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ORIGINAL ARTICLE

Functional Outcomes of Fixation of the Scaphoid Fracture with Herbert Screw: A Cross-Sectional Study

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ABSTRACT

Objective: The present study aims at the assessment of the radiological union and clinical outcomes of scaphoid fracture followed by fixation by Herbert Screw.

Study design: A cross-sectional study

Place and Duration: This study was conducted Muhammad Medical College and Hospital Mirpurkhas from may 2021 to may 2022

Methodology: A total of 20 patients were included in the study and all of them had sustained a scaphoid fracture. All of them were treated with Herbert screw fixation. Overall 18 of them were male and 2 were female. Serial radiographs were obtained for the assessment of union and the Modified Mayo wrist scoring (MMWS) system was used for the assessment of functional outcomes. The patients were called after 6 months of surgery for a follow-up visit. A total of 9 (45%) patients were treated within the first week of the injury. Overall 5 (25%) were treated in two weeks and 6 (30%) were treated in 2 to 4 weeks

Results: Out of 20 patients included in the study, 17 had fractured at the waist of the scaphoid and the remaining 3 had sustained fractures at the proximal pole of the scaphoid. The dorsal and volar approach of fixation by Herbert Screw was used for treating all the fractures. A good alignment was observed post-operatively. Out of all the 20 patients, 12 (60%) patients showed excellent outcomes with a full range motion of the wrist, 6 (30%) had shown good results, and 2 (10%) showed poor results. A final follow-up was arranged during the sixth month of treatment and 18 (90%) patients showed adequate radiological union.

Conclusion: Fixation of scaphoid fracture with a Herbert Screw in a convenient and effective mode of treatment which has shown excellent functional outcomes and exceptionally reduced complications.

Keywords: Herbert Screw, Fixation, Functional outcomes, Scaphoid fracture

INTRODUCTION

A scaphoid fracture is not a very common fracture in young individuals constituting 2-7% of all fractures. Whereas, out of carpal bones, it is the most commonly fractured bone accounting for almost 82-89 percent of cases [1]. If it is not treated in time and left neglected, it can result in nonunion or malunion, hence, it should be taken seriously in the beginning and an appropriate treatment should be commenced. Almost 10-35% of this type of infection is left untreated, resulting in non-union [2]. The negligence eventually results in pain and altered biomechanics of the joint. The motion of the wrist also alters and a reduction in grip strength is also seen. Moreover, some patients also develop carpal arthritis [3]. There are multiple treatment techniques for the non-displaced scaphoid fracture that range from an external cast to open surgical management and percutaneous fixation. Nonetheless, the union rate is 10-50% in the case of cast treatment [4].

There are certain other factors too that are responsible for malunion and non-union of the scaphoid fracture even after treatment. These factors include fractures of the proximal pole, displaced fractures, and fractures involving ligaments [5]. Some studies have shown that the failure rate of treatment with plaster and immobilization is 10-12% [6]. The major benefit of fixation through a percutaneous Herbert Screw is that it does not hinder the blood supply of scaphoid bone and it also helps in the stabilization of the wrist ligament [7]. Various studies have reported encouraging outcomes of using Herbert Screw for reduction and internal fixation of scaphoid fracture followed by stable and unstable fractures [8-10]

Our study aims at reviewing the radiological, functional, and clinical outcomes of the reduction and fixation of a scaphoid fracture by using Herbert Screw.

METHODOLOGY

A total of 20 cases of scaphoid fracture were treated using Herbert Screw in our study. The cases included acute scaphoid fractures, cases of non-union, those patients who did not show any sign of union even after 12 weeks of wearing a cast, and fractures presenting after three weeks to two months of the initial injury. According to the exclusion criteria of the present study, the patients with trans-scaphoid peri-lunate dislocation, such as humpback of the scaphoid, osteonecrosis of any fragment of the scaphoid bone, any other injury of wrist and tuberosity fracture of scaphoid, were not included in the study.

A total of 18 (90%) of the patients were male and 2 (10%) of the patients were female. The mean age of the patients was 26.3 years with a range of 17-46 years. Almost 5 (25%) patients had left scaphoid fractured and 15 (75%) patients had their right scaphoid fractured. The mean time after which the patients had presented after the injury was 15±2 days. The patients were called after 6 months of surgery for a follow-up visit. Overall 9 (45%) patients were treated within the first week of the injury. A total of 5 (25%) were treated in two weeks and 6 (30%) were treated in 2 to 4 weeks. Out of all the patients, 3 (15%) had presented with a delayed union after treatment with a plaster cast.

The radiographs of the scaphoid included a poster-anterior view, semi-pronated oblique, anteroposterior view, and lateral view. The gradation of the injuries was done according to the Herbert and Fisher Classification. 8 (40%) fractures treated were of type B2, 5 (25%) were type A2, 4 (20%) were type B3, and 3 (15%) were type C fractures. All the waist fractures were treated by the volar approach and all the proximal pole fractures were treated by the dorsal approach. All the patients were operated on under general anesthesia. In the beginning, a K-wire was used for the sake of fixation, but Herbert Screw was introduced then and confirmation was done by image intensifier. Sutures were removed two weeks after the surgery. A cast was continued for four weeks after the removal of sutures. In the sixth post-operative week, the

cast was detached and a wrist immobilizing brace was attached for four weeks. Physiotherapy was advised in this phase of the treatment.

All the patients were checked every four weeks until a union of the fracture was detected on radiographs. At least three follow-up visits were considered for the confirmation of the union. MMWS was done on the final follow-up visit. The data was analyzed by IBM SPSS version 26.

RESULTS

Out of 20 fractures treated, 18 united successfully. Radiological imaging was considered for the confirmation of the union after the surgery. Delayed union at the eighth week of fracture has been shown in the figures. Table 1 gives the demographic data of the patients.

Table 1: Demographic data of the patients in the present study (n=20)

Number of patients	20
Mean age of the patients	26.3 years (Range 17-46 years)
Gender Male Female	 18 (90%) 2 (10%)
Side Left Right	 5 (25%) 15 (75%)
Herbert Type B2 A2 B3 C	 8 (40%) 5 (25%) 4 (20%) 3 (15%)

Table 2: Approach, MMWS, and complications

Variables	Value
Average duration after which surgery was done	15±2 days
Approach Volar Dorsal	 17 (85%) 3 (15%)
Average time of union (weeks)	10.57±3.6
Average MMWS	90

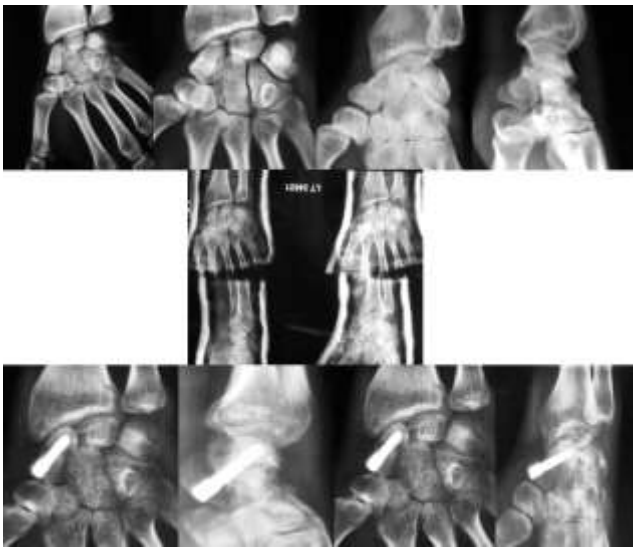

Figure 1: Delayed union at 8th week post-operatively

One patient showed radiological union in the proximal pole fracture after 6th week. One patient did not have a union at all. The mean MMWS score was 90, ranging from 45 to 100. Out of all the 20 patients, 12 (60%) patients showed excellent outcomes with a full range motion of the wrist, 6 (30%) had shown good results, and 2 (10%) showed poor results.No peri-operative complications were seen in any of the cases. Malunion was also not seen in any case. One patient had presented with loosening of the screw and that patient denied further treatment. One of the patients had exhibited signs of osteoarthritis of the scaphoid due to operative trauma. Table 2 exhibits the approach, MMWS, and complications seen during the study.

DISCUSSION

Scaphoid fractures are commonly seen in people of all age groups. However, they are the most difficult to treat. Prolonged morbidity is one of the adverse outcomes of these fractures. In the present study, only 4 (20%) patients were above the age of 30 years, rest 16 (80%) were below the age of 30 years which depicts that these fractures are more common in young adults.

In a prospective study to compare the Herbert Screw fixation with the short-term application of cast in scaphoid fracture cases, Saeden B et al concluded that the patients that received fixation treatment through Herbert Screw were able to come back to work earlier [11]. Their study has a similar suggestion to that of the present study. Similarly, Davis EN et al studied and compared the techniques of fixation and cast immobilization for scaphoid fractures. They concluded that fixation is not only more effective than casting, but it is also more cost-effective. It is even more cost-effective than many other interventions being used [12].

Various research have recommended that the technique of fixation by Herbert Screw is more effective compared to other techniques used to treat a scaphoid fracture. The study of Naranje et al reported that 100% unio of the scaphoid bone can be obtained by application of this technique. Their study included 32 patients having late and fresh fractures of the scaphoid [13]. Likewise, Shin et al observed that the fracture of the scaphoid healed in 7.1 weeks if treated with fixation compared to 11.6 weeks if treated by cast application [14].

CONCLUSION

Open reduction and internal fixation are a reliable options to avoid malunion and non-union carpal instability which occurs as a complication of scaphoid fracture. Herbert Screw fixation has better functional and radiological outcomes.

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