# Our practis in operative treatment of scaphoid fracture with open reduction and internal fixation by K-wires

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**Abstract:** Purpose of our study: To given high union rate, early mobilization and weight-bearing by K-wires fixation. Materials and methods: In our department from June 2020 to June 2023, 23 patients treated with open reduction and internal fixation by K-wires. Results: After operation in a lot of patients union or callus formation occurred at the time (6-8 weeks). Conclusion: Open reduction and internal fixation by K-wires is one of the best methods of scaphoid fracture because after that union rate is high, malunion and also chances of avascular necrosis is very low.

**Keywords:** fracture, the scaphoid bone, K-wire

## INTRODUCTION

The scaphoid is the most frequently fractured carpal bone, accounting for 65-71% of all carpal bone injuries, 11% of all hand fractures and 5% of all wrist injuries [7]. Scaphoid fractures often occur in young and middle-aged adults, typically those aged 15-60 years. Men aged 20 to 30 years are most often affected. Who also have the highest incidence of non-union, take the longest time to unite. The importance of scaphoid fracture diagnosis is clear when one realizes that 90% of all acute scaphoid fractures heal if treated early. There are no specific risks or diseases that increase the chance of having a scaphoid fracture. “Campbell’s Operative Orthopedics” estimates that 40% of scaphoid fractures are undiagnosed at the time of the injury [3]

*Aim of our study:* To given high rate of union, early mobilization and weight-bearing by pin fixation.

## MECHANISM OF SCAPHOID FRACTURE

Hyperextension with axial load during a fall on an outstretched hand is the most common cause of scaphoid waist fracture [11](Fig. 1A). A direct blow to the scaphoid

tubercle often during a fall could cause a distal fracture [2], and this is the most common fracture in children [1,8,10,12](Fig. 1B). Fracture can also occur with an unloaded wrist in maximum extension in combination with a sudden hit. This is typical for a goalkeeper getting struck by a high-velocity ball, and it often results in a proximal pole fracture [4,9](Fig. 1C). Yet, another way to fracture the scaphoid is through a punch mechanism whereby an axial load to the index metacarpal through the trapezium and trapezoid is transferred to the distal scaphoid, causing a shear force type of scaphoid waist fracture [6](Fig 1D). When a high-energy trauma is involved, a scaphoid fracture could result, often in combination with other concomitant carpal fractures and, sometimes, perilunate dislocation [5].

Figure 1: Four most common mechanisms of injury in scaphoid fractures.

MATERIALS AND METHOD

We used open reduction and internal fixation by K-wires to fix scaphoid fracture. Period of study: 24 months from June 2020 to June 2023. 23 patients with diagnosis of scaphoid fracture treated with open reduction and internal fixation by K-wires in our department in which 19 patients male and only 4 patients were female. Age distribution range from 23 to 47 years. In 23 scaphoid fracture only 8 patients with acute scaphoid fracture and rest 15 with chronic scaphoid fracture.

RADIOLOGICAL EVALUATION

Scaphoid fractures are most commonly diagnosed by x-rays of the wrist. However, when the fracture is not displaced, x-rays taken within the first week may not reveal the fracture. A non-displaced scaphoid fracture could thus be incorrectly diagnosed as a “sprain” because the x-ray was “negative.” Therefore a patient who has significant tenderness directly over the scaphoid bone (which is located in the hollow at the thumb side of the wrist, or “snuffbox”) should be suspected of having a scaphoid fracture and be splinted. The patient should be re-evaluated about two weeks later and if findings are still suspicious for a scaphoid fracture, x-rays at that time will usually show the fracture due to changes in the bone at the edge of the fracture. In cases where waiting two weeks in a splint may cause undue hardship, or if the x-rays remain negative but the clinical exam is still suspicious, more sophisticated (and expensive) imaging techniques may be utilized, such as CT scan.

TREATMENT

All patients with scaphoid fracture received third generation antibiotic 2 hours before operation to 5-7 postoperative days. Mean duration between injury and

operation was 1-3 days. Under intravenous anesthesia with the patient on supine position, clean skin of the upper limb three times with antiseptic solution betadine. Elastic tourniquet is will be placed at the level of the lower third of the shoulder. S-shaped incision is made on the dorsum of the wrist up to 4-5 cm. Layer by layer by sharp and blunt revealed the fracture of the scaphoid bone. Scaphoid bone fragments cleaned from blood clots, then will be mapped and fixed by K- wires. The surgical wound is will be washed with antiseptic, elastic tourniquet will be remove. The wound is sutured layer by layer. Aseptic bandage to surgical wound. Fixing by plaster splint for six weeks. Daily dressing done for 14 days after 14 days sutures removed. After six weeks repeat x-ray done if healing is good K-wires will be removed and the healing is not good K-wires are not removed and continue fixation 1-2 weeks more.

RESULTS

Mean operation time from the skin incision to the closure of the wound was 45-60 minutes. No any patients developed failure of pins (K-wires) fixation. After operation in 4 patients developed nonunion, in 7 patients occurred delay union. And in rest patients union or callus formation an appropriate time was achieved after pin fixation (average time 6-8 weeks). No developed avascular necrosis in any patients. No any patients showed nerve injury due to pin fixation. Scaphoid fracture treated with open reduction and internal fixation by K-wires given about 70% good movement after operation in wrist joint but in some patients due to bad care and physiotherapy occurred painful stiffness of joint.

CONCLUSION

Open reduction and internal fixation by K-wires is one of the best methods of scaphoid fracture because after that union rate is high, malunion and infection rates are low and also chances of avascular necrosis is very low. Functional outcome is high that means movement of joint and also weight lifting is good after physiotherapy compare to conservative treatment treated by plaster cast because they give high rate of nonunion and malunion formation and also chances of avascular necrosis formation (statically). And functional outcome is also bad. So for scaphoid fracture open reduction and internal fixation by K-wires is good method of choice.

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