

Summary

Background: Scaphoid fracture is a major cause of morbidity in patients with upper extremity injuries.

Aims: To assess clinical outcome and radiological union of scaphoid fracture after operative management following Herbert screw fixation in patient attending Sharda Hospital.

Materials and methods: This prospective study was carried out from December 2010 to December 2014. Out of 78 patients, 34 cases were of acute fractures and 44 cases of non-union. 34 cases of acute scaphoid fractures were treated with percutaneous Herbert screw fixation and 44 cases of non-union were treated with Herbert screw fixation with bone grafting. These study group patients were compared healing and complications with a matched control group of 78 scaphoid fractures. Serial radiographs were taken to assess radiographic union and functional outcome was assessed using Modified Mayo wrist score. All patients were followed for twelve months.

Results: Median time to union was longer for control group of scaphoid fractures compared with the study group of scaphoid fractures: 84 days (range, 70–104 days) versus 52 days (range, 40–76 days), respectively. Percutaneous Herbert screw fixation is an option to reliably diminish the incidence of nonunion and malunion with residual carpal instability that occur with cast immobilization in scaphoid fracture. The mean MMWS score was 92 (range 45–100). The results were excellent in 88.46% (69/78) and good in 11.53% (9/78) in study group patients.

Conclusion: The Herbert screw provides rigid internal fixation and allows earlier mobilization of the wrist.

Keywords

Scaphoid fracture – Herbert screw – Percutaneous fixation – Functional outcome

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ORIGINAL PAPER

Results of Herbert screw fixation in scaphoid fracture: A prospective study

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Introduction

The scaphoid is considered the worst bone in the entire arm to break [8]. It has a poor blood supply. They do not heal (i.e. go on to 'non-union') and/or have part of the bone die ('avascular necrosis': like a heart attack of bone) [16]. Generally we put a fresh non-displaced (the fragments haven't moved) fracture into a cast, a distal pole fracture takes 2 months to heal, a waist fracture takes 3 months to heal, and a proximal pole fracture may never heal, and takes 4–6 months to heal when it does [3,6,13,4]. The reason that proximal pole scaphoid fractures often won't heal in a cast is because these fractures are less stable than the others. Proximal pole fractures will almost always do better with surgical fixation [10,9,20]. Scaphoid fractures often don't show up on the initial X-rays. Scaphoid fractures may take 2 weeks to become visible on X-ray. An magnetic resonance imaging can diagnose a scaphoid fracture within 24 h. Percutaneous screw placement does not disrupt the soft tissue and blood supply around the scaphoid, which allows it to heal better and quicker than compared to using a traditional open incision. If the scaphoid screw is placed within 4 weeks

of the fracture, percutaneous screw placement has a 95% chance of success [16,18,12]. Our aim is to assess clinical outcome and radiological union of scaphoid fracture after operative management following Herbert screw fixation in patient attending Sharda Hospital.

Patients and methods

This prospective study was carried out at Orthopaedics Department of School of Medical Sciences and Research, Sharda University from December 2010 to December 2014. It was approved by institutional medical ethics committee. A total of 156 patients with scaphoid fractures admitted to our institute were included in present study. Out of 156 patients, 78 patients were of study group and rest of 78 patients were of control group. Study group patients were treated operatively with Herbert's screw and control group patients treated conservatively with thumb spica cast. Out of 78 study group patients, 34 cases were of acute fractures and 44 cases of non-union (Table 1). 34 cases of acute scaphoid fractures were treated with percutaneous Herbert screw fixation and 44 cases of non-union were treated with Herbert screw fixation with bone

Ergebnisse der Herbert-Schrauben-Osteosynthese bei Scaphoidfrakturen: eine prospektive Studie

Zusammenfassung

Hintergrund: Scaphoidfrakturen sind ein häufiger Grund für die Morbidität von Patienten mit Verletzungen der oberen Extremität.

Ziel: Ziel der Studie ist die Beurteilung des klinischen Ergebnisses und der radiologische Nachweis der Heilung einer Scaphoidfraktur nach operativer Versorgung mittels Herbertschraubenosteosynthese von Patienten des Sharda Krankenhauses.

Material und Methoden: Diese prospektive Studie wurde von Dezember 2010 bis Dezember 2014 durchgeführt. Von 78 Patienten waren 34 Fälle mit akuten Scaphoidfrakturen und 44 Fälle mit Pseudarthrosen. 34 Fälle der akuten Scaphoidfrakturen wurden mittels percutaner Herbertschraubenosteosynthese behandelt, die 44 Pseudarthrosen mit Herbertschraubenosteosynthese und Knochentransplantation. Diese Studiengruppe wurde nach Heilung und Komplikationen verglichen mit einer Match-Kontrollgruppe mit 78 Scaphoidfrakturen. Serielle Röntgenuntersuchungen wurden durchgeführt, um die radiologische Durchbauung nachzuweisen, das funktionelle Ergebnis wurde mittels modifiziertem Mayo Wrist Score beurteilt. Alle Patienten wurden 12 Monate lang untersucht.

Schlüsselwörter

Scaphoidfraktur– Herbertschraube– Percutane fixierung– Funktionelles Ergebnis

Table 1. Details of fracture according to type ($n = 78$).

Type of fracture	Number of scaphoid fracture	Surgical approach		Bone graft	Follow-up
		Volar	Dorsal		
B1	5	5	0	0	12 months
B2	23	22	1	0	12 months
B3	6	0	6	0	12 months
D1	20	16	4	20	12 months
D2	14	11	3	14	12 months
D3	10	7	3	10	12 months
Total	78	61	17	44	

grafting. Control group had 78 acute scaphoid fractures. We excluded patients with tuberosity fracture, trans-scaphoid perilunate dislocation; hump back deformity of scaphoid, Dorsal intercalated segmental instability deformity (DISI), osteonecrosis of proximal scaphoid fragment and any other associated fracture around the wrist. A written informed consent was obtained from all the patients; they were explained about treatment plan, cost of operation, and hospital stay after surgery, and complications of anaesthesia. They were followed up after surgery, were clinically and radiologically assessed for fracture healing, joint movements and complications. According to the criteria the results are graded as excellent when the fractures unite within 16 weeks without any complication, good when union occur within 24 weeks with treatable complications like superficial infection and wrist stiffness and poor when union occur before or after 24 weeks with one or more permanent complications like infection (osteomyelitis), implant failure, non-union, and permanent wrist stiffness. The median age was 27 years (range, 16–46 years). The control group of 78 cases did not differ

from the study group of 78 cases in characteristics such as sex, age, additional injuries, the amount and types of fractures, and presence of diabetes, which potentially affects fracture healing negatively. The time to initial surgery, duration of initial surgery, type of initial fixation, and length of initial hospital stay did also not differ between the two groups. Follow-up was done for twelve months. Scaphoid radiographs included, postero anterior view, lateral view, semipronation oblique and antero posterior view with wrist in ulnar deviation. Injuries were graded according to Herbert and Fisher Classification (Table 2) [11]. We operated on five (6.41%) type B1 fractures, twenty-three (29.48%) type B2 fractures, six (7.69%) type B3 fractures, twenty (25.64%) type D1 fractures, fourteen (17.94%) type D2 and ten (12.82%) type D3 fracture. Volar approach was used to all waist fracture and dorsal approach to all proximal pole fracture. Surgery was performed under general or regional anaesthesia. Preliminary reduction was achieved with K-wire fixation and once satisfactory reduction achieved, Herbert screw fixation was done and confirmed using image intensifier. The wrist was supported

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