

An Evidence-Based Approach to the Management of Acute Scaphoid Fractures

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EDITOR'S COMMENT

This month's Evidence-Based Medicine papers both address the same hot topic: cast versus screw for nondisplaced scaphoid waist fractures. It is instructive to see what different groups make of the same evidence, demonstrating that even with the best evidence there will always be an art to medicine.

CURRENT OPINION

Current opinion favors operative treatment of displaced scaphoid fractures as it has been recognized that displaced fractures are at a higher risk of malunion and/or nonunion.¹ The role of surgical fixation for undisplaced scaphoid waist fractures is more controversial. Proponents of operative fixation cite a quicker return to activity (work/sport) and a reduced risk of nonunion compared with that for cast treatment and with minimal additional risk.

THE EVIDENCE

Fracture union

There exist 6 published randomized controlled trials comparing cast with operative fixation.²⁻⁷ In all 6 studies, the determination of union was not optimal as none of the investigators employed computed tomography (CT) scans. The authors were not blinded, and the definition of union was based on clinical exam and radiographs alone. Time to union was only reported in 3 of the 6 studies. McQueen et al.² ($p < .001$) and Bond

et al.³ ($p < .0003$) reported a significantly faster time to union in the operative group, but Adolfsson et al. did not⁴ (Table 1). Union rates were high in both the operative and nonoperative groups in 5 of the 6 studies.²⁻⁶ In the only study to report a significant difference in union rate, Dias et al. also reported the greatest number of nonunions (10 of 44 with a cast vs 0 of 44 for operative treatment, $p = .001$).⁷ They defined nonunion as absence of radiographic signs of healing at 12 weeks and a gap on CT scan at 16 weeks; however, this definition may be flawed as one such nonunion healed without additional treatment and 4 of 10 patients did not have a visible fracture line or evidence of mobility at the time of surgery.

Return to activity

Most studies report improved grip strength and range of motion in the surgical group (compared with that for the cast group) between 8⁷ and 16⁴ weeks but no difference at the time of final assessment.^{2-4,6,7} Both Adolfsson et al.⁴ and McQueen et al.² ($p < .001$) report a faster return to sport in those treated surgically. Bond et al. ($p < .0001$) and McQueen et al. ($p < .001$) report an earlier return to work with surgery.^{2,3} On the other hand, Dias et al. reported no difference in return to work times between the 2 groups,⁷ and the 2 remaining trials found that only those working in manual labor had a significantly faster return to work with surgery (Vinnars et al., $p = .03$; Saedén et al., $p < .01$).^{5,6} Taking into consideration return to work times and the cost of work disability, Vinnars et al. reported that cast treatment still had lower total costs than those of surgical treatment for both manual laborers (cast €3,485 vs surgery €4,529, $p > .05$) and nonmanual laborers (cast €770 vs surgery €2,253, $p < .047$); however, these costs were only significantly lower in nonmanual laborers.⁵

Complications

There are very few complications reported with cast treatment. The stiffness and weakness related to disuse are transient and resolve by final follow-up. In addition, the incidence of nonunion with cast treatment was not higher in the majority of

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TABLE 1. Review of Randomized Controlled Trials Evaluating Cast Treatment Versus Surgical Fixation for Acute Scaphoid Fractures

Study	Fracture Type	Sample Size (N) of Patients	Treatment	Nonunion	Time to Union
Saedén et al. (2001) ⁶	Acute	62	Herbert SATSC	1 of 30 2 of 30	Not reported
McQueen et al. (2008) ²	Scaphoid waist (displaced and undisplaced)	60	Percutaneous Acutrak (Acumed, Beaverton, OR) Colles' cast	1 of 30 4 of 30	9 weeks* 14 weeks*
Adolfsson et al. (2001) ⁴	Undisplaced waist	53	Percutaneous Acutrak Below-elbow plaster	1 of 23 0	20 patients, 10 weeks 2 patients, 16 weeks 20 patients, 10 weeks 2 patients, 16 weeks 4 patients, 19–24 weeks
Bond et al. (2001) ³	Undisplaced waist	25	Percutaneous Acutrak LATSC × 6 weeks SATSC until healed	0 0	7 weeks** 12 weeks**
Vinnars et al. (2007) ⁵	Undisplaced	52	Herbert SATSC	0 of 26 1 of 26	Not reported
Dias et al. (2005) ⁷	Undisplaced and minimally displaced	88	Herbert Colles' cast	0 of 44* 10 of 44*	Not reported

SATSC, short-arm thumb-spica cast; LATSC, long-arm thumb-spica cast.
* $p < .001$.
** $p = .0003$.

studies.^{2–6} Only Dias et al. identified a significantly greater nonunion rate in the cast group ($p < .001$) compared to the group treated with the Herbert screw.⁶

The most frequent operative complications reported in these 6 trials were scar-related complications,⁷ prominent hardware,^{2,3} other technical difficulties (ie, breakage of 2 screwdrivers),² chronic regional pain syndrome,^{2,7} infection,⁷ and asymptomatic scaphotrapezium osteoarthritis in 1 long-term study.⁶

SHORTCOMINGS OF THE EVIDENCE AND DIRECTIONS FOR FUTURE RESEARCH

None of the 6 published clinical trials used CT or arthroscopy to diagnose fracture displacement, and it is possible that some of the fractures included were displaced or unstable.⁸ Furthermore, because scaphoid fracture union cannot be diagnosed accurately on radiographs,⁷ use of time to union and union as measures of treatment success are suspect, particularly as the evaluators were neither blinded nor independent.

Return to activity or work is a relatively imprecise and nonobjective measure of treatment success. For instance, the Bond et al. trial was performed among U.S. Navy personnel, who are not allowed to return to active duty when in a cast—in other words, it was in

large part a regulation and not a medical evaluation that determined return to work in that study.³ Furthermore, if patients and their surgeons believe that a screw will allow patients to work or play sooner, they probably will, regardless of whether it is more or less appropriate.

The reported complication rates reflect the experience of specialist surgeons that perform scaphoid fixation regularly. The complication rate might be higher in the hands of surgeons performing this procedure less frequently.

Some studies have low follow-up rates (McQueen et al. 80%, Adolfsson et al. 73.6%, Vinnars et al. 61%),^{2,4,5} and 1 study reported follow-up data for only 16 weeks.⁴ The typical scaphoid fracture patient is young and mobile, and it can be difficult to get them to return once the fracture is healed.

Clinical trials are difficult in surgery, particularly for less common conditions such as scaphoid fractures, and especially when randomizing patients to operative or nonoperative treatment. It can be difficult to obtain adequate numbers from a single center. For example, although 62 patients were eligible for randomization in the study by Bond et al., only 25 consented to participation.³ Given the small differences in outcomes such as union and range of motion, most published trials are probably underpowered.

We need reliable and valid methods for diagnosing displacement and union. Our unit has been using serial CT scans in the planes defined by the long axis of the scaphoid, but the diagnostic performance characteristics of this approach are incompletely defined.

A large multicenter trial using CT scans to assess displacement and union, standardized objective and functional outcomes assessed by independent and blinded observers, consistent and independent criteria for return to work, and strong incentives for long-term participation is necessary before we can definitively determine if surgical fixation is superior to cast treatment when managing undisplaced fractures of the scaphoid.

CURRENT CONCEPTS

The data to date have demonstrated that the advantages of surgical fixation are transient, the possible complications must not be underestimated, and the long-term outcomes of surgical fixation are incompletely understood. The current literature suggests that operative fixation of the patient under consideration (a 20-year-old man employed as a construction worker) will lead to a faster return to work and less time spent in a cast; however, the fracture will not heal faster, the nonunion risk is unchanged, he will not have a better end result, and he will be exposed to the risk of possible operative complications. A discussion of these factors will allow the patient to make a well-informed decision. If the trend in favor of percutaneous screw fixation continues, our opinion is that many patients may receive unnecessary surgery, contributing to escalating health care costs and exposing patients to avoidable risks.

At our institution, the patient under consideration would have a CT scan⁹ to confirm that the fracture is undisplaced followed by immobilization in a short-arm

thumb-spica cast. Serial CT scans would be used to monitor union, with the first scan taken at 6 weeks. Once 50% of the scaphoid shows evidence of union, the patient would be allowed to use a removable thumb-spica splint. A few months later, a CT scan would be obtained to confirm complete union. In our personal experience, the majority of patients with scaphoid waist fractures have cast removal by 8 weeks, and the union rate approaches 100%.

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