

## FIXATION OF FRACTURE SCAPHOID LIMITED ACCESS WITH HEADLESS COMPRESSION SCREW-PROSPECTIVE ASSESSMENT OF OUTCOME BY MMWS

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### **ABSTRACT**

**Introduction:** Scaphoid fractures are among the most common injuries which are usually resulting from RTA, Accidental fall, Sports injury. The greatest problems for the orthopaedic surgeon to treating the unstable scaphoid fracture and the complications (persistent pain at wrist, non-union, hypertrophic scar) occur from Herbert screw fixation that results in wrist strength.

**Material And Methods:** 25 patients were included in our study from OCTOBER 2021 to APRIL 2022, with subsequent period of follow up of 6 months (OCTOBER 2022). 25 patients with scaphoid fracture treated by operative fixation by Herbert screw.

**Results:** Regarding functional results, 24 cases (96%) had no difficulty doing day to day activity, in last follow up according to Modified Mayo Wrist Score. Regarding post-operative complications, Scar tenderness (2 cases, 8%) was seen and treated with local infiltration of corticosteroids. One patient had developed cast failure and one patient had developed persistent pain.

**Conclusion:** We have concluded that fractures of scaphoid when fixed with headless compression screw shows excellent functional outcome.

**Keywords-**MMWS-Modified Mayo Wrist Score, Herbert Screw, Scaphoid fracture

### **Introduction**

The scaphoid is the carpal bone most often fractured. Considering all injuries to the wrist, scaphoid fractures are second only to fractures of the distal radius. The age-specific incidence for male subjects was highest in the age group 20 to 30 years. The complex three-dimensional anatomies and tenuous blood supply of carpal scaphoid bones make fracture management challenging. Open surgical treatment is well established in the management of acute unstable scaphoid fractures for early functional recovery by adequate reduction. Early surgical intervention with fixation enabled young active patients to return to previous activities of daily living or sports as soon as possible. Scaphoid fractures can go on to non-union which can cause significant morbidity in terms of time off work and activities if not treated adequately. Displaced fractures have been associated with rates of non-union and osteonecrosis in excess of 50%. Nondisplaced (<1 mm displacement), stable fractures of the distal and middle third of the scaphoid can be treated conservatively. However, recently

prospective randomised studies comparing acute fixation to closed (cast) treatment of stable fracture have shown that patients with surgically fixed fractures have a faster rate of healing and earlier return to work. Hence there has been a trend towards surgical fixation of these fractures by means of Headless compression screw.

### **MATERIAL AND METHODS :**

It is a hospital based prospective study which includes fractures in adult patients of both genders. The study was done between OCTOBER 2021 to APRIL 2022, with subsequent period of follow up of 6 months (OCTOBER 2022) at Department of Orthopaedics in R.G.Kar Medical College & Hospital, Kolkata. The study was conducted on total of 25 cases of fracture scaphoid aged more than 18yrs attending the Emergency and OPD, treated by Headless compression screw (Herbert screw). The assessment of clinical and functional outcome was done by Modified Mayo Wrist Score (MMWS).

#### **Inclusion Criteria**

- Patients aged >18 years of both sexes.
- Closed Fracture scaphoid of B1 and B2 types (Herbert classification)
- Only those patients who will give informed consent will be included in the study.
- Patients who will meet the medical standards for routine elective surgery.
- Fractures up to 6 weeks old.

#### **Exclusion Criteria**

- Patients aged < 18yrs.
- Associated fractures in same limb.
- Associated Neurovascular injury of the affected limb.
- Surgically unfit.
- Fracture scaphoid of Type A, B3, B4, B5, Type C and Type D according to Herbert's classification.
- Fractures >6 weeks old.

### **RESULTS AND OBSERVATIONS :**

**Table 1: Age distribution (in years)**

Age Distribution (years)		Frequency	Percent
Age	20-30	16	64.0%
	31-40	6	24.0%
	41-50	2	8.0%
	>50	1	4.0%
	Total	25	100.0%

**Table 2: Gender Distribution**

Gender Distribution		Frequency	Percent
Sex	Male	22	88.0%
	Female	3	12.0%
	Total	25	100.0%

**Table 3: Comparison on side of injury**

		Frequency	Percent
Side	Right	20	80.0%
	Left	5	20.0%
	Total	25	100.0%

**Table 4: Mechanism of Injury**

Cause of Injury		Frequency	Percent
Mechanism of injury	RTA	14	56.0%
	Self-Fall at home	6	24.0%
	Sports injury	5	20.0%
	Total	25	100.0%

**Table 5: Type of Fracture according to Herbert classification**

Classification		Frequency	Percent
Herbert type	B1	8	32.0%
	B2	17	68.0%
	Total	25	100.0%

**Table 6: Assessment of Functional outcome of different approaches by MMWS**

Fracture Type	Number of Cases	Approach		Excellent	%	Good	%	Fair	%
		Volar	Dorsal						
<b>B1</b>	8	7	1	5	20	3	12	0	0
<b>B2</b>	17	13	4	8	32	8	32	1	4
<b>Total</b>	25	20	5	13	52	11	44	1	4

**Table 7: T-test and p-value of MMWS at different intervals**

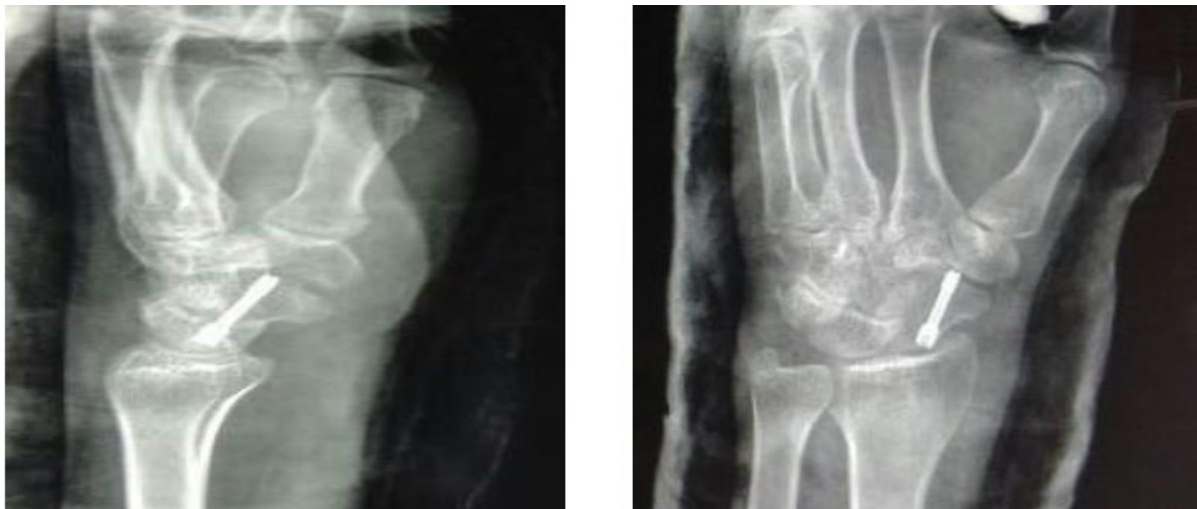
T-test		N	Mean	Std. Deviation	t-value	p-value
Pair 1	MMWS 4 weeks	25	62.40	6.94	12.537	.0001**
	MMWS 3 months	25	75.00	7.50		
Pair 2	MMWS 4 weeks	25	62.40	6.94	24.060	.0001**
	MMWS 6 months	25	90.80	7.73		
Pair 3	MMWS 3 months	25	75.00	7.50	14.798	.0001**
	MMWS 6 months	25	90.80	7.73		

**Table 8: Complications in different subjects**

Complications		Frequency	Percent
Complications	Cast failure	1	4.0%
	Scar tenderness	2	8.0%
	Persistent Pain	1	4.0%
	No	21	84.0%
	Total	25	100.0%



PRE-OP X-rays



POST-OP X-rays



## Final Follow-up X-rays



## Clinical Outcome

**DISCUSSION**

Scaphoid fractures are quite common in hand injuries; however, they are usually difficult to diagnose and manage. It is seen that a scaphoid fracture can cause absenteeism from work in young adult due to extended morbidity. (1)

In present study, 22 patients were between the ages 20-40 years (88%), while only three patients (12%) were above 40 years, suggesting that scaphoid fractures are seen more in young adults. This finding suggests that scaphoid fracture is common in young adults which correlates with the studies conducted by Haisman JM et al and Tysver T et al.(2,3)

In a study evaluating volar and dorsal approach in acute displaced waist of scaphoid fracture fixation by Herbert screw and K-wires was done by Rettig ME et al (4) in 14 patients. Herbert screw fixation was tried in 8 patients. A fracture union ranging from 8 to 20 weeks with good functionality found in 13 patients (93%) having a mean of 11.5 weeks. Naranje S et al(5) reported 100% union rate seen with Percutaneous Headless compression screw fixation in 32 patients involving both fresh and late scaphoid fracture presentations with dorsal approach. Conservative treatment was tried in cases of distal and middle third of scaphoid fracture which was stable and minimally displaced (greater than 1mm displacement).

Both dorsal and palmar approach can be used for insertion of Herbert screw. The waist fractures and distal pole fractures are more easily accessed by palmar approach as it preserves the blood supply from dorsal aspect. However, as the commonly interrupted structure is volar carpal ligament and insufficient exposure of the proximal pole in this approach. The tenuous

blood supply of scaphoid is at risk when dorsal approach is taken, though it provides the proximal pole exposure better. (6,7)

In present study, 20 patients were subjected to volar approach and 5 patients were managed by dorsal approach. 21 of our patients (84%) had no per-operative complications or difficulties. Early minimally displaced fractures of proximal pole accessed with percutaneous dorsal approach in 5 cases of our study. Early fixation with screw in displaced scaphoid fractures having a rate of union of 88% suggested by a study conducted by Filan and Herbert.<sup>(8)</sup>

The Modified Mayo Wrist Score helps ascertain the functional outcome in various wrist surgeries. In present study, the MMWS was found to be 90.80 at final follow-up. In other studies conducted separately by Parajuli NP et al(1) and Naranje S et al (5) the MMWS scores were found to be 92 and 95.20 respectively. Another study conducted by Amit K et al (8) suggested excellent outcome in the final follow up.

Present study having a union rate of 100% with a complication rate of 16% seen in only 4 cases of total study population. The type of fracture did not have an impact on recovery of wrist functionality early in operative fixation by Herbert screw. Many journals reported open technique complicated by soft tissue dissection and volar and dorsal extrinsic ligaments are violated by the approach. (10)

Persistent pain, scar tenderness and cast failure are the three complications seen in our study. Lack of proper placement of screw is the common cause for Herbert screw failure suggested by many studies.

## CONCLUSION

Present study has shown that fixation of fracture scaphoid using the Headless compression screw results in early relief of symptoms and recovery of function. Based on the results of present study, we concluded that Operative method gives satisfactory results. Operative intervention restores the anatomical configuration and vascularity of the scaphoid bone, thus improving long term outcome of function. Review of these cases shows that the screw provides adequate stability to allow normal wrist function. Achieving, maintaining the anatomy and vascularity is better by operative method. Dorsal percutaneous method gives minimal post-operative complication, better patient compliance and best functional outcome. Screw length and orientation plays a pivotal role in prevention of delayed complication like wrist pain and arthritis. Internal fixation provides faster recovery in function in most patients who can resume work in few weeks.

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