APPENDIX 2

RCTs included in the scoping review

Table A. Table of RCTs for interventions for the treatment of scaphoid fractures

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Scaphoid fractures						
(Adolfsson et al., 2001) Sweden	Adults (mean age 31, range 15-75) with undisplaced fracture of the waist of the scaphoid.	Percutaneous Acutrak screw fixation was compared to immobilisation in a below elbow plaster cast for 10 weeks	ROM, Grip strength, Active flexion/extension, Radial/ulnar deviation, time to union.	16 and 24 weeks	53	No statistically significant differences with regard to the time to union. Patients who underwent surgery had a significantly better range of movement (ROM), but there were no significant differences for grip strength at 16 weeks.
(Bond et al., 2001) USA	Adults (mean age 24, range 18-44) with an acute nondisplaced fracture of the scaphoid waist	Percutaneous cannulated screw fixation was compared to cast immobilization	Grip strength, ROM, Radiographic union, Snuffbox tenderness, complications, Patient satisfaction, time to return to military duty	1 week and then at 2-week intervals until union. Every 12 weeks up to 104 weeks	25	Percutaneous cannulated screw fixation of nondisplaced scaphoid fractures resulted in faster radiographic union and return to military duty compared with cast immobilization.
(Bilic et al., 2006)	Adults	There were three treatment	Pain (VAS),	4, 8, 12, 16,	17	Osteogenic protein-1 resulted in an

Croatia	(average age 21, standard deviation 5) with symptomatic scaphoid non-union with no evidence of progressive healing	groups: (1) autologous iliac graft, (2) autologous iliac graft and osteogenic protein-1, and (3) allogenic iliac graft	Movements, Grip strength, Radiographic union.	28, 52 weeks		accelerated radiological and clinical repair of scaphoid avascular and necrotic proximal pole non-unions.
(Braga-Silva et al., 2008) Brazil	Adults (mean age 31, range 17-52) with symptomatic scaphoid non-union of a single wrist	Surgery including distal radius vascularised bone grafting compared to surgery including non-vascularised iliac crest bone grafting.	Wrist ROM, Grip strength, Radiographic union	145 weeks	80	Similar functional results were obtained with the two techniques
(Buijze et al., 2014) Netherlands	Adults (mean age 37.5, standard deviation 16) with acute nondisplaced or minimally displaced fracture of the scaphoid waist	Treatment in a below-elbow cast including the thumb was compared to treatment in a below-elbow cast excluding the thumb	Wrist motion, Grip strength, The Mayo Modified Wrist Score, DASH, Pain (VAS), Radiographic union	10 and 24 weeks	62	There was a significant difference in the average extent of union on CT at 10 weeks favouring treatment with a cast excluding the thumb
(Caporrino et al., 2014) Brazil	Adults (mean age 27.7, range 18-56)	Vascularised bone grafting (VBG) using the 1,2 intercompartmental	Union rate, Functional outcomes	Every two weeks until bone healing	27	Although the VBG group attained earlier union, this may not be clinically meaningful, nor justify the

	with lack of scaphoid union for 3 months of conservative treatment.	suprareticular artery was compared to distal radius nonvascularised bone graft.	(pain, functional status, ROM, wrist strength)	and at discharge.		greater technical difficulty and use of resources associated with this intervention.
(Clay et al., 1991) UK	Adults (mean age 29.7, range 16-71) with radiologically proven scaphoid fractures	A forearm gauntlet (Colles') cast, leaving the thumb free was compared to a conventional 'scaphoid' plaster incorporating the thumb as far as its interphalangeal joint.	Radiological union, Tolerance of casts, Functional recovery	2, 4, 8 24 weeks	352	For acute, undisplaced fractures of the waist of the scaphoid, the simpler Colles' plaster appears to be equally effective.
(Clementson et al., 2015) Sweden	Adults (median age 30, range 16-63) with acute scaphoid fracture	Surgical treatment consisted of wrist arthroscopy and percutaneous antegrade screw fixation compared to conservative treatment consisted of a below-elbow thumb spica cast until radiological signs of union appeared	DASH, VAS score, ROM, grip strength, Radiographic (CT scan)	6, 10, 14, 26, 52 weeks and then every 52 weeks	31	Non- and minimally displaced scaphoid waist fractures are best treated conservatively. Operative treatment may provide an improved functional outcome in the short term but at the price of a possible increased risk of arthritis in the long term
(Clementson et al., 2015) Sweden	Adults (median age 30, range 16-63) with scaphoid waist fracture	Arthroscopically assisted screw fixation was compared to conservative treatment	Time to union	10, 14, 24 and 52 weeks	35	Screw fixation does not reduce time to fracture union compared with conservative treatment
(Dias et al., 2005) UK	Adults (mean age 29.5, range 16-61)	Early fixation was compared to non-operative treatment.	Clinical assessment: pain, swelling,	2, 8, 12, 26, 52 weeks.	88	This study did not demonstrate a clear overall, benefit of early fixation of acute scaphoid fractures.

	with a fracture of the waist of the scaphoid		tenderness, ROM, Grip strength, PEM			
(Dias et al., 2008) UK	Adults (mean age 30, standard deviation 16-61) with a scaphoid fracture	Operative treatment (open reduction and internal fixation through the volar approach using a Herbert screw or a cannulated Whipple screw, with an additional Kirschner wire, or two Kirschner wires only) was compared to non-operative treatment (immobilisation of the wrist in a below-elbow cast for eight weeks with the thumb left free).	PRWE, Grip strength, Pinch strength, ROM, Radiological union	Seen 416 weeks after treatment	88	Our study revealed that the outcome of early fixation is comparable to that of initial non-operative treatment.
(Drac et al., 2014) Czech Republic	Adults (mean age 30) with acute nondisplaced or minimally displaced scaphoid waist fracture	Palmar percutaneous approach (surgical) was compared to dorsal limited approach (surgical).	Flexion, Extension, Radial deviation, Ulnar deviation, Grip strength, Pain, Complaints, DASH score, Patient satisfaction	4, 8, 12 weeks	76	We found no advantage to the palmar percutaneous approach in the treatment of nondisplaced and minimally displaced scaphoid fractures compared to dorsal limited approach.
(Gaebler et al., 2002) Austria	Adults (age of participants not reported)	Percutaneous screw fixation was compared to non-operative treatment.	Radiological union, ROM, Grip strength, Pinch grip, Green/O'Brien	8, 12, 16, 26, 52 weeks.	41	This study suggests that percutaneous stabilisation of scaphoid fractures is a safe and reasonable approach, especially in younger patients who want and need

	with acute undisplaced scaphoid fractures		score, Time to return to work and sports			to get back to work and sports early.
(Gellman et al., 1989) USA	Adults (age of participants not reported) with acute non-displaced fractures of the carpal scaphoid	Long thumb-spica cast for 6 weeks, followed by application of a short thumb-spica cast until union was compared to short thumb-spica cast as a sole form of treatment.	Radiographs (Time to union, Delayed union, Non-union)	Every 3-4 weeks, until union.	51	We recommend an initial period of six weeks of immobilisation in a long thumb-spica cast, followed by use of a short thumb-spica cast.
(Goyal et al., 2013) India	Adults (mean age 34.7) with scaphoid non-union	Iliac crest bone graft compared to distal radius bone graft in surgery of nonunion of scaphoid fractures	Residual pain, Complications, Pinch strength, Grip strength, ROM. QDASH, Mayo' scoring system, Pain (VAS)	Minimum 156 weeks	100	The results of our study show that the fusion rates and functional results of the two techniques are equivalent.
(Hambidge et al., 1995) UK	Adults (age of participants not reported) with acute scaphoid fracture	Plaster immobilisation in 20 degrees of flexion was compared to immobilisation in 20 degrees of extension.	Comfort in plaster, ROM, Union	24 weeks	146	The authors recommend that a colles' type cast in slight extension be used for immobilization of the acute un-displaced scaphoid fracture.
(Hannemann et al., 2012) Netherlands	Adults (mean age 41,	Pulsed electromagnetic field treatment compared to	Grip strength, range of active	4,6,9, 12, 24 and 52	53	We conclude that stimulation of bone growth by PEMF has no

	range 16-84) with acute scaphoid fracture	placebo	extension, flexion, radial and ulnar deviation, Radiological healing, Tenderness, Pain	weeks after diagnosis of the fracture		additional value in the conservative treatment of acute scaphoid fractures
(Hannemann et al., 2014) Netherlands	Adults (mean age 35, range 18-77) with acute scaphoid fracture	Active PEMF (pulsed electromagnetic fields) compared to placebo. All fractures were treated with immobilisation in a forearm cast with the first metacarpal and both phalanges immobilised	Range of active extension, flexion, radial and ulnar deviation, Grip strength, Tenderness in the anatomical snuffbox, Radiological healing, Pain	6, 9, 12, 24 and 52 weeks	102	We concluded that the addition of PEMF bone growth stimulation to the conservative treatment of acute scaphoid fractures does not accelerate bone healing
(Lawton et al., 2007) USA	Adults (age range 24-35) with acute non displaced scaphoid fracture	Munster thumb-spica cast was compared to a long arm thumb-spica cast	Forearm pronation and supination, elbow ROM.	Not reported	10	A Munster thumb-spica cast may play a role in the conservative treatment of non-displaced scaphoid fractures by allowing some elbow motion during the long immobilization period.
(Lyons et al., 2017) UK	Adults (age of participants not reported) with acute	Standard fiberglass resin cast was compared to thermoplastic removable splint	Union of fracture, Patient satisfaction, QDASH	Not reported	25	Treatment with a thermoplastic polymer based removable splint resulted in comparable outcomes and patient satisfaction compared to the use of traditional resin casts.

	non-displaced scaphoid fractures					
(Mayr et al., 2000) Germany	Adults (mean age 37, standard deviation 14) with fresh, stable scaphoid fractures	Low intensity, pulsed ultrasound with immobilisation was compared to immobilisation only.	Not reported.	CT scan every 2 weeks	28	The low-intensity, pulsed ultrasound therapy is suitable for accelerating the healing of fresh scaphoid fractures
(McQueen et al., 2008) UK	Adults (mean age 29.4, range 17-65) with acute scaphoid fracture	Percutaneous fixation with a cannulated Acutrak was compared to immobilisation in a cast	ROM, Grip and pinch strength, Modified Green/O'Brien functional score, Return to work and sports, Radiological evidence of union	8, 12, 26, 52 weeks	60	We recommend that all active patients should be offered percutaneous stabilisation for fractures of the waist of the scaphoid.
(Raju and Kini, 2011) Singapore	Adults (mean age 28, range 20-48) with non-union of the scaphoid involving the proximal pole, waist,	The Herbert screw fixation, the Matti Russe bone grafting, or the Kohlman modification of vascularised muscle pedicle graft procedure.	Scapholunate and radiolunate angles, ROM, Functional outcomes, Modified scaphoid outcome	24 weeks	33	The time to union was earliest in the Kohlman modification of vascularised muscle pedicle graft procedure, which is recommended for patients with old non-union (>1 year) or proximal pole fractures.

	and distal pole.		scoring system, Hardware failure or any iatrogenic fracture during pedicle dissection			
(Ribak et al., 2010) Brazil	Adults (age of participants not reported) with scaphoid non-union	Treatment using a vascularised bone graft from the dorsal and distal aspect of the radius was compared to treatment with a conventional non-vascularised bone graft from the distal radius.	Radiographic evaluation, Active range of flexion, extension, radial deviation, ulnar deviation, scaphoid-lunate angle, Pain, Grip strength, Joint mobility, Global outcome score	Not reported	86	We conclude that vascularised bone grafting yields superior results and is more efficient in patients in scaphoid nonunion.
(Ricardo, 2006) Cuba	Adults (mean age 26.7, range 17-62) with fractures of the scaphoid with established non-unions	Low-intensity ultrasound was compared to placebo. The placebo units were adjusted to give no ultrasound signal output across the transducer.	Pain, Active range of motion of the wrist, carpal height index, and scapholunate-capitolunate angles,	Not reported	21	Our data analysis suggests that ultrasound therapy may be beneficial to the healing of non-union of the scaphoid after treatment by vascularised pedicle bone graft.

	treated with vascularised pedicle bone graft		Radiographic evidence of union, Time to healed non-union			
(Saeden et al., 2001) Sweden	Adults (mean age 33, standard deviation 17) with acute scaphoid fracture visible at the first radiological examination.	Operatively using a Herbert screw was compared to conservatively by a short-arm cast	Tenderness, ROM, strength, Radiological union, Duration of sick leave, Symptoms (VAS), Grip strength, Range of flexion/extension	Not reported	61	Operative treatment of an acute fracture of the scaphoid allows early return of function and should be regarded as an alternative to conservative treatment in patients in whom immobilisation in a cast for three months is not acceptable for reasons related to sports, social life or work.
(Sjolin and Andersen, 1988) Denmark	Adults (mean age 27, range 9-75) with symptoms of a fractured carpal scaphoid, but without radiological evidence of fracture	Dorsal plaster cast was compared to supportive bandage	Radiographs (fractures, avulsion), Sick leave	Not reported	108	We conclude that patients presenting with the clinical picture of a fracture of the carpal scaphoid should be treated as having a soft-tissue injury if the four standard radiographs do not show a fracture. A cast may still be offered to patients with much pain.
(Vinnars et al., 2008) Sweden	Adults (mean age 31, standard	Immobilization in a below-the-elbow scaphoid cast with the thumb held in palmar	DASH, PRWE, Radiographic, Complications	520 weeks	83	This study did not demonstrate a true long-term benefit of internal fixation, compared with

	deviation 12) with an isolated scaphoid fracture that was nondisplaced or minimally displaced	abduction, the interphalangeal joint free, and the wrist in neutral or slight extension for a planned period of six weeks was compared to a standard Herbert screw or a cannulated Herbert-Whipple stabilisation.				nonoperative treatment.

Table B. Table of RCTs for interventions for the treatment metacarpal fractures

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Metacarpal fractures						
(Anand et al., 1999) USA	Adults (mean age 24, range 11-48) with Boxer's fracture (fracture of the neck of the fifth metacarpal)	Immediate mobilisation was compared to attempted reduction and splint immobilization.	Cosmetic satisfaction, Return to pre-injury status, Radiological union, Dorsal and ulnar angulation, Extensor lag, Grip strength,	1, 3, 6, and 12 weeks	60	The results of our study would suggest that these fractures could be treated with immediate mobilization with good functional results. We feel that reduction and splintage seem unnecessary for these fractures

			ROM.			
(Braakman et al., 1998) Netherlands	Adults (mean age 26, range 14-44) with fracture of the 5th metacarpal.	Functional tape for four weeks was compared to ulnar gutter plaster-cast for four weeks.	Power grip, static pulling strength of little finger, maximum torque force, fracture angulation, power grip, Radiographic union, Residual symptoms at 6 months	1, 4, 12, and 24 weeks	50	We advise treating fractures of the 5th metacarpal with a functional tape rather than with cast immobilisation
(Cepni et al., 2016) Turkey	Adults (mean age 28, range 18-46) with an acute (0–15 days), closed, and simple fracture of the fifth metacarpal neck	Operative treatment was compared to splinting (U-shaped ulnar gutter)	Palmar angulation, ROM, Metacarpal shortening, QDASH, Return to work, Radiological union	4 and 7 weeks	24	We recommend antegrade intramedullary K-wire fixation as a reliable method, which minimizes the functional loss and allows for early return to daily activities in office workers who sustained a fracture of the fifth metacarpal neck.
(Galal and Safwat, 2017) Egypt	Adults (mean age 32, standard deviation 6) with a closed 5th	Surgical treatment using transverse pinning was compared to surgical treatment using intramedullary pinning.	Total Active ROM, Total Active Range of Flexion, QDASH, Radiological	2, 6, 12, and 24 weeks	80	Both techniques are equally safe and effective. The only difference was shorter operative time & less incidence of complications in transverse pinning group.

	metacarpal fracture with angulation more than 30		union			
(Garramone, 1996) USA	Adults (age of participants not reported) with small finger metacarpal neck fractures.	Volar splint was compared to dorsal hood short arm cast	Grip strength, ROM, Subjective patient satisfaction	8-10 weeks	33	Volar splinting was shown to provide significantly increased grip strength along with improved range of motion, and decreased complaints of post treatment pain
(Gulke et al., 2017) Germany	Adults (mean age 32, range 18-60) with postoperative management of metacarpal fractures	A home exercise (HE) program was compared to a traditional physical therapy (PT) program.	ROM, Grip strength, DASH	2, 6, 12 weeks	60	Study results show that both HE program and traditional PT are effective in the postoperative management of metacarpal fractures
(Hansen and Hansen, 1998) Denmark	Adults (age of participants not reported) with fractures of the necks of	Ulnar plaster-of-Paris from proximal interphalangeal joint to the ring and little finger was compared to a functional brace made of Hexalite and to an elastic bandage alone.	Fracture tenderness, ROM, Patient satisfaction	4, and 12 weeks	105	We recommend the functional brace for treatment of fractures of the neck of the ring and little metacarpals.

	the ring or little metacarpals.					
(Harding et al., 2001) UK	Adults (mean age 27, range 12-57) with fractures of the neck of the little finger metacarpal	Treatment with a moulded metacarpal brace was compared to treatment with neighbour strapping.	ROM, Tenderness, Overall satisfaction, Back to work	3 weeks	73	Patients treated with the metacarpal brace had significantly less pain than those treated with neighbour strapping, and this facilitated an early return to work.
(Hofmeister et al., 2008) USA	Adults (age of participants not reported) with isolated fracture of the fifth metacarpal neck.	Short-arm cast with volar outriggers (SAC-VOR) was compared to a short-arm cast extended to the proximal interphalangeal joint with a 3-point mold (MCP-ext).	Radiographic union, cast durability, complications. DASH. ROM, grip strengths	1, 4 and 12 weeks	81	Advantages of the MCP-ext cast include quicker application and, to a much lesser degree, better tolerability, range of motion, and final grip strength
(Kim and Kim, 2015) South Korea	Adults (mean age 27, range 18-53) with a surgical indication for a fifth metacarpal neck fracture	An antegrade intramedullary K-wire was compared to a percutaneous retrograde intramedullary K-wire	DASH, Pain (VAS), Radiographic union, ROM	3, 24 weeks	46	Antegrade intramedullary pinning has some clinical advantages during the early recovery period, but the advantages are not evident at 6 months postoperatively.
(Konradsen et al., 1990) Denmark	Adults (age of	Immobilization by a plaster cast (immobilizing the wrist	Pain, Cast inconvenience,	1, 3, and 12 weeks.	100	Functional casting reduced volar angulation by two thirds for

	participants not reported) with a shaft or neck fracture of the second through the fifth meta-carpal bone	and the joints of the involved digits) was compared to immobilisation by a functional cast (allowing the wrist and the digits a free range of motion)	Time to return to work, Rotation, Ulnar/radial angulation, ROM, Grip strength, Radiographic union			metacarpal shaft fractures and by one third for metacarpal neck fractures when compared with plaster cast immobilization. Sick leave was reduced by two thirds after functional casting compared with the plaster cast group.
(Kuokkanen et al., 1999) Finland	Adults (median age 28, range 11-68) with subcapital fractures of the fifth metacarpal bone	Closed reduction and splinting was compared to functional treatment	ROM, Grip force, Hand grip strength	4, and 12 weeks	29	Subcapital fractures of the fifth metacarpal bone can successfully be treated without closed reduction and splinting.
(McMahon et al., 1994) UK	Adults (mean age 31) with a unilateral fresh closed stable fracture of the shaft of a single finger metacarpal.	Compression glove and early mobilization was compared to immobilization in a plaster splint.	Hand volume, Finger circumference, ROM, Loss of flexion, Pain and functional limitations.	Not reported	42	Use of a compression glove relieved pain and avoided the loss of function imposed by splintage and was associated with a greater range of movement during the second and third weeks.
(Rafique et al., 2006) Pakistan	Adults (age of participants not reported)	Percutaneous K wires were compared to a buried placement of K wires.	Infection rate, Time to remove K wires	Not reported	60	Percutaneous K wires had significantly greater infection rate than wires which were buried deep to skin.

	with isolated hand fractures (of metacarpals and phalanges). Both open and closed fractures were included.					
(Randall et al., 1992) USA	Adults (mean age 29, range 19-46) following treatment of a metacarpal fracture and whose hand had been immobilized for least 2 weeks.	Traction and palmar/dorsal glide techniques were used to perform the joint mobilization treatment and they were compared to no treatment.	Active ROM, Torque ROM, Excursion.	Three appointments over a 1 week period	18	The joint mobilization treatment given to the subjects in this study resulted in a significant gain in AROM and decrease in joint stiffness within a treatment session when compared to the control group.
(Sletten et al., 2015) Norway	Adults (mean age 27, range 18-68) with little finger metacarpal neck fractures.	Operative treatment (closed reduction and internal fixation) was compared to conservative treatment (no attempt of reduction, plaster-of-Paris for 1 week, buddy strapping and active exercises)	QDASH, Pain (VAS), Patient satisfaction, QoL EQ-5D-3L, Active flexion/extension, Flexion/extension deficit, TAM, Grip	1, 6, 12 and 52 week	85	We recommend conservative treatment with early mobilization for fractures up to 45–50° palmar angulation in the lateral view.

			strength			
(Sorensen et al., 1993) Denmark	Adults (age of participants not reported) with fractures of the second through the fifth metacarpal bones	A functional brace (the Galveston metacarpal brace) was compared to a dorsal/ulnar plaster cast	Complications, Fracture angulation, Satisfaction with bandage	1, 4 and 12 weeks	113	We found that the benefits did not outweigh the risks of the functional fracture bracing, and we cannot recommend the tested version of the Galveston metacarpal brace.
(Statius Muller et al., 2003) Netherlands	Adults (mean age 29, range 15-74) with a fracture of the subcapital 5th metacarpal	Treatment with an ulnar gutter plaster cast for a period of 3weeks followed by mobilization was compared to pressure bandage for 1 week and immediate mobilization within limits imposed by pain	ROM, Patient satisfaction, Pain perception, Return to work and hobby, Need for physiotherapy.	6 and 12 weeks	40	A pressure bandage for 1 week and immediate mobilization is a sufficient alternative treatment of a boxer's fracture, if this is not angulated greater than 70° and not rotated.
(Strub et al., 2010) Switzerland	Adults (mean age 30, range 20-70) with acute, closed fractures of the little finger metacarpal neck with a palmar displacemen	Closed reduction and intramedullary splinting was compared to conservative treatment without reduction	Flexion / extension of the MCP joint, Grip strength, Radiological union, Pain (VAS), Patient satisfaction, Time off work, Complications	2, 6, 12, 24, and 52 weeks	40	We conclude that intramedullary splinting for displaced fractures of the little finger metacarpal neck offers an aesthetic, but not a functional advantage.

	t of between 30o and 70o.					
(van Aaken et al., 2016) Switzerland	Adults (mean age 29, standard deviation 12) with fifth metacarpal (MC) neck fractures (Boxer's fracture)	Soft wrap and buddy taping (SW) was compared to reduction and cast (RC)	Pain (VAS), Patient Satisfaction, ROM, Power grip, Radiographic union	1, 4 and 16 weeks	68	This study supports the use of soft wrap and buddy taping for treatment of boxer's fracture with palmar angulation </=70 degrees and no rotational deformity.
(Winter et al., 2007) France	Adults (mean age 32, range 18-65) with fractures of the little finger metacarpal neck, or ''Boxer's'' fractures.	Transverse pinning (operative) was compared to intramedullary pinning (operative). A palmar splint was applied for 1 week. Patients began physiotherapy three times per week for 30 days	Pain (VAS), Patient satisfaction, ROM, Grip strength, Radiographic union, Complications	Evaluated clinically six times after surgery, up to the 12 weeks	36	Intramedullary pinning gave better functional outcomes than transverse pinning, although the former was more technically demanding
(Xia, 2015) China	Adults (mean age 27.5, range 18-50) with metacarpal or phalangeal fracture	Mini-plate fixation was compared to Kirschner wire	TAFS score for hand function, total active flexion degree, length of hospital stay, delayed healing of bone, incidence of	Not reported	76	The mini-plate fixation for metacarpal and phalangeal fractures can obviously improve hand function, shorten length of hospital stay and healing time

			infection, healing time			
(Zyluk and Budzynski, 2009) Poland	Adults (mean age 34, range 16-75) with isolated, displaced and extra-articular metacarpal fractures.	Operative (by fixation with K-wires) treatment was compared to conservative treatment.	Active ROM, Grip strength, Radiological union, DASH	8 and 24 weeks	74	The results of this study indicate the equal effectiveness of both the operative by K-wiring, and conservative treatment of fractures of the metacarpals.

Table C. Table of RCTs for interventions for the treatment of mallet finger

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Mallet finger						
(Auchincloss, 1982) UK	Adults (mean age 41, range 17-82) with mallet finger. Both open and closed injuries were included.	Percutaneous fixation of the distal interphalangeal joint using a K wire was compared to a Pryor and Howard splint for 6 weeks without radiographic control.	Subjective results (treatment acceptable good result, normal function), Objective results (Good, improved, unchanged), ROM	56, 72 weeks	50	After a mallet finger injury treated within two weeks by either method few patients have significant persistent disability. Both groups of patients were generally satisfied with their treatment and its outcome.
(Batibay et al., 2017) Turkey	Adults (mean age 36, range 17-61) with mallet finger	The new suture anchor technique (operative) compared to conservative management (aluminium orthotic device)	ROM, Extension lag/deficit DIP flexion, VAS score, Return to work, Radiologic	12, 24, 52 weeks	29	Our study suggests that the new suture anchor technique is not superior to conservative treatment

			union, DIP joint degeneration			
(Gruber et al., 2014) USA	Adults (mean age 50, range 24-78) with mallet finger with or without fracture and treatment with a period of continuous splint or cast immobilization for 6 weeks or greater	A night splint for an additional month after 6 to 8 weeks of continuous splinting was compared to no night splint.	DASH	Not reported	51	Supplemental night splinting does not improve the outcome of mallet finger.
(Kinninmonth and Holburn, 1986) UK	Adults (age of participants not reported) with mallet finger	Perforated splint and told to keep it on without restricting their activities compared to standard 'stack' splint with instructions on daily removal for hygiene purpose.	Skin status, Lag, Ability to change splint	2, 6, 52 weeks	54	The perforated mallet finger splint can produce consistently good results even in those patients who would not tolerate a conventional splint.
(O'Brien and Bailey, 2011) Australia	Adults (mean age 38, range 11-86) with mallet finger	A prefabricated stack splint (control), was compared to a dorsal padded aluminum splint, and a custom-made thermoplastic thimble splint. All were worn for 8 weeks	ROM, Compliance, Treatment failure and complications, Pain (VAS),	1, 6, 8, 10, 12, 20 weeks	64	In this study, no extensor lag difference was found between the 3 splint types, but custom-made thermoplastic splints were significantly less likely to result in treatment failure.

		continuously, with a 4 week graduated withdrawal and exercise program.	Patient satisfaction			
(Pike et al., 2010) Canada	Adults (mean age 43) with acute mallet finger	3 splint types were compared: volar padded aluminum splint, dorsal padded aluminum splint, and custom thermoplastic. Splints were continued for 6 weeks full-time.	Clinical lag, Radiographic lag, Complications, MHQ scores	7, 12, 24 weeks.	87	No lag difference was demonstrated between custom thermoplastic, dorsal padded aluminum splint, and volar padded aluminum splinting for Doyle I acute mallet fingers.
(Saito and Kihara, 2016) Japan	Adults (mean age 42, range 18-72) with mallet finger.	The 2-step immobilization group underwent initial immobilization using an orthosis, followed by the use of a second orthosis. This was compared to the figure of eight-type orthosis (control) group, which underwent conventional immobilization using an orthosis.	Not reported.	3 and 16 week	44	Our study thus suggested that the initial immobilization involved in new 2-step orthosis and is thus a good immobilization technique.
(Tocco et al., 2013) Italy	Adults (mean age 45, standard deviation 12) with mallet finger	Cast immobilization of closed mallet fingers using Quickcast (QC) was compared to a removable, lever-type thermoplastic orthosis.	Edema, Hand function, Subjective evaluation of the orthosis, Satisfaction with outcome, Grip strength	Once during 3-4, 6-8, 7-9, 8-10, 10-12, 12-14, 24-28 and weeks	57	Cast immobilization seems to be slightly more effective than the traditional approach probably for its greater capacity to reduce edema.
(Warren et al., 1988) UK	Adults (mean age 46.1, range 10-77) with mallet finger	Stack splint was compared to Abouna splint	Extension loss, Success of treatment, Patient satisfaction	Regularly until 10 weeks	116	The Stack splint is more acceptable to the patient than the Abouna splint.

(Zhou et al., 2008) China	Adults (mean age: 27.5, standard deviation 9.5) with mallet finger	Percutaneous pinning with plaster splint was compared to open reduction and pulling out wire	Total active movement (TAM) functional assessment, operation time, flap necrosis and infection, skin ulcer, bone union, pseudoarthrosis	Regularly until 104 weeks	72	Percutaneous pinning with plaster splint is simple in operation and has smaller incisions and fewer complications compared with open reduction and pulling out wires.

Table D. Table of RCTs for interventions for the treatment of proximal phalangeal fracture

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Proximal phalangeal fracture (Abubeih et al.,	Adults (mean	An extensor tendon splitting	QDASH, Total	Not reported	40	Meticulous surgical dissection,

2016) Egypt	age 31, range 14-56) with extra-articular proximal phalangeal fractures.	approach fixed with a nonlocking titanium miniplates and screws was compared to an extensor tendon sparing approach	active ROM, Grip strength		anatomical closure of layers, and early active mobilization are the keys to success in fixation of phalangeal fractures, regardless of the approach chosen.
(Franz et al., 2012) Switzerland	Adults (mean age 49, range 16-93) with extra-Articular Fractures of the Proximal Phalanges of the Fingers	Treatment using a functional forearm cast was compared to treatment with LuCa	Clinical and radiographic assessments, ROM	1, 2, 4, 6, and 12 weeks	66	The clinical and radiological results achieved with the Lucerne cast are comparable to those of established treatment.
(Horton et al., 2003) UK	Adults (mean age 26, range 14-79) with an isolated spiral or long oblique fracture of the proximal phalanx	Closed reduction and Kirschner wire group was compared to open reduction and lag screw	Pain (VAS), Functional recovery, Tip-palm distance, loss of extension/flexion grip strength, Radiographic union, Failure of fixation	12, 24 and 52 weeks	32	We feel that surgeons treating displaced spiral and long oblique fractures of the proximal phalanx should favour the method with which they are most familiar and competent, or the technique that utilizes the least health care resources.
(Kappos et al., 2016) Switzerland	Adults (age of participants not reported) with an	Open reduction and internal fixation with a plate and screws via a dorsal approach with adhesive barrier was compared to no adhesion barrier.	ROM. DASH, ability to work, Need for secondary surgery.	6 and 24 weeks	42	At 6 weeks there was a trend favouring the adhesion barrier that disappeared at 6 months. Overall the results do not support the use of this device

	isolated, closed proximal phalangeal fracture needing plate osteosynthesis					
(Miller et al., 2016) Australia	Adults (mean age 34, standard deviation 11) following 1 week of open reduction and internal fixation of proximal phalangeal fractures	6 weeks of synergistic wrist and finger exercises with the metacarpophalangeal joint constrained were compared to finger exercises with the metacarpophalangeal joint unconstrained, as part of a comprehensive rehabilitation program	Pain, Difficulty with specific and usual hand activity	1, 6 and 12 weeks.	66	Constrained and unconstrained exercises has similar effects after open reduction and internal fixation of proximal phalangeal fracture.
(Sourmelis et al., 1995) Greece	Adults (age of participants not reported) with proximal phalangeal fracture	Functional treatment was compared to static splinting	Fracture union	4 and 6 weeks	40	We conclude that functional treatment is a safe method for the conservative treatment of the proximal phalangeal fractures

Table E. Table of RCTs for interventions for the treatment PIP joint injuries

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Fracture/dislocation of PIP joint						
(Arora et al., 2004) Austria	Adults (age of participants not reported) with isolated, acute, closed dorsolateral dislocation of the PIP joint	Dorsal block splinting of the PIP joint following reduction with daily exercises was compared to a closed reduction and immobilisation with a short-arm cast including both interphalangeal joints for 4 weeks	Pain, Radiological (looking for arthritis and bony healing), Active ROM, Pinch power, Circumference of the finger, Stability of the collateral ligament	Not reported	65	Early active motion after dorsolateral dislocation of the PIP joint produces significantly superior results regarding the active range of motion and pinch power than static splinting.
(Boisgontier et al., 2009) France	Adults (mean age 36, standard deviation 12) with sprain of proximal interphalangeal joint	The techniques of both active range of motion (AROM) and of NMES superimposed (superimposed technique [ST]: application of electrical stimulus during a voluntary muscle action) compared to active range of motion (AROM) treatment on its own	ROM	Not reported	20	These findings highlighted the superimposed technique as an effective method, which could be integrated in rehabilitation protocols for recovering the proximal interphalangeal joint range of motion following sprain
(Norregaard et al., 1987) Denmark	Adults (mean age 24, standard deviation 11) with hyperextensi	3 weeks of immobilization with a foam-rubber-covered aluminum splint applied to the volar surface with the injured joint flexed was compared to treatment with analgesics and	Pain, Thickened joint, Flexion/extension defect, Swan-neck or	24 and 160 weeks	112	We concluded that comfort of the patient and the economic advantages of early motion are obvious.

	on trauma to the PIP joints of any of the four ulnar fingers	no immobilization. They were advised to start active movements a few days after the trauma.	Button-hole deformity, Volar-plate tenderness, Stiffness and coldness			
(Pedersen et al., 1995) Denmark	Adults (mean age 37, range 18-79) with dislocation of the PIP joint (volar plate injuries)	Double finger bandage was compared to a Carstam splint	Clinical examination according to Benke and Stableforth, ROM	2 and weeks.	24 40	The two methods were equally good as treatment for volar plate injuries to the PIP-joint. The advantage of DFB may be a quicker return to full ROM.
(Thomsen et al., 1995) Denmark	Adults (mean age 37, range 18-79) with type I hyperextension injuries to PIP joint, involving avulsion of the volar plate or a minor avulsion fracture	Treatment with an aluminium splint for 2 weeks was compared to treatment conservatively by an elastic double-finger bandage for 2 weeks	ROM, Clinical (joint stiffness, hyperextension). Satisfaction with treatment, Return to work.	2 and weeks.	24 40	We find that type 1 hyperextension injuries to the PIP joint are well-treated with an aluminium splint or with DFB for 2 weeks.

Table F. Table of RCTs for interventions for the treatment of rupture of UCL

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Rupture of UCL (Moineau and Boisgontier, 2014) France	Adults (mean age 43, standard deviation 12)	In the superimposed electrical stimulation session, they performed 20 min of percutaneous neuromuscular	Not reported.	Not reported	8	Superimposing electrical stimulation to voluntary contractions is an efficient technique to improve active range of motion of the pre-stiff

	with pre-stiff thumbs after operative repair for rupture of the ulnar collateral ligament	electrical stimulations which were superimposed to voluntary flexion. In the voluntary contraction session, they performed 20 min of repeated active flexions of the impaired metacarpophalangeal joint.				metacarpophalangeal joint of the thumb
(Rocchi et al., 2014) Italy	Adults (mean age 39, range 16-64) with an acute tear of the UCL (0-7 days)	Patients received modified spica splint with freedom of motion at the MCP joint, but prevention of the radial and ulnar joint deviation. This was compared to the operated thumb being immobilised for a month using a traditional spica splint.	ROM, Pinch strength, Stability, Time off work, Physiotherapy, Complications	Weekly in the first 4 weeks, and then 8, 24 and 52 weeks.	30	Surgical repair, combined with active metacarpophalangeal motion allowed by the new functional splint, was effective, safe and well tolerated.
(Sollerman et al., 1991) Sweden	Adults (mean age 32, range 11-62) with fresh rupture of the ulnar collateral ligament of the MCP joint of the thumb.	Immobilization in a plaster cast was compared to a functional splint	Clinical examination, Stability tests, ROM, Pinch grip test, Comfort of the bandage, Length of sick leave.	60 weeks	63	We conclude that immobilization of the thumb after a ligamentous injury with a movable splint is strongly preferred by the patients and that the functional results of this technique are equal to plaster cast immobilization after both surgical and nonsurgical treatment.

Table G. Table of RCTs for the interventions for treatment of distal phalangeal fractures

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Distal phalangeal fractures (open)						
(Sloan et al., 1987) UK	Adults (mean age 37, standard deviation 16)	Short or long courses of antibiotics compared to no antibiotics.	Infection rate	1 week	85	Three different antibiotic regimes were compared, with no difference in the infection rate.

	with open fractures of the distal phalanges of less than 6 hours duration treated by conventional surgery.				
(Stevenson et al., 2003) UK	Adults (range 16-88) with open fractures of the distal phalanges of less than 12 hours old.	Prophylactic flucloxacillin compared to placebo (in addition to meticulous wound toilet)	Infection rate (superficial, deep)	1, 2, and 8 weeks.	193	It is concluded that the addition of prophylactic flucloxacillin to thorough wound toilet and careful soft-tissue repair of open fracture of the distal phalanx confers no benefit

Table H. Table of RCTs for interventions for the treatment of closed bone fractures

Study identifier	Population	Intervention and comparator	Outcomes	Follow up at	Sample size	Conclusion
Closed bone fractures						
(Chang et al., 2014) Taiwan	Adults (mean age 33, standard deviation 8) with closed bone fracture (CBF) of wrist and hand. The fracture was in the phalanges, or the metacarpal,	Low level laser therapy (LLLT) for the healing of CBF five times per week for 2 weeks compared to sham laser treatment	Pain (VAS), Functional disability, QDASH, Grip strength, Radiographic union	2 weeks	50	LLLT can relieve pain and improve the healing process of CBF in the human wrist and hand.

	carpal, distal ulna, or distal radial bones. The patients had not been treated.		

References

Abubeih H, Saleh W, Thabet M, Ibrahim A-K. Extensor tendon splitting versus extensor tendon sparing approach for miniplate fixation of extraarticular proximal phalangeal fractures. Current orthopaedic practice. 2016, 27: 623-32.

Adolfsson L, Lindau T, Arner M. Acutrak screw fixation versus cast immobilisation for undisplaced scaphoid waist fractures. Journal of hand surgery (Edinburgh, Scotland). 2001, 26: 192-5.

Anand N, Tannoury T, Mey S, Weinstein R. Boxer's fracture: A prospective randomized study comparing immediate mobilization to immobilization. *American academy of orthopaedic surgeons annual meeting; 1999 feb 4-8; anaheim (CA)* 1999.

Arora R, Lutz M, Fritz D, Zimmermann R, Gabl M, Pechlaner S. Dorsolateral dislocation of the proximal interphalangeal joint: Closed reduction and early active motion or static splinting; a retrospective study. Archives of orthopaedic and trauma surgery. 2004, 124: 486-8.

Auchincloss JM. Mallet-finger injuries: A prospective, controlled trial of internal and external splintage. Hand. 1982, 14: 168-73.

Batibay SG, Akgul T, Bayram S, Ayik O, Durmaz H. Conservative management equally effective to new suture anchor technique for acute mallet finger deformity: A prospective randomized clinical trial. Journal of hand therapy : official journal of the American Society of Hand Therapists. 2017.

Bilic R, Simic P, Jelic M et al. Osteogenic protein-1 (bmp-7) accelerates healing of scaphoid non-union with proximal pole sclerosis. International orthopaedics. 2006, 30: 128-34.

Boisgontier M, Vuillerme N, Thomas D, Pinsault N, Emprin M, Caillat-Miousse JL. Effects of neuromuscular electrical stimulation on the range of motion recovery in hand proximal interphalangeal sprain. Science and Sports. 2009, 24: 192-5.

Bond CD, Shin AY, McBride MT, Dao KD. Percutaneous screw fixation or cast immobilization for nondisplaced scaphoid fractures. J Bone Joint Surg Am. 2001, 83-a: 483-8.

Braakman M, Oderwald EE, Haentjens MH. Functional taping of fractures of the 5th metacarpal results in a quicker recovery. Injury. 1998, 29: 5-9.

Braga-Silva J, Peruchi FM, Moschen GM, Gehlen D, Padoin AV. A comparison of the use of distal radius vascularised bone graft and non-vascularised iliac crest bone graft in the treatment of non-union of scaphoid fractures. J Hand Surg Eur Vol. 2008, 33: 636-40.

Buijze GA, Goslings JC, Rhemrev SJ et al. Cast immobilization with and without immobilization of the thumb for nondisplaced and minimally displaced scaphoid waist fractures: A multicenter, randomized, controlled trial. The Journal of hand surgery. 2014, 39: 621-7.

Caporrino FA, Dos Santos JB, Penteado FT, de Moraes VY, Belloti JC, Faloppa F. Dorsal vascularized grafting for scaphoid nonunion: A comparison of two surgical techniques. Journal of orthopaedic trauma. 2014, 28: e44-8.

Cepni SK, Aykut S, Bekmezci T, Kilic A. A minimally invasive fixation technique for selected patients with fifth metacarpal neck fracture. Injury. 2016, 47: 1270-5.

Chang W, Wu J, Wang H, Jiang J. Therapeutic outcomes of low-level laser therapy for closed bone fracture in the human wrist and hand. Photomedicine and laser surgery. 2014, 32: 212-8.

Clay NR, Dias JJ, Costigan PS, Gregg PJ, Barton NJ. Need the thumb be immobilised in scaphoid fractures? A randomised prospective trial. The Journal of bone and joint surgery British volume. 1991, 73: 828-32.

Clementson M, Jorgsholm P, Besjakov J, Bjorkman A, Thomsen N. Union of scaphoid waist fractures assessed by ct scan. Journal of wrist surgery. 2015, 4: 49-55.

Clementson M, Jorgsholm P, Besjakov J, Thomsen N, Bjorkman A. Conservative treatment versus arthroscopic-assisted screw fixation of scaphoid waist fractures--a randomized trial with minimum 4-year follow-up. The Journal of hand surgery. 2015, 40: 1341-8.

Dias JJ, Dhukaram V, Abhinav A, Bhowal B, Wildin CJ. Clinical and radiological outcome of cast immobilisation versus surgical treatment of acute scaphoid fractures at a mean follow-up of 93 months. The Journal of bone and joint surgery British volume. 2008, 90: 899-905.

Dias JJ, Wildin CJ, Bhowal B, Thompson JR. Should acute scaphoid fractures be fixed? A randomized controlled trial. J Bone Joint Surg Am. 2005, 87: 2160-8.

Drac P, Cizmar I, Manak P et al. Comparison of the results and complications of palmar and dorsal miniinvasive approaches in the surgery of scaphoid fractures. A prospective randomized study. Biomedical papers of the Medical Faculty of the University Palacky, Olomouc, Czechoslovakia. 2014, 158: 277-81.

Franz T, von Wartburg U, Schibli-Beer S et al. Extra-articular fractures of the proximal phalanges of the fingers: A comparison of 2 methods of functional, conservative treatment. The Journal of hand surgery. 2012, 37: 889-98.

Gaebler C, McQueen M, Vecsei V. Percutaneous screw fixation versus conservative treatment in undisplaced scaphoid fractures. European journal of trauma. 2002, 28: 98.

Galal S, Safwat W. Transverse pinning versus intramedullary pinning in fifth metacarpal's neck fractures: A randomized controlled study with patient-reported outcome. Journal of clinical orthopaedics and trauma. 2017, 8: 339-43.

Garramone J. A functional analysis of short arm cast vs volar splint immobilization in the treatment of small finger metacarpal neck fractures. Orthopaedic transactions. 1996, 20.

Gellman H, Caputo RJ, Carter V, Aboulafia A, McKay M. Comparison of short and long thumb-spica casts for non-displaced fractures of the carpal scaphoid. J Bone Joint Surg Am. 1989, 71: 354-7.

Goyal T, Sankineani SR, Tripathy SK. Local distal radius bone graft versus iliac crest bone graft for scaphoid nonunion: A comparative study. Musculoskeletal surgery. 2013, 97: 109-14.

Gruber JS, Bot AG, Ring D. A prospective randomized controlled trial comparing night splinting with no splinting after treatment of mallet finger. Hand (New York, NY). 2014, 9: 145-50.

Gulke J, Leopold B, Grozinger D, Drews B, Paschke S, Wachter NJ. Postoperative treatment of metacarpal fractures-classical physical therapy compared with a home exercise program. Journal of hand therapy : official journal of the American Society of Hand Therapists. 2017.

Hambidge J, Davis T, Schranz P, Compson J, Barton N. Which position for the wrist when immobilising scaphoid fractures. Journal of bone and joint surgery - british volume. 1995, 77 Suppl 1: 12.

Hannemann PF, Gottgens KW, van Wely BJ et al. The clinical and radiological outcome of pulsed electromagnetic field treatment for acute scaphoid fractures: A randomised double-blind placebo-controlled multicentre trial. The Journal of bone and joint surgery British volume. 2012, 94: 1403-8.

Hannemann PF, van Wezenbeek MR, Kolkman KA et al. Ct scan-evaluated outcome of pulsed electromagnetic fields in the treatment of acute scaphoid fractures: A randomised, multicentre, double-blind, placebo-controlled trial. The bone & joint journal. 2014, 96-b: 1070-6.

Hansen PB, Hansen TB. The treatment of fractures of the ring and little metacarpal necks. A prospective randomized study of three different types of treatment. Journal of hand surgery (Edinburgh, Scotland). 1998, 23: 245-7.

Harding IJ, Parry D, Barrington RL. The use of a moulded metacarpal brace versus neighbour strapping for fractures of the little finger metacarpal neck. Journal of hand surgery (Edinburgh, Scotland). 2001, 26: 261-3.

Hofmeister EP, Kim J, Shin AY. Comparison of 2 methods of immobilization of fifth metacarpal neck fractures: A prospective randomized study. The Journal of hand surgery. 2008, 33: 1362-8.

Horton TC, Hatton M, Davis TR. A prospective randomized controlled study of fixation of long oblique and spiral shaft fractures of the proximal phalanx: Closed reduction and percutaneous kirschner wiring versus open reduction and lag screw fixation. Journal of hand surgery (Edinburgh, Scotland). 2003, 28: 5-9.

Kappos EA, Esenwein P, Meoli M, Meier R, Grunert J. Implantation of a denaturated cellulose adhesion barrier after plate osteosynthesis of finger proximal phalangeal fractures: Results of a randomized controlled trial. J Hand Surg Eur Vol. 2016, 41: 413-20.

Kim JK, Kim DJ. Antegrade intramedullary pinning versus retrograde intramedullary pinning for displaced fifth metacarpal neck fractures. Clinical orthopaedics and related research. 2015, 473: 1747-54.

Kinninmonth AW, Holburn F. A comparative controlled trial of a new perforated splint and a traditional splint in the treatment of mallet finger. Journal of hand surgery (Edinburgh, Scotland). 1986, 11: 261-2.

Konradsen L, Nielsen PT, Albrecht-Beste E. Functional treatment of metacarpal fractures 100 randomized cases with or without fixation. Acta orthopaedica Scandinavica. 1990, 61: 531-4.

Kuokkanen HO, Mulari-Keranen SK, Niskanen RO, Haapala JK, Korkala OL. Treatment of subcapital fractures of the fifth metacarpal bone: A prospective randomised comparison between functional treatment and reposition and splinting. Scandinavian journal of plastic and reconstructive surgery and hand surgery. 1999, 33: 315-7.

Lawton JN, Nicholls MA, Charoglu CP. Immobilization for scaphoid fracture: Forearm rotation in long arm thumb-spica versus munster thumb-spica casts. Orthopedics. 2007, 30: 612-4.

Lyons R, Stanley C, McKenna P. Assessment of the use of a synthetic removable polymer splint (fastform polytrexxtm) for the treatment of non-displaced scaphoid fractures: Prospective randomized trial. Irish journal of medical science Conference: 42nd sir peter freyer memorial lecture and surgical symposium Ireland. 2017, 186: S330.

Mayr E, Rudzki MM, Rudzki M, Borchardt B, Hausser H, Ruter A. [does low intensity, pulsed ultrasound speed healing of scaphoid fractures?]. Handchirurgie, Mikrochirurgie, plastische Chirurgie : Organ der Deutschsprachigen Arbeitsgemeinschaft fur Handchirurgie : Organ der Deutschsprachigen Arbeitsgemeinschaft fur Mikrochirurgie der Peripheren Nerven und Gefasse 2000, 32: 115-22.

McMahon PJ, Woods DA, Burge PD. Initial treatment of closed metacarpal fractures. A controlled comparison of compression glove and splintage. Journal of hand surgery (Edinburgh, Scotland). 1994, 19: 597-600.

McQueen MM, Gelbke MK, Wakefield A, Will EM, Gaebler C. Percutaneous screw fixation versus conservative treatment for fractures of the waist of the scaphoid: A prospective randomised study. The Journal of bone and joint surgery British volume. 2008, 90: 66-71.

Miller L, Crosbie J, Wajon A, Ada L. No difference between two types of exercise after proximal phalangeal fracture fixation: A randomised trial. Journal of physiotherapy. 2016, 62: 12-9.

Moineau B, Boisgontier MP. Superimposed electrical stimulation improves mobility of pre-stiff thumbs after ulnar collateral ligament injury of the metacarpophalangeal joint: A randomized study. Annals of physical and rehabilitation medicine. 2014, 57: 373-80.

Norregaard O, Jakobsen J, Nielsen KK. Hyperextension injuries of the pip finger joint. Comparison of early motion and immobilization. Acta orthopaedica Scandinavica. 1987, 58: 239-40.

O'Brien LJ, Bailey MJ. Single blind, prospective, randomized controlled trial comparing dorsal aluminum and custom thermoplastic splints to stack splint for acute mallet finger. Archives of physical medicine and rehabilitation. 2011, 92: 191-8.

Pedersen M, Thomsen N, Hovgaard C. Double finger bandage versus carstam splint for the treatment of volar plate injuries of the proximal interphalangeal joint. Acta orthopaedica scandinavica. 1995, 66: 72.

Pike J, Mulpuri K, Metzger M, Ng G, Wells N, Goetz T. Blinded, prospective, randomized clinical trial comparing volar, dorsal, and custom thermoplastic splinting in treatment of acute mallet finger. The Journal of hand surgery. 2010, 35: 580-8.

Rafique A, Ghani S, Sadiq M, Siddiqui IA. Kirschner wire pin tract infection rates between percutaneous and buried wires in treating metacarpal and phalangeal fractures. Journal of the College of Physicians and Surgeons--Pakistan : JCPSP. 2006, 16: 518-20.

Raju PK, Kini SG. Fixation techniques for non-union of the scaphoid. Journal of orthopaedic surgery (Hong Kong). 2011, 19: 80-4.

Randall T, Portney L, Harris BA. Effects of joint mobilization on joint stiffness and active motion of the metacarpal-phalangeal joint. The Journal of orthopaedic and sports physical therapy. 1992, 16: 30-6.

Ribak S, Medina CE, Mattar R, Jr., Ulson HJ, Ulson HJ, Etchebehere M. Treatment of scaphoid nonunion with vascularised and nonvascularised dorsal bone grafting from the distal radius. International orthopaedics. 2010, 34: 683-8.

Ricardo M. The effect of ultrasound on the healing of muscle-pediculated bone graft in scaphoid non-union. International orthopaedics. 2006, 30: 123-7.

Rocchi L, Merolli A, Morini A, Monteleone G, Foti C. A modified spica-splint in postoperative early-motion management of skier's thumb lesion: A randomized clinical trial. European journal of physical and rehabilitation medicine. 2014, 50: 49-57.

Saeden B, Tornkvist H, Ponzer S, Hoglund M. Fracture of the carpal scaphoid. A prospective, randomised 12-year follow-up comparing operative and conservative treatment. The Journal of bone and joint surgery British volume. 2001, 83: 230-4.

Saito K, Kihara H. A randomized controlled trial of the effect of 2-step orthosis treatment for a mallet finger of tendinous origin. Journal of hand therapy : official journal of the American Society of Hand Therapists. 2016, 29: 433-9.

Sjolin SU, Andersen JC. Clinical fracture of the carpal scaphoid--supportive bandage or plaster cast immobilization? Journal of hand surgery (Edinburgh, Scotland). 1988, 13: 75-6.

Sletten IN, Hellund JC, Olsen B, Clementsen S, Kvernmo HD, Nordsletten L. Conservative treatment has comparable outcome with bouquet pinning of little finger metacarpal neck fractures: A multicentre randomized controlled study of 85 patients. J Hand Surg Eur Vol. 2015, 40: 76-83.

Sloan JP, Dove AF, Maheson M, Cope AN, Welsh KR. Antibiotics in open fractures of the distal phalanx? Journal of hand surgery (Edinburgh, Scotland). 1987, 12: 123-4.

Sollerman C, Abrahamsson SO, Lundborg G, Adalbert K. Functional splinting versus plaster cast for ruptures of the ulnar collateral ligament of the thumb. A prospective randomized study of 63 cases. Acta orthopaedica Scandinavica. 1991, 62: 524-6.

Sorensen JS, Freund KG, Kejla G. Functional fracture bracing in metacarpal fractures: The galveston metacarpal brace versus a plaster-of-paris bandage in a prospective study. Journal of hand therapy : official journal of the American Society of Hand Therapists. 1993, 6: 263-5.

Sourmelis S, Platanitis G, Korakis T, Daras A, Schinas N, Papakostas C. Static splinting vs. Functional treatment in extra-articular fractures of the proximal phalanges. Orthopaedic transactions. 1995, 19: 210.

Statius Muller MG, Poolman RW, van Hoogstraten MJ, Steller EP. Immediate mobilization gives good results in boxer's fractures with volar angulation up to 70 degrees: A prospective randomized trial comparing immediate mobilization with cast immobilization. Archives of orthopaedic and trauma surgery. 2003, 123: 534-7.

Stevenson J, McNaughton G, Riley J. The use of prophylactic flucloxacillin in treatment of open fractures of the distal phalanx within an accident and emergency department: A double-blind randomized placebo-controlled trial. Journal of hand surgery (Edinburgh, Scotland). 2003, 28: 388-94.

Strub B, Schindele S, Sonderegger J, Sproedt J, von Campe A, Gruenert JG. Intramedullary splinting or conservative treatment for displaced fractures of the little finger metacarpal neck? A prospective study. J Hand Surg Eur Vol. 2010, 35: 725-9.

Thomsen NO, Petersen MS, Hovgaard C. Treatment of hyperextension injuries to the pip joint. Journal of hand surgery (Edinburgh, Scotland). 1995, 20: 383-4.

Tocco S, Boccolari P, Landi A et al. Effectiveness of cast immobilization in comparison to the gold-standard self-removal orthotic intervention for closed mallet fingers: A randomized clinical trial. Journal of hand therapy : official journal of the American Society of Hand Therapists. 2013, 26: 191-200; quiz 1.

van Aaken J, Fusetti C, Luchina S et al. Fifth metacarpal neck fractures treated with soft wrap/buddy taping compared to reduction and casting: Results of a prospective, multicenter, randomized trial. Archives of orthopaedic and trauma surgery. 2016, 136: 135-42.

Vinnars B, Pietreanu M, Bodestedt A, Ekenstam F, Gerdin B. Nonoperative compared with operative treatment of acute scaphoid fractures. A randomized clinical trial. J Bone Joint Surg Am. 2008, 90: 1176-85.

Warren RA, Norris SH, Ferguson DG. Mallet finger: A trial of two splints. Journal of hand surgery (Edinburgh, Scotland). 1988, 13: 151-3.

Winter M, Balaguer T, Bessiere C, Carles M, Lebreton E. Surgical treatment of the boxer's fracture: Transverse pinning versus intramedullary pinning. J Hand Surg Eur Vol. 2007, 32: 709-13.

Xia X. Kirschner wire and mini-plate fixation in repair of metacarpal and phalangeal fractures: Hand function and adverse reactions. *Chinese journal of tissue engineering research*, 2015, Vol. 19: 2741-4.

Zhou F, Shen B, Wang R, Fan S, Hu W. [clinical contrast of percutaneous pinning with plaster splint and open reduction and pulling out wire in the treatment of mallet fingers]. Zhongguo xiu fu chong jian wai ke za zhi = Zhongguo xiufu chongjian waike zazhi = Chinese journal of reparative and reconstructive surgery. 2008, 22: 1451-4.

Zyluk A, Budzynski T. [conservative vs operative treatment of isolated fractures of phalanges: Results of the prospective, randomized study]. Chirurgia narzadow ruchu i ortopedia polska. 2009, 74: 74-8.