Original Article

Scaphoid Fractures Reduction

# Reducing Operative Time in Scaphoid Fractures Reduction

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## ABSTRACT

**Objective:** We aim to share our experience of scaphoid fractures repair with screw and its impact on the outcome.
**Study Design:** Retrospective case control study
**Place and Duration of Study:** This study was conducted at the Plastic Surgery Department, Liaquat National Hospital, Karachi from January, 2011 to December, 2015
**Materials and Methods:** We retrieved and compared all patients meeting our inclusion criteria, who had undergone scaphoid fracture fixation with either lag screw or compression screw, and sorted them into two groups respectively. Post-operative time was noted and patient rated wrist evaluation (PRWE) was used to objectify pain and function.
**Results:** Most of our patients were males 91.3% (21) with mean age of 26.4 ± 5.2 years.69.5% (16) of the patients were right hand dominant. Out of 23 fractures we managed 65.2% (15) with AO lag screws and 34.7% (8) with cannulated compression screws.The mean total PRWE score was 37.6. Eighty seven percent (20) of the patients showed improvement after intervention for scaphoid fractures, with PRWE mean pain score of 8.9.
**Conclusion:** Early scaphoid fractures fixation using compression screws reduces operative time, pain and helps a young man to resume the earning in his productive years of life.
**Key Words:** Scaphoid fractures, Hand injury, Patient rated wrist evaluation, Conservative management, Screw fixation.

**Citation of articles: Beg MSA, Rahman SS, Khan FH, Rehman O. Reducing Operative time in Scaphoid Fractures Reduction. Med Forum 2017;28(8):79-82.**

## INTRODUCTION

Among hand injuries, carpal bones fractures are a challenge to diagnose and manage. Each bone demands a special treatment[1]. Fractures of scaphoid account for most of the fractures among carpal bones[2]. There are a number of studies providing algorithm for its management[3-7], however most have emphasized on the radiological modalities and findings of scaphoid fractures[8-10].

About 88-90% of scaphoid fractures can be dealt with cast immobilization of the wrist in neutral position[11], but there has been a recent incline to address scaphoid fractures fixation with screws, especially after failed union in conservative management after 6 weeks[12]. Literature is available highlighting use of different type of screws, its position at the fracture site[13] and the pros and cons of its uses. In a study by Verga P and et al, who looked into the use of compression screws for scaphoid fixation and its effects on functional return of hand[2], they concluded that by reducing the inter-fragmentary shearing forces, compression screws results in better union and early return of hand activity. We would like to share our experience with two types of screw fixation, lag screw versus compression screws, in scaphoid fractures management.

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Received: May 13, 2017; Accepted: June 20, 2017

## MATERIALS AND METHODS

The study was conducted over a period of 5 years, from January, 2011 to December, 2015, at Plastic Surgery department of a tertiary care, private sector teaching hospital in Karachi, Pakistan, equipped with multidisciplinary teams and advanced treatment modalities. Serving the region for over 50 years with key role in the last 1 decade, during and after the war in Afghanistan, providing its services with specialized trauma team and hand surgeons is exceptional. Being a teaching unit it is the departmental policy to inform and gain consent from the patients about possible use of medical data for research purposes, after ensuring their hidden identity. Institutional ethical review board has approved the study.

We retrieved data for all the scaphoid fractures which were managed by screw fixation and reviewed it for age of injury, gender, hand dominance, type of screw used, outcomes and complications.Following was the inclusion criteria:

- Unstable scaphoid fracture (defined by any 1 of these)

- greater than 1 mm of displacement
- lateral intra-scaphoid angle greater than 35 degrees
- bone loss or comminuted fracture
- peri-lunate fracture-dislocation
- dorsal intercalated segment instability
- proximal pole fractures

▪ Patients with American Society of Anesthesiology (ASA) score of 2 or less

▪ Nonunion or mal-union after conservative approach

Outcomes were assessed in terms of operative time, post-operative pain and range of motion. We used patient rated wrist evaluation (PRWE) scoring for objective measurement of pain and function. We labelled the score as follows:

- Pain:
  - 0: No pain
  - 1-10: Mild pain
  - 11-20: Moderate pain
  - 21-35: Severe
  - 36-50: Unbearable

- Function:
  - 0-25: Excellent
  - 26-50: Good
  - 51-75: Satisfactory
  - 76-100: Poor

Statistical Package for Social Studies (SPSS) version 19.0 was used to analyze the data for frequencies and co-relations. Chi-square test was used to test significance with 95% confidence interval.

# RESULTS

23 patients met our inclusion criteria. Male (21) to female (2) ratio was 10.5:1 and mean age of presentation was 26.4 ± 5.2 years. Most were right hand dominant, 69.5% (16) as compared to left 30.4% (7). Figure 1 shows demographic distribution in both the groups.

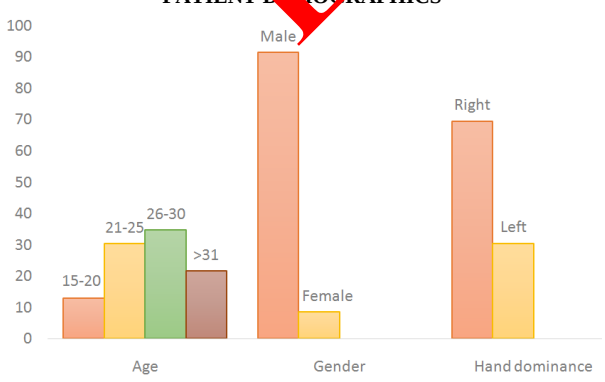


**Figure No.1: Patient demographics in the 2 sub-groups**

Out of 23 patients, 65.2% (15) had AO screw fixation (mini fragment 2mm lag screw) and 34.7% (8) had cannulated screws (2.4mm compression screws). We had shifted our approach from 2014 onward, with 65.2% (15) patients were before 2014 and 34.7% (8) afterwards.

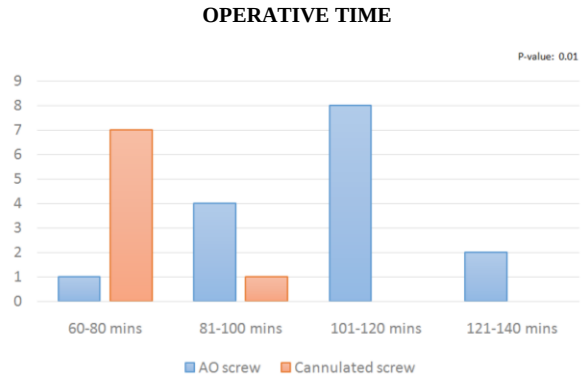


**Figure No.2: Correlation between screw type and operative time (n=23)**

**Outcomes:** All patients were followed up for minimum of 6 months. The mean total PRWE score was 37.6. There was improvement in pain in 86.9% (20) of the patients after intervention for scaphoid fractures, with PRWE mean pain score of 8.9. In AO screw group most patient had mean post-operative score of 1.2 as compared to 2.6 in cannulated screw (p-value: 0.84). One of our patient, with AO screw, had pain score of 45 and so the screw was removed after 6 weeks to relieve the symptom. There was a significant reduction in operative time, with majority in AO screws group had fixation in 101-120 minutes, as compared to cannulated screws group, who had fixation within 60-80 minutes (p-value: 0.01) (Figure 2). Comparing range of motion after scaphoid repair within the two modalities, there was (PRWE mean function score: 28) improvement in this aspect among 80% (12)patients in AO screw group as compared to 87.5% (7) in cannulated screws group (p-value: 0.18). We could not find statistically significant co-relation of age with type of screw and range of motion (p-value: 0.79 and 0.20 respectively). One patient in each group had mild surgical site infection which was managed with antibiotics according to local policy and no additional surgical intervention was required.

# DISCUSSION

Scaphoid enjoys the importance in having tenuous blood supply, acutely missed diagnosis results in early non-union, arthritis or arthrosis of the bone[4, 14]. These injuries are easily missed at acute presentation but the specific presentation of fall on extended hand with tenderness and swelling in anatomical snuff box makes space for suspecting underlying scaphoid injury[15, 16]. Looking at the epidemiology of the disease, which is in line with our observations too, the incidence is more common in young active men with majority presenting

in their 3rd decade[17], affecting their productive years of life.

Plain radiograph is 59–70% sensitive in picking scaphoid fractures[18], though it does not accurately evaluate injury at 6 weeks of follow up, which is usually required after conservative treatment[12]. Bone scan has sensitivity of 99% for detecting occult scaphoid fractures but after 3 days of injury and it does not help in reducing cast immobilization in radiographic absent disease[19]. On the other hand computed tomography (CT) and magnetic resonance imaging (MRI), in addition to being non-invasive, have 72% and 80% sensitivities with 99% and 100% specificities, respectively[20].

A meta-analysis has shown that 34% of conservatively managed proximal pole fractures of scaphoid end up in non-union[14]. Another meta-analysis of 340 scaphoid fractures compared non-operative and operative management. It highlighted that early intervention even in acute un-displaced or minimally displaced fractures, resulted in preventing delayed non-union, better functional outcome and early return of activity[21].

Surgical management ranges from percutaneous fixation to arthroscopic or open screw placement[4, 22, 23]. There had been researches on which screw is better in early return to work and post-operative pain[2, 24, 25]. In our study we observed a significant reduction in operative time with cannulated compression screws. As concluded by other studies the compression screws restrict inter-fragmentary forces and helps to stabilize the fracture site more appropriately[2, 24]. In our study we observed an improvement in range of wrist motion too but this was statistically non-significant, however the study by Gehrmann S.V. and et al showed significant improvement in wrist function after fixing with these screws[24]. We could not find statistical correlation between age group and wrist function neither could use age to determine which screw type was appropriate for the groups.

## CONCLUSION

Early intervention for scaphoid fixation with compression screw reduces operative time and post-operative screw site pain.

**Author's Contribution:**

Concept & Design of Study: Mirza Shehab Afzal Beg
Drafting: Fahad Hanif Khan
Data Analysis: Obaid-ur-Rehman
Revisiting Critically: Syed Sheeraz ur Rahman
Final Approval of version: Mirza Shehab Afzal Beg

**Conflict of Interest:** The study has no conflict of interest to declare by any author.



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