

FPIN's Clinical Inquiries

Thumb Spica Casts for Scaphoid Fractures

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Clinical Question

In nonoperative management of scaphoid fractures, does using a thumb spica cast lead to superior outcomes compared with a cast that does not include the thumb?

Evidence-Based Answer

The type of cast used does not appear to impact outcomes. A short arm cast allows the patient to have better function and mobility during immobilization without compromising the healing process. (Strength of Recommendation [SOR]: B, randomized controlled trials and cross-sectional studies.) Thumb spica casts are no better than casts that do not include the thumb in fracture healing rates or long-term improvement in range of motion, strength, or pain. (SOR: B, multiple randomized controlled trials.) Testing on uninjured individuals shows no difference in the range of motion or functional movement of the wrist when immobilized in a thumb spica cast compared with a cast that does not include the thumb. (SOR: C, cross-sectional anatomic studies.) Patients wearing thumb spica casts also have more functional limitations than patients able to use their thumb while casted. (SOR: C, cross-sectional studies.)

Evidence Summary

FRACTURE UNION

A 2014 multicenter randomized controlled trial from the Netherlands compared below-elbow casting with and without inclusion of the thumb for the treatment of non-displaced or minimally displaced fractures of the scaphoid waist ($n = 55$) and distal scaphoid ($n = 7$).¹ Included patients ($n = 62$) were 18 years or older and presented less than four weeks after injury with a scaphoid fracture confirmed by magnetic resonance imaging or computed tomography

(CT) with less than 1 mm of gapping or translation between fracture fragments and no other associated fracture or perilunate injury. Patients were treated with cast immobilization for 10 weeks, with or without the thumb included, at which time a CT scan was performed, and fracture union was measured as a percentage of the fracture line crossed by bridging bone. The primary outcome was extent of union at 10 weeks, with secondary outcomes measured at six months, including radiographic union, flexion/extension, grip strength and wrist motion, and arm-specific disability. At 10 weeks, there was a statistically significant difference in extent of union favoring the no-thumb cast ($n = 31$) compared with the thumb cast ($n = 31$; 85% vs. 70%; $P = .048$), although the authors note that this likely does not have any clinical significance. None of the secondary outcomes measured at six months showed any statistically significant differences between the groups. Study limitations included unintentional inclusion of fractures of the distal third of the scaphoid, unreliable measurement of union on CT, and patients lost to follow-up.

A 1991 prospective randomized clinical trial from the United Kingdom compared scaphoid casts, which include the thumb, with forearm gauntlet casts, which do not include the thumb (Colles cast), for the treatment of scaphoid fractures.² Patients ($n = 292$; mean age = 29.7 years; 76% male) with a radiographically confirmed scaphoid fracture who presented within two weeks of injury were randomized to a scaphoid cast or a Colles cast for treatment. Cast integrity and presence of functional problems were reviewed at two and four weeks after receiving the cast. At eight weeks, the cast was removed, and the fracture was clinically and radiographically assessed for union. Cast treatment was discontinued after confirmation of acceptable healing, defined

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as appearance of trabeculae crossing the fracture line or signs of increased bone density. Lack of acceptable healing resulted in four more weeks of wrist immobilization in the same type of cast. Final follow-up was six months after injury with radiographic examination of fracture union. At six months, there was no significant difference in fracture nonunion with the Colles cast ($n = 148$ with 15 nonunions) compared with the scaphoid cast ($n = 143$ with 14 nonunions; relative risk = 1.04; 95% CI, 0.52 to 2.07).

SCAPHOID MOVEMENT

A 2019 cross-sectional study measured anatomic and functional range of motion for Colles-type casts and splints compared with scaphoid-type casts and splints.³ Ten healthy volunteers (mean age = 28 years) with no previous wrist injury or disability had flexion, extension, radioulnar deviation, and circumduction measured to determine their baseline achievable range of motion as well as baseline functional testing, including opening a jar lid, pouring from a jar, drinking the last drops from a cup, and simulated dart throwing. For each patient, these measurements were taken with their wrist free and with it casted. There were no statistically significant differences between Colles-type and scaphoid-type casts for restriction of wrist movement ($P > .406$; no comparison data provided). Study limitations were the small study size and use of healthy participants and, thus, a lack of generalization to the population with scaphoid fractures.

A 2017 anatomic study compared motion of the scaphoid bone when immobilized in short arm thumb spica casts and forearm gauntlet casts.⁴ Ten healthy men (mean age = 34 years) with no history of trauma or scaphoid fracture had their right wrist immobilized in both casts. The wrists were serially imaged by CT, first in the spica cast with the thumb immobilized in volar abduction and forearm neutral rotation, then in the gauntlet cast with the wrist in neutral rotation and the thumb fully abducted radially, and then fully opposed to the distal palmar crease. The scaphoid did not move significantly, demonstrating less than 1 mm of displacement with motion in all directions. Study limitations included small sample size and no actual scaphoid fractures imaged.

HAND FUNCTIONALITY

A 2017 multicenter prospective comparative study in the United States evaluated hand functionality with thumb spica cast and short arm cast immobilization.⁵ Healthy men and women 18 years or older were randomized into two groups: thumb spica cast on the dominant hand followed by a short arm cast and thumb spica cast on the nondominant hand followed by a short arm cast. Each cast type was worn for 24 hours, at the end of which the participants completed a typing test and the Patient-Reported Outcomes Measurement

Information System (PROMIS) assessment before the cast was removed. The PROMIS survey rates the difficulty of performing upper extremity activities of daily living on a scale of 0 to 100, with 100 indicating no loss of function. A statistically significant difference was observed in average PROMIS scores for dominant hands in short arm vs. thumb spica casts (89.1 vs. 52.2; $P = .0001$) and for nondominant hands (96.9 vs. 85.2; $P = .0001$). Statistically significant outcomes favored dominant hand short arm casts vs. thumb spica casts in typing accuracy (94.4% vs. 92.8%; $P = .0001$) and speed (47.5 words per minute [wpm] vs. 38.2 wpm; $P = .0001$). For those with a nondominant hand short arm cast, typing accuracy and speed results were also statistically better (94.8% vs. 93.2% with thumb spica casts; $P = .0001$ and 51.2 wpm vs. 39.5 wpm; $P = .0001$). Study limitations included the use of healthy participants and only short-term (24 hours) duration of wearing casts.

A 2006 prospective study from the United Kingdom compared hand function with a scaphoid cast and a Colles cast.⁶ Participants were men and women ($n = 10$; 20 to 45 years of age) with no known hand-related orthopedic or neuromuscular disorder. All participants were right-hand dominant, and scaphoid and Colles casts were applied to the right forearm of each participant. Hand function was tested using the Jebsen-Taylor Hand Function Test, a timed, standardized test that measures seven items simulating everyday functional activities. The shorter the time to complete the test, the better the hand function. The Colles cast resulted in significantly shorter time to complete the hand function test compared with the scaphoid cast (mean difference = -10.3 seconds; 95% CI, -15.3 to -5.3 seconds).

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