



RESULTS OF OPERATIVE MANAGEMENT OF UNSTABLE VOLAR BARTON FRACTURES BY USING VOLAR LOCKING PLATES A STUDY OF 25 CASES

Orthopaedics

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ABSTRACT

Aim And Objective: To study the clinical and functional outcome of unstable volar barton fractures managed by volar locking plates. **Material And Methods:** The prospective study will be done from July 2019 onwards. Sample will be taken from the patients treated in P.D.U. Medical College and Hospital having unstable volar barton fracture on basis of plain radiograph and CT scan, classification and treatment plan will be decided on that basis. Follow up taken on 1 month, 3 months and 6 months. **Results:** In Our study of 25, all patients having AO type B3 fracture treated by open reduction and internal fixation. Out of all the patients treated by volar locking plate 80% patient had good to excellent results and 12% patients had fair result and 8% patients had poor results. **Conclusion:** From our perspective, functional and clinical outcome by open reduction internal fixation of radial head fracture appears to be provide excellent function.

KEYWORDS

unstable volar barton fracture.

INTRODUCTION

the most frequent fractures encountered by orthopedicians accounting for 17.5% of all adult fractures are distal radius fractures.^[1] Barton fractures constitute only 1.3% of distal radius fracture.^[2] orthopaedic surgeon John Rhea Barton first described the Barton's fracture, fracture of distal end of radius that involves dorsal or volar rim and extends into the intra-articular part^[3]. They constitute only 1.3% of distal radius fracture. These intra articular fractures are usually due to low or high velocity trauma and are classified in volar and dorsal barton fracture on the basis of the site and shifting direction of the fragments. various treatment modalities have been described in literatures like cast immobilization, percutaneous fixation, external fixation, open reduction internal rotation, arthroscopic assisted internal fixation, etc.^[4] internal fixation has advantages of early mobilisation of wrist and fingers and reduces the stiffness, less post operative followup.^[5] The volar locking plate is considered as the 'gold standard' in treatment of volar Barton's fractures.^[6] According to AO classification, volar Barton's fractures are type B3 fractures of the distal radius (Type 23-B3).^[7] The purpose of our study is to evaluate the functional and radiological outcome of volar Barton fractures treated using volar locking plates.

Aims

To study the clinical and functional outcome of volar barton fractures managed by volar locking plates.

Objectives

1. To assess the clinical outcome of volar barton fractures managed by volar locking plates.
2. To assess the functional outcome of volar barton fractures managed by volar locking plates.
3. To analyze the complications associated with volar barton fractures managed by volar locking plates.

Literature Survey

In 1838, Barton^[8] defined the transected type of fracture due to acting force when the hand is at volar flexion, with the line of the fracture passes obliquely intraarticularly and the coronal split of the fractured fragment.

In 1915, Jones^[9] enumerated a closed manipulation technique for reduction by increasing the deformity, giving traction and immobilizing in reduced position.

In 1965, Ellis^[10] devised a technique of open reduction and internal fixation with T shaped plate for unstable Smith's or volar Barton fracture.

In 1993, Agee^[11] found that volar tilt is brought about by volar

translation of the hand.

In 2007, Rohit Arora et al^[13] analyzed internal fixation with 2.4 mm locking compression plate and claimed superior stability with maximum number of screws in metaphyseal segment.

In 2007, Dennison DG^[14] Open reduction and internal locked plate fixation of distal radius fracture gave good to excellent functional outcome score.

MATERIALS AND METHODS

This prospective study was conducted from 2019 to 2020 for which sample patients taken from P.D.U. Civil Hospital, Rajkot. The fractures were classified under AO classification and managed by internal fixation by volar locking plates. Results were assessed at 1 month, 3 month, 6 month. functional and clinical outcome measure by using Modified Cooney, Green and O'Brien functional score for wrist.

Inclusion Criteria AO Type B3 Injuries ; i.e. volar aspect of distal articular surface of radius was involved while the dorsal aspect of rim being intact.

AGE : 18-60 YEARS

Closed fracture

Mentally Stable patient

Willing for participation

Exclusion Criteria All Dorsal Barton and all Extra-articular radius fracture are not included

AGE OF <18 AND >60 YEARS

Patient associated with comorbidities

Patient not willing to participate

Table 2 : Materials Used

1	Knife Handle
2	No. 23 and no. 15 knife and handle
3	Tissue Retractor
4	Kirschner wires
5	T-Handle
6	Power Gun
7	Volar locking plates
8	Locking and cortical screws
9	Suture materials

Surgical Procedure

On simple table, patient is made to lie in supine position with affected limb rested on forearm stand which provide good radiological evaluation and application of traction. Routinely preoperative

prophylactic intravenous cefotaxime was administered for all patients. Image Intensifier(C-Arm) is mandatory in all cases to check the reduction and assist the fixation of fracture. The standard modified Henry's volar approach was undertaken to fix the fragments of the distal radius. using the plane between flexor carpi radialis tendon and radial artery. After release of pronator quadratus muscle the fracture site was exposed. Reduction was achieved by manual traction hold temporarily by K. wires under c-arm guidance. Appropriate size plate was applied over volar surface of radius. Reduction was checked under and image intensifier and cortical screw inserted in oval hole of locking plate, then fixed with variable angle locking screw under image intensifier guidance. Routine decompression of median nerve was not done in any patient. drain was not put in any patients. after perfect anastomosis and sterile dressings applied. intravenous antibiotics was given for next 72 hours followed by oral antibiotics for 5 days.



Figure 1: Modified Henry Approach

Table 1: Modified Cooney, Green and O'Brien Functional Score For Wrist.^[15,16]

Category	Findings	Score
Pain	No pain	25
	Mild occasional	20
	Mild, regular, no significant effect on Activity	15
	Moderate, activity reduced, no pain at rest	10
	Severe, pain at rest	0
Range movement (arc)	>140°	25
	100 to 140° degree	20
	70° to 99° degree	15
	40° to 69° degree	10
	<40° degree	0
Hand grip (compared to side)	Normal	25
	75 to 90 %	20
	50 to 74 %	15
	25 to 49%	10
	<24%	0
Activity	No Limitations	25
	Normal duties, Some medication	20
	Light duties due to wrist pain	15
	Unable to work	0
Final Results	Excellent 90-100	
	Good 80-89	
	Fair 65-79	
	Poor <65	

RESULTS AND DISCUSSION

Volar Barton's fracture is an unstable intraarticular fracture of distal radius associated with anterior subluxation or dislocation of wrist joint with volar displacement of fragment. The primary goal in treatment of this injury is to provide good reduction and immediate stability to achieve anatomic fracture union, allow the quick return of hand function and avoid complications. In our study average follow up period is 6 months, all fractures were healed mostly in mean periods of 8 weeks (range 6 to 10 weeks). There was no reported case of non union and infections. In our study 25 patients are included. All have unilateral volar barton fracture. among 25 patients, all are AO type b3. 20 patients (80%) are male patients and 5 patients (20%) are female. In our study youngest patient was 22 year and oldest one is 57 year. 13 patients had right sided fracture and 12 patients had left sided fractures. In age group 18 to 30 years there were 4 patients, in 31 to 40 year age 13 patients, in 41 to 50 years 4 patients, in 51 to 60 years age 4 patients. The average age of patients was found to be 34.2 years. Median is 36 year and mode is 32 year. Among 25 patients 20 had history of road

traffic accidents (80%), 2 patients had sports injuries (8%), and 3 have history of fall down (12%). In total 25 cases 8 had associated injuries, two had tibia fractures, one had head injury, one had femur fracture, one had clavicle fracture same side, one had chest trauma, one had associated pharynx fracture, one had abdominal injuries. In our study, functional and clinical outcome of surgery is assessed by Modified Cooney, Green and O'Brien functional score for wrist. In this score 13 (52%) patients had excellent results, 7 (28%) patients had good results, 3 (12%) patients had fair results and 2 (8%) had poor results. A higher score of 100 points accounted for greater function and greater patient satisfaction while a score of '0' or nearer to '0' was associated with more functional disability. In our study 80% patients had good to excellent outcome.

Modified Cooney, Green, O'Brien score	Number of patients	Percentage
Excellent 90-100	13	52%
Good 80-89	7	28%
Fair 65-79	3	12%
Poor <65	2	8%
Total	25	100%

Case Illustration



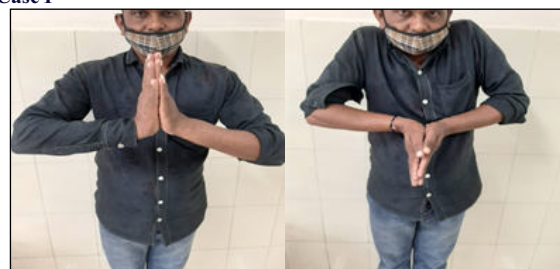
Pre Operative

Post Op



6 Months Follow Up

Case 1





Clinical Outcomes

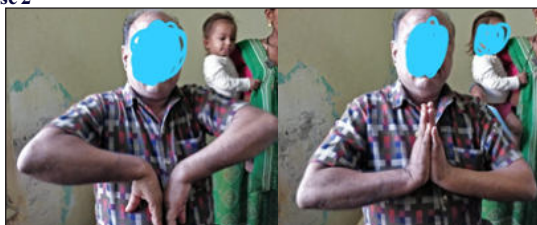


Post Op X-Ray



Follow Up X-Ray

Case 2



Clinical Outcome

Complications

In our study of 25 cases, 2 patients suffering from wrist pain, 3 patients suffering from stiffness of wrist joint, 1 with radiocarpal arthritis and none suffering from infection, Sudeck's osteodystrophy and median nerve involvement. Other complications associated with volar barton fractures includes tendon rupture which is due to long screw resultant in extensor tendon, postero-interosseous nerve palsy and anaesthesia related complications which has not been seen in our study.

CONCLUSIONS

From our prospective study, clinical and functional outcome of the patient having volar barton fracture treated by open reduction and internal fixation by volar locking plate appeared to provide greater function without any greater disability. In our study, we assessed clinical and functional outcome of AO Type 3 B fracture (volar barton fracture) treated by means of Open Reduction and Internal Fixation by volar locking plate. One should know that operative treatment represents complications such as infections, wound problems, anaesthesia related complications which should be undertaken with care. Anatomical reduction of unstable volar barton fracture managed with volar locking plate is proven and promising technique.

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