



## FUNCTIONAL AND RADIOLOGICAL OUTCOME FOLLOWING FIXATION WITH HERBERT SCREW IN SCAPHOID FRACTURE

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### KEYWORDS :

#### INTRODUCTION

Scaphoid fracture most commonly occurred in young adults and constitute 2%- 7% of all fractures, and accounts for approximately 82- 89% of all carpal fracture. Even with proper treatment around 10 to 35% of these fractures go into non-union. This leads to altered carpal biomechanics with resultant pain, diminished motion of wrist, grip strength, and carpal arthritis. The management option for patients with acute nondisplaced scaphoid fracture or with delayed union have expanded from open surgical technique to percutaneous fixation technique. Encouraging results have been reported after open reduction and internal fixation of scaphoid fractures using the herbert screw for fractures which are stable, unstable and for those with delayed union. Our study was intended to review the clinical, radiological and functional outcome of open reduction and herbert screw fixation for scaphoid fractures.

#### MATERIALS AND METHODS

We have done a study of 12 patients with fracture of scaphoid operated with open reduction and Herbert screw fixation at our institute with follow up of 6 months.

#### METHODS OF COLLECTION OF DATA

By interview, regular follow up at monthly intervals, clinical examination and analysing case papers. Inclusion Criteria is cases of acute scaphoid fracture, patients with delayed union, fractures which showed no signs of healing after 12 weeks wearing plaster cast and fracture presenting late. Exclusion Criteria is patients with tuberosity fracture, Dorsal intercalated segmental instability deformity (DISI), osteonecrosis of proximal scaphoid fragment, trans-scaphoid perilunate dislocation, hump back deformity of scaphoid and previous wrist injury.

12 scaphoid fracture patients include our inclusion criteria. Ten were males and two female with average age of 28.06 years (range 18- 45 years). Seven patients had an injured right wrist and five had left wrist injury. The mean duration of presentation after injury was 12.5 days (range 1- 65 days). The minimum follow up was six months (range 6 – 24months). Six (50%) patients were operated with in first week after injury, three (25%) patients with in two weeks and two (16%) were operated in between two to four weeks. One (08%) patients had delayed union of scaphoid waist fracture after 12 weeks of cast treatment who were operated after 12 weeks. Scaphoid radiographs included, postero anterior view, lateral view and scaphoid view. Injuries were graded according to Herbert and Fisher Classification. We operated on eight (66%) type B2 fractures, two (16%) type A2 fractures, one (16%) type B3 fractures and One (08%) type C fracture.

#### OPERATIVE PROCEDURE

Surgery was performed under general or regional anaesthesia. Dorsal approach to all proximal pole fracture and volar approach was used to all waist fracture and Preliminary reduction was achieved with K-wire fixation and once satisfactory reduction achieved, Herbert screw fixation was done and confirmed using image intensifier.

#### POST OPERATIVE MANAGEMENT

In all cases, scaphoid slab was applied post operatively. Two weeks post operatively; sutures were removed and scaphoid cast was given for next four weeks. At six weeks, cast was removed and replaced with

removable wrist immobilizer brace for another four weeks along with physiotherapy. Hand grip strengthening exercise with active assisted range of motion exercise of wrist was started. All patients were evaluated at four weeks interval until fracture united. At each follow up, patients were subjected to clinical as well as radiological examination with scaphoid profile. On final follow up clinical assessment were performed based on Modified Mayo Wrist score (MMWS).

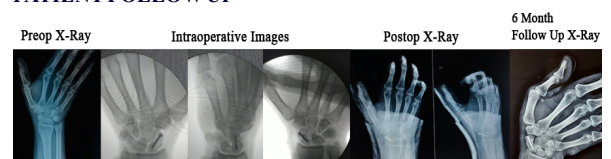
#### RESULTS

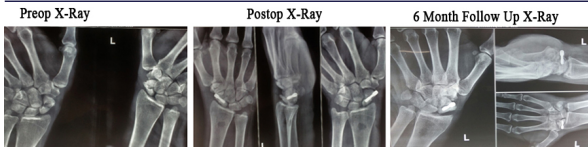
11 out of 12 scaphoid fracture united successfully. Radiological union was confirmed in ten patients at the end of 10 weeks post operatively. In one patient with proximal pole fracture radiological union was achieved after sixteen weeks. In one patient radiological union was not seen till final follow up (6 months). In other cases; wrist flexion averaged 61 degree (range 35 to 75) and wrist extension averaged 60 degree (range 40 to 70). Per Modified Mayo wrist score (MMWS); the mean pain score was 21.5 (range 10 to 25), mean range of motion score was 23.0 (range 15 to 25), mean grip strength score was 24.1 (range 0 to 25) and activity score was 23.8 (range 15 to 25). The mean MMWS score was 92.4 (range 45 to 100). Accordingly, 09 (75%) patients had excellent results, 02 (16%) patients had good results and 01 (08%) patient had poor result with total MMWS of 40. There were no perioperative complications. None of the patient had malunion. None of the patients showed signs of post traumatic osteoarthritis of the scaphoid or wrist at final follow up (range 6-24 months). One patient had scar tethering and sensitivity which subsided with physiotherapy and scar massage.

#### MODIFIED MAYO WRIST SCORE

Category	Points
Pain	(25 points)
None	25
Mild occasional	20
Moderate (with normal use, not at rest)	10
Severe, Constant	0
Range of Motion	(25 points):
Flexion+ Extension (Degrees) > 140	25
100 – 140	20
70 – 99	15
40 – 69	10
< 40	0
Grip strength	(25 points)
Normal	25
Diminished but > 50% of normal	15
Less than 50% of normal	0
Activity	(25 points)
Same activities	25
Restricted activities caused by injured wrist	15
Change of work or sports caused by injured wrist	0

#### PATIENT FOLLOW UP





## DISCUSSION

In our series three (24%) patients were above 30 years, rest 9(76%) patients were below 30 years. This finding suggests that scaphoid fracture is common in young adults. Open reduction and internal fixation of acute fracture of the scaphoid using a compression lag screw was recommended by mclaughlin and Maudsley and Chen to allow early mobilization of wrist[1;2]. Herbert and Fischer first described the technique in 1984, since then the Herbert screw has become widely accepted as a mode of treatment[3]. In our study, Herbert screw can be inserted through both palmar and dorsal approach. Palmar approach is useful in waist as well as distal pole fractures and preserves the important dorsal blood supply; however, it disrupts the volar carpal ligaments and gives poor exposure of proximal pole. Dorsal approach provides exposure of the proximal pole but can disrupt the tenuous blood supply.

Filan and Herbert achieved 88% union rate with displaced or mobile fracture of scaphoid waist that had early surgical intervention with screw fixation[4]. Naranje S et al reported 100% union rate with Percutaneous Herbert screw fixation in 32 patients involving both fresh and late scaphoid fracture presentations with dorsal approach[5]. In our series, we achieved 90% union rate, minimal complication and an early return of wrist function with open reduction and internal fixation with Herbert screw irrespective of type of fracture. Open technique, however, is not without risk and significant complications have been reported. It requires significant soft tissue dissection and violation of the extrinsic volar and dorsal ligaments.

The most common complication seen in various studies were; non union, problem with scar (Hypertrophied scar), screw protrusion, osteoarthritic changes in scaphotrapezoid joint after volar approach and post-operative instability. In our study one patient[8%] developed non union. Non-union may occur in 5% to 10% of all cases, with an even higher incidence in displaced fracture and proximal pole fracture. The reason behind such high incidence is attributed to the tenuous blood supply of the scaphoid. The blood supply of the scaphoid is primarily from the radial artery via the artery to the dorsal ridge of the scaphoid, whose branches enter the scaphoid via foramina at the dorsal ridge and run proximally and planarly to supply the proximal pole. The proximal pole therefore, is dependent entirely on intraosseous blood flow. Avascular necrosis is said to occur in 13% to 50% of cases of fracture of the scaphoid, and the incidence of avascular necrosis is even higher with in those with involvement of the proximal one fifth of the scaphoid[6;7].

## CONCLUSION

Open reduction and internal fixation is an option to reliably diminish the incidence of non-union and malunion with residual carpal instability that occur with cast immobilization in scaphoid fracture. We recommend use of Herbert screw for fixation of scaphoid fracture whether displaced or undisplaced for better radiological and functional outcome.

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