (Case 5)
 K- (Fig. 1). 가

. Type III 14
 B.F. Morrey³⁾ Functional (Case 9)
 rating index (Table 1)
 , 가 3 ,
 가 4 , 1 , 2 . (Fig. 4).
 8.7 122.5 K- 가 1 , 가 1 ,
 가 , 57.5 , 55 . 1 (Table 2).
 Mason Type III
 , Mason Type IV
 , Elbow score
 84.1 , Type III 92.8, Type IV 63.6
 가 Mason ⁶⁾
 , Johnson ⁴⁾

Table 2. Summary of Case

No	Sex/Age	Trauma	Type	Plate	Screw	Wire	Result	Complication	Treatment
1	M/48	out car T.A	III(E-L)	L	herbert	K-wire	Good	K-wire migration, Nonunion, Stiff elbow	Hardware removal
2	M28	slip down	III	L	miniscrew	K-wire	Excellent		
3	F/30	slip down	III	L	miniscrew	K-wire	Good	Stiff elbow	arthrolysis, H/W removal
4	M/29	slip down	IV(E-L)	T	-	K-wire	Poor		
5	M/38	falling down	IV	I	-	K-wire	Poor	Stiff elbow, Tardy ulnar nerve palsy	arthrolysis, Hardware removal, Anterior transposition
6	M/30	slip down	III(E-L)	T	herbert	-	Excellent		
7	M/18	slip down	III	T	-	-	Excellent		
8	F/34	rolling down	IV(E-L)	T	-	-	Fair	Stiff elbow	PTx
9	F/14	direct trauma	III	T	-	-	Good		
10	M/30	slip down	III	T	-	-	Good		

*E-L : Essex-Lopresti

가	가	가	
1		2	
K-	Herbert	110	
3		65	45 . Safety zone
			18)
		L-shape	T-shape
		plate, 6	T-shape plate
		plate	safety zone
		3	L-shape
		1	I-shape
			가
		가	
10)	Silicone prosthesis		
	, silicone	360	가
	5)		
		1	
		T-shape plate	
		good	
		Mason Type III	
2,3)	King	3)	II
		100%	
		33%	
		16,17)	
		12,14)	Mason
		Type III	3
			4
	Geel	2)	Elbow score
			92.8
		Mason Type III	
Sanders	16)	AO	360
		Mason	(extracorporeal
Type III	Herbert	Mini	reduction)
AO plate		15)	K-
			가
		360	
	가	K-	가
	가		가
		가	
		Mason Type IV	

Mason Type IV

Type IV

III

Elbow score 63.6

Stability 10,12,12

score

가

Mason Type III

IV

가

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