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Original Research

Efficacy of Splinting in Managing Adult Trigger Finger: A Systematic Review of Short-Term Outcomes

Elise S. McKenna, [*] Nathaniel Co, [†] Hanna Brancaccio, [‡] Blane Soper, [§] Aryan Borole, [§] Yuri Han, [§] David Kirschenbaum, MD, [‖] Brian M. Katt, MD [‖]

[*] *Rutgers New Jersey Medical School, Newark, NJ*
[†] *University of California Riverside School of Medicine, Riverside, CA*
[‡] *Rowan University School of Osteopathic Medicine, Stratford, NJ*
[§] *Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ*
[‖] *Department of Orthopaedic Surgery, Robert Wood Johnson University Hospital, New Brunswick, NJ*

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Purpose: Trigger finger is a common hand condition often managed conservatively with splinting, which reduces pain and improves function by immobilizing the affected digit. Splinting is a viable alternative for patients wishing to avoid corticosteroid injections or surgery. Short-term studies suggest it effectively relieves symptoms; however, adherence can be challenging. This systematic review evaluates the short-term efficacy of splinting for trigger finger and aims to identify the most effective splint.

Methods: A systematic review was conducted following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines and registered with the International Prospective Register of Systematic Reviews Registry. Six medical databases were queried, and studies screened using predetermined inclusion criteria. Relevant data were extracted and analyzed.

Results: Thirteen studies met criteria, investigating various blocking orthoses worn for 6 to 12 weeks. Splinting consistently reduced pain, stopped triggering, and improved function over the short term (within 1 year), with success rates up to 97%, comparable to corticosteroid injections but without risks like skin atrophy or infection. Regardless of splint type, splinting was most effective when worn 24 hours a day. Although the metacarpophalangeal joint blocking orthoses was the most studied orthotic, the proximal interphalangeal joint blocking orthoses (PIP-BO) outperformed the metacarpophalangeal joint blocking orthoses , providing more effective pain reduction and better functional outcome. Patients found the PIP-BO to be more comfortable and aesthetic, leading to greater wear time.

Conclusions: Splinting is an effective short-term conservative treatment for trigger finger, offering symptom relief and functional improvement. Although adherence may be challenging for some patients, splinting remains a valuable option for those seeking noninvasive management. PIP-BOs superior functional outcomes, patient satisfaction, and cost-effectiveness, leads our study to recommend a PIP-BO worn continuously for at least 6 weeks, if splinting is chosen as a first-line treatment. Further research is needed to explore long-term outcomes and standardize splinting approaches for broader clinical application.

Type of study/level of evidence: Therapeutic III.

Trigger finger, or stenosing flexor tenosynovitis, is a leading cause of finger pain and dysfunction, accounting for a considerable number of referrals to outpatient hand clinics with a prevalence of approximately 2.6% in the general population.[1] The condition typically results from narrowing of the A1 pulley sheath, which causes inflammation and nodular development along the tendon-sheath interface.[2] Clinically, this presents as pain, snapping, or

Corresponding author: Brian Katt, MD, Robert Wood Johnson University Hospital, Department of Orthopaedic Surgery, 1 Robert Wood Johnson Place, New Brunswick, NJ, 08903-2601.
E-mail address: briankatt@gmail.com (B.M. Katt).

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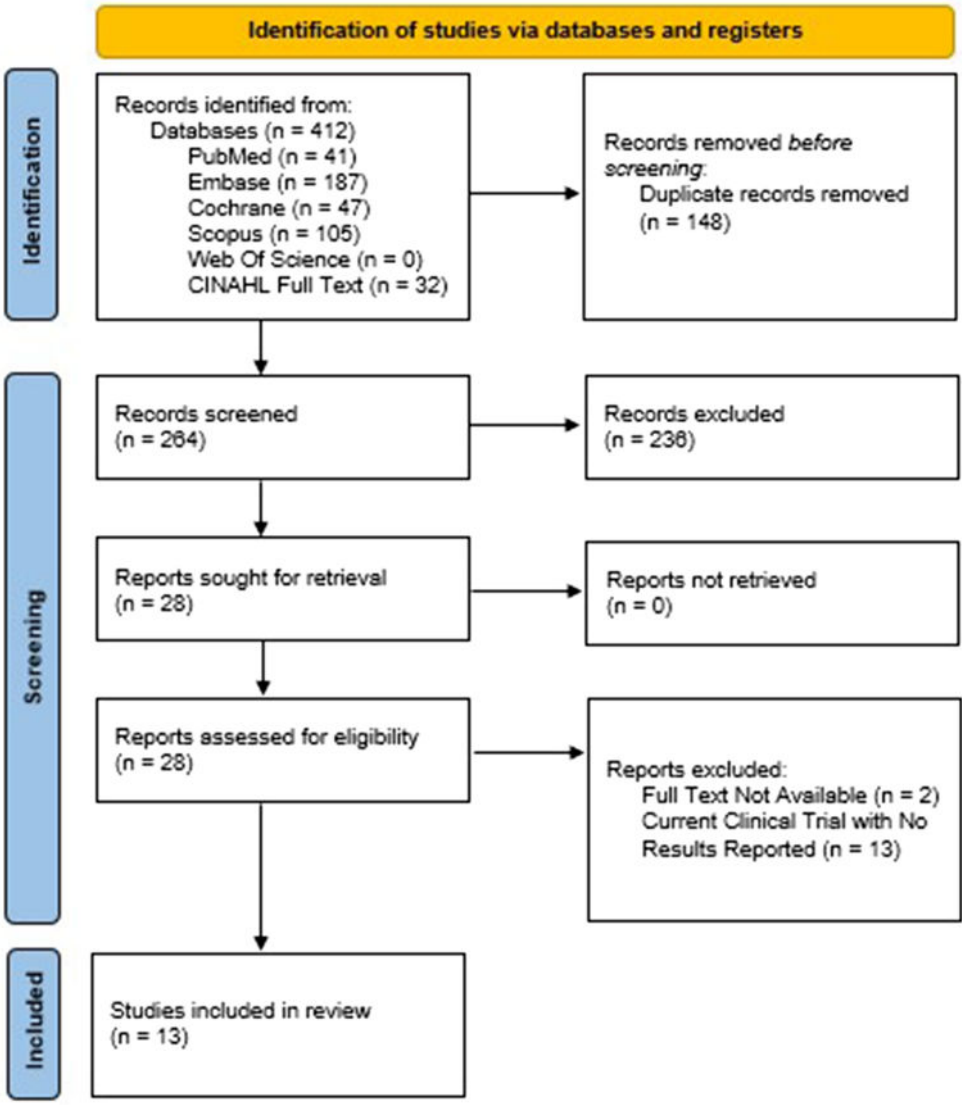

Figure 1. Summary of current research on splinting for trigger finger.

locking of the finger during movement, particularly when flexing and extending at the proximal interphalangeal joint.[3,4]

Treatment options for trigger finger range from conservative therapies, such as corticosteroid injections and splinting, to surgical intervention. Steroid injections are a widely used treatment with reported success rates of around 80%, but results vary. In addition, side effects such as skin atrophy or infection can occur.[2,5,6] Splinting, which aims to minimize tendon movement through the pulley system, is another conservative approach.[4] Studies have shown that splinting may offer better short-term relief, with success rates as high as 87% over 1 year in some cases after 6–9 weeks of use.[7]

There are multiple types of splints used for treating trigger finger, including metacarpophalangeal joint blocking orthoses (MCP-BO), proximal interphalangeal joint blocking orthoses (PIP-BO), distal interphalangeal joint blocking orthoses (DIP-BO), and relative motion extension orthoses (RME-O). Each type has varying degrees of efficacy for reducing pain and improving function.[8] This systematic review evaluates the short-term efficacy of splinting for trigger finger and aims to identify the most effective splint.

Materials and Methods

A systematic review examining outcome measures following the use of orthoses for trigger finger was conducted with strict adherence to The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines.[9] The review was registered with the International Prospective Register of Systematic Reviews Registry, Number CRID615127.

Inclusion criteria

Only full-length English texts reporting primary clinical data on orthotic devices for treating trigger finger in patients aged 18 years and older were included. All RCTs, retrospective studies, prospective studies, pilot studies, and case series (where $n \geq 5$) were included. For studies with multiple arms, patients were included if one arm involved splinting without steroid injection or surgery. Patients who received physical therapy in addition to splinting were also eligible. All patients from the relevant arms were included in the analysis, which encompasses a range of pretreatment disease severity, studies with and without

Table 1
General Study Characteristics for Splinted Patients

	Study Type	No. of Patients Splinted	No. of Digits	Mean Age of Splinted Patients (Range)	Sex	Type of Orthotic	Concurrent Therapy	Patient Selection Criteria
Yendi et al[8]	RCT	30	30	50 (30–62)	22 F, 8 M	MCPJ-BO RME-O	Activity modification and flexor tendon gliding exercises	- Froimson stage 1–3 - Acute, subacute, and chronic disease phase - Excluded steroid injection in the affected finger within the previous 6 months or had previously undergone trigger release surgery
Drijkoningen et al[21]	PCS	34	34	61 (41–85)	22 F, 12 M	Custom-made MCP hand-based night orthotic	None	- Quinnell grade 1 or 2, symptoms for <3 mo - 3 had sought nonmedical treatment before (8.8%)
Pataradool et al[22]	PCS	30	30	59 (43–72)	19 F, 11 M	Custom-made adjustable PIP joint orthosis - custom-made volar thermoplastic orthosis with dorsal adjustable Velcro tape	Gliding exercises	- SST 2–5 - Onset of <6 mo - No prior treatment (corticosteroid injection and surgery)
Tarbhai et al[15]	RCT	30	32	MCPJ-BO: 58 (37–79) DIPJ-BO: 68 (36–79)	MCP joint: 3 M, 10 F DIP joint: 8M, 7 F	MCPJ-BO, DIP-J BO	None	- Never treated
Nadar et al[16]	RCT	28	28	60.68 (48–71)	20 F, 8 M	PIP-J BO	Hand therapy including gliding and passive range of motion exercises, stretching, and massage. 1 in-person therapy session/week.	- Green grade 2 or 3 - No previous treatments
Colbourn et al[17]	RCT	28	28	64.6 (44–80)	21 F, 7 M	Low-profile custom thermoplastic MCP blocking (ring) splint	Exercises to complete independently	- All SST - No previous steroid injections
Valdes et al[7]	RCS	46	63	68.48	28 F, 18 M	1 Involved Digit: Static finger circumferential orthosis that blocked (PIP) motion 2+ Involved Digits: Hand finger orthosis that immobilized the MP joints of the involved digits in 10–15° of flexion that allowed unrestricted IP motion	Passive IP joint flexion, composite full finger flexion, full finger extension, and active hook exercises	- All SST - No previous steroid injections
Teo et al[18]	RCT	35	43	MCPJ-BO: 60.94 (42–74) PIPJ-BO: 58.95 (49–71)	24 F,11 M	PIPJ-BO, MCPJ-BO	Massage, thermal and electrical therapy, passive and active range of motion exercises, tendon gliding	- Green's classification grade 2 or 3
Alsancak et al[24]	MSWC	29	43 Thumbs Group A: n = 28 splint 1 at night splint 3 during day Group B: n = 15 splint 2 at night splint 3 during day	Group A: 45.53 Group B: 49.6	22 F, 7 M	Splint 1- limited the IP, MCP, and CMC joint flexion and extension Splint 2- limited the MCP joint and given 15 degrees of flexion position and limited CMC joint hyperextension Splint 3- only limited IP joint and positioned in 15 degrees flexion	Exercise program and connective tissue manipulation	- All SST - No previous A1 pulley release surgery and steroid injections within the past year
Atthakomol et al[19]	RCT	43 splinting only group	43 splinting only group	Splinting only group: 56	39 F, 4 M	Fixed metacarpophalangeal joint orthosis	None	- All SST - Excluded previous local corticosteroid injection, splint, or surgical

(*continued on next page*)

Table 1 (*continued*)

	Study Type	No. of Patients Splinted	No. of Digits	Mean Age of Splinted Patients (Range)	Sex	Type of Orthotic	Concurrent Therapy	Patient Selection Criteria
Patel et al[20]	RCT	50	50	60	14 F, 36 M	Splinting of MCP in 10–15 degrees flexion. Thermoclast splint and Velcro hook and loop straps	None	- All SST
Rodgers et al[23]	PCS	21	31	30 (23–34)	12 M, 9 F	Alumafoam and Stax DIP splints	None	- SST 2–5 - Excluded previous surgical release
Evans et al[25]	Pilot study	55	55	60 (31–74)	25 F,13 M	MCP at 0* extension, unrestricted IP joint movement	Hook fist exercise, massage, place and hold full fist exercises	Not stated

MCPJ-BO, metacarpophalangeal joint blocking orthosis; MSWC, multiarm study without control; PCS, prospective cohort study; PIP, proximal interphalangeal; RCS, retrospective cohort study; SST, Stages of Stenosing Tenosynovitis

presence of coexisting conditions and various prior treatment history.

Exclusion criteria

Orthotics for de Quervain tenosynovitis, orthotics for joints other than the hand, meta-analyses, systematic review articles, expert opinions, case studies, and nonhuman studies, were excluded. Patients were excluded if they had a concurrent steroid injection or surgery.

Information sources and search strategy

Six medical databases (PubMed, Embase, Cochrane, Scopus, Web of Science, and CINAHL) were extensively queried by two independent reviewers (E.M. and N.C.). The search string employed in database searching was developed using major keywords and MeSH terms of the therapeutic technique and condition of interest. The search string used was ("trigger finger" OR "flexor tenosynovitis" OR "stenosing tenosynovitis" OR "trigger digit" OR "flexor tendon entrapment") AND ("splint" OR "orthosis"). PubMed was searched on July 15, 2024, and all others were searched on July 16, 2024. Reference lists of key articles were separately reviewed. Search results are detailed in Figure 1.

Study selection

Articles were imported into Rayyan.ai and subjected to duplicate detection and removal.[10] Articles were manually sorted by two independent reviewers and assessed for adherence to predetermined inclusion and exclusion criteria. After extensive abstract review, a full-text appraisal of the remaining articles was conducted. If an article was determined to meet all criteria, the data was extracted onto an external spreadsheet.

Data collection

Data points extracted were: year of publication, journal, type of study, number of patients/digits, mean age and range, sex, types of orthotics, primary metrics/outcomes, secondary metrics/outcomes, patient-reported outcomes, time of day of use, length of use, compliance with use, timing of follow-ups, patient inclusion criteria, and referral to other therapies.

Certainty of evidence and risk of bias assessment

The outcome of interest in this study was scored for certainty of evidence using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria with use of GRADEpro Guideline Development Tool.[11,12] Bias was assessed using metrics designed for the studies specific study type. Risk Of Bias In Nonrandomized Studies of Interventions was employed to encompass the study types included.[13,14]

Results

Of 412 records identified, 148 duplicates were removed, and 264 were screened. Figure 1 shows screening results. Thirteen studies were identified to be included in this review: seven randomized controlled trials (RCTs), three prospective cohort studies, one retrospective cohort study, one multiarm trial without control, and one pilot study.[7,8,15–25]

A total of 440 splinted subjects, with reported ages from 30 to 85 years (weighted average 58.1 years) and reported split of 158 men (36%) and 282 women (64%), are summarized in Table 1 along with patient selection criteria.[7,8,15–25]

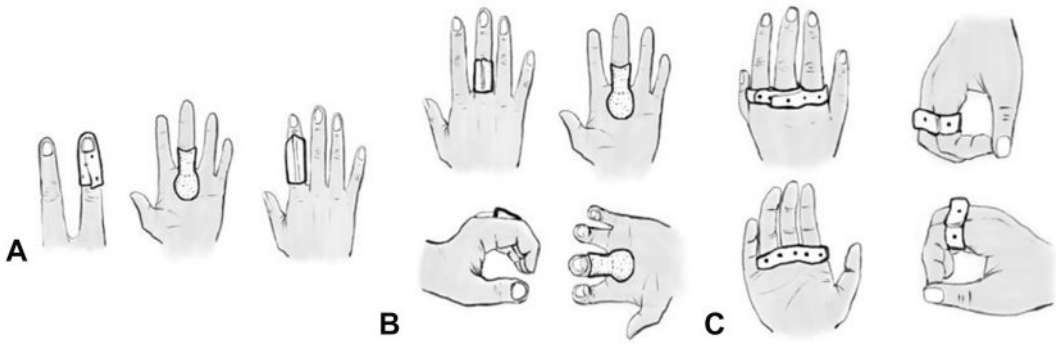

Figure 2. Example orthotics used in the study by Yendi et al.[8]

Trigger finger orthotics

A variety of orthotics were used across the studies as summarized in Table 1.[7,8,15–25] Figure 2 illustrates orthotics from Yendi et al,[8] demonstrating the diversity of splints available for practitioners to choose from.

Primary and secondary outcomes measured

Fifteen different primary and secondary metrics were tracked across studies. These included visual analog scale (VAS) for pain intensity; numeric pain rating scale ; Disabilities of the Arm, Shoulder, and Hand (DASH); Quick Disabilities of the Arm, Shoulder, and Hand (*Quick*DASH); Michigan Hand Outcomes Questionnaire; grip strength; success rate; recurrence; number of triggering events in ten active fists; duration of symptoms; degree of symptom improvement; Greens classification; Stages of Stenosing Tenosynovitis; adverse reaction to orthotic device; and "length of wear, comfort and function" as used in Tarbhai et al.[15]

The definition of success varied across studies. Valdes et al[7] measured success rate as determined by the number of participants that did not required either injection or surgical intervention in the year after orthotic device application. Patel et al[20] defined success if the patients had minimal pain or uneven movements that did not interfere with hand function and required no further treatment or if they were free of symptoms (patients were followed for 1 year). Rodgers et al[23] defined successful treatment as complete resolution or painless clicking that did not interfere with hand function.

Degree of symptom improvement is similar to success rate. It is a bucket created by the authors to include metrics which tracked improvement in triggering where the authors did not define the metric as a "success rate". Drijkoningen et al[21] used an ordinal scale (0–10) to have patients rate how much splinting helped relieve locking or triggering. Tarbhai et al[15] used a similar 0- to 10-point scale to have patients rate severity of triggering, frequency of triggering, and functional impact of triggering. Colbourn et al[17] reported participant perceived improvement in symptoms categorized into one of five categories. Atthakomol et al[19] used Quinnell classification to grade improvement. Evans et al[25] rated patient improvements in three buckets: resolved triggering, improved triggering, failed results.

The 15 metrics can be grouped into five broader categories denoted in Table 2, along with the breakdown of primary and secondary metrics.[7,8,15–25] Table 3 describes the primary and secondary metric outcomes by article.[7,8,15–25]

Different study approaches

The type of study, patient selection, orthotic type, wear schedule, data collected, and follow-up time varied considerably between the studies, but three general approaches were taken, including orthosis versus orthosis, orthosis versus other therapy, and the efficacy of one orthotic, as shown in Table 4.[7,8,15–25]

Are orthotics a successful treatment method for trigger finger?

In all studies reviewed, splinting proved to be an effective treatment method for trigger finger during the study timeframes. In 1988, Evans et al[25] reported 73% of treated digits required no additional treatment (average follow-up of 8.8 months), and later studies reported even higher rates of success. Rodgers et al[23] reported 71% of patients were treated successfully (average follow-up 1 year). Colbourn et al[17] reported 92.9% of patients believed that their triggering resolved (6 to 10 week follow-up length). Valdes et al[7] reported 87% required no further intervention in the year after orthosis intervention. Pataradool et al[22] reported 97% patients believed that their symptoms improved (6 week follow-up length).[7,17,22,23,25] The lowest success rate reported was 52%, with a night-time-only MCP-BO.[21] Splinting was most successful when the splint was worn continuously, 24 hours a day (expect for hygiene and physical therapy breaks), and for at least 6 to 8 weeks.[7,8,16,18,21,22] The reviewed studies did not include stratification on success by initial staging criteria/grading.

Orthotic versus orthotic

Four papers compared an orthotic versus orthotic, as shown in Table 2.[7,8,15–25] Three papers compared an MCP-BO versus another orthotic, whereas one compared two thumb protocols. Yendi et al[8] and Tarbhai et al[15] found the MCP-BO superior to other orthotics, whereas Teo et al[18] found the PIP-BO superior to the MCP-BO. Alsancak et al[24] found that a combination interphalangeal (IP), MCP, and carpometacarpal (CMC) BO was more effective than only the MCP-BO and CMC-BO for trigger thumb.

Orthotic versus other treatments

Orthotics performed superior to physical therapy and similar to steroid injections as shown in three articles. Nadar et al[16] found the PIP-BO to be superior to therapy alone, which showed no considerable improvement. Atthakomol et al[19] compared MCP-BO, steroid injections, and a combination of both, finding no considerable differences in pain or function at 6, 12, or 52 weeks, leading them to recommend MCP-BO as a first-line treatment. Patel et al[20]

Table 2
Primary and Secondary Metrics Reported by Study and Category Summarization

		Method														
		VAS	Numeric Pain Rating Scale	*Quick*DASH Score	DASHScore	Michigan Hand Outcomes Questionnaire	Grip Strength	Stages of Stenosing Tenosynovitis	Greens	Success Rate	No. of Triggering Events in Ten Active Fists	Degree of Symptom Improvement	Duration of Symptoms	Recurrence	Adverse Reaction to Orthotic Device	Length of Wear, Comfort and Function
Study	Yendi et al[8]		1		2											
	Drijkoningen et al[21]		2	1								2				
	Pataradool et al[22]	2		1				2			2					
	Tarbhai et al[15]											1				2
	Nadar et al[16]		2	2					1	1						
	Colbourn et al[17]		1				1	1			1	1				
	Valdes et al[7]	1						1		2					2	
	Teo et al[18]		1	1					2							
	Alsancak et al[24]	1						1								
	Atthakomol et al[19]	1				1						2				
	Patel et al[20]									1			2	2		
	Rodgers et al[23]									1						
	Evans et al[25]											1				
	Total	4	5	4	1	1	1	4	2	4	2	5	1	1	1	1
	Patient-reported metric	ü	ü	ü	ü	ü						ü			ü	ü
	Category of Outcomes Measured															
	Pain	ü	ü													
	Function/quality of life			ü	ü	ü	ü									
	Objective TF staging							ü	ü							
	Success/recurrence									ü	ü	ü	ü	ü		
	Adverse reactions and orthotics use														ü	ü

1 = primary metric, 2 = secondary metric.
MHQ, Michigan Hand Outcomes Questionnaire; NPRS, Numeric Pain Rating Scale; PIP, proximal interphalangeal; TF, trigger finger.
Greens Classification (Greens): Grades the severity of trigger finger based on clinical symptoms. 1 = Pain/history of catching. 2 = Demonstrable catching on physical examination, but patient can actively extend the digit. 3 = Demonstrable catching on physical examination, digit must be passively extended. 4 = Fixed flexion contracture.
Stages of Stenosing Tenosynovitis: Stages the severity of stenosing tenosynovitis from mild to severe. 1 = Normal. 2 = painful palpable nodule. 3 = Triggering. 4 = The PIP joint locks into flexion and is unlocked with active PIP joint extension. 5 = The PIP joint locks and is unlocked with passive PIP joint extension. 6 = The PIP joint remains locked in a flexed position.
Number of Triggering Events in Ten Active Fists: Counts the number of times the finger locks or triggers in 10 fist movements.

Table 3
Primary and Secondary Outcomes by Study

Study	Primary Outcomes	Secondary Outcomes
Evans et al[25]	52% of patients resolved or excellent (completely asymptomatic digit); 21% good or improved (intermittent clicking with no pain); 27% failed, (injection or surgery required).	Average follow-up of 8.8 mo for resolved or excellent patients, 4.2 mo for good or improved.
Patel et al[20]	66% of splinted patients and 84% of injected patients saw success (minimal pain or uneven movements that did not interfere with function, no further treatment required, and free of symptoms).	12% of splinted patients experienced a 1-y recurrence. Splinting was only 50% successful and injection was 92% successful for trigger thumbs specifically. In nonthumbs, splinting was 77% successful and injection was 84% successful before 6 mo of symptom onset; splinting and injections were 44% and 71% successful after 6 mo, respectively.
Atthakomol et al[19]	MCP joint orthosis vs steroid injection vs combination: Week 6 VAS scores of 2.6, 2.6, and 1.9. Week 12 VAS scores of 2.6, 2.8, and 1.9. Week 52 VAS scores of 1.6, 2.1, and 1.2. Week 6 MHQ scores of 65, 67, and 74. Week 12 MHQ scores of 64, 63, and 72. Week 52 MHQ scores of 75, 72, and 82.	At 52 wk, 70%, 52%, and 76% of patients saw improvement in trigger finger severity, respectively.
Alsancak et al[24]	Group A vs Group B: SST reduced from 2.71 to 1.71 vs 2.73 to 1.4. Mean VAS reduced from 8.03 to 2.72 vs 8.18 to 4.52. Both treatment regimens showed statistically considerable improvement in both metrics.	-
Teo et al[18]	PIPJ-BO vs MCPJ-BO: Pain scale reductions of 2.65 vs 1.25, considerable for both groups. *Quick*DASH score improvement was only considerable for the PIPJ-BO group.	48% of PIPJ-BO patients improved by at least one Green's classification grade compared to 40% in the MCPJ-BO group. Duration of orthosis wear was considerably longer in the PIPJ-BO group.
Valdes et al[7]	PIP or MCP orthoses reduced mean pain score from 5.63 to 1.20. Mean SST score reduced from 3.93 to 1.21.	87% of patients required no further intervention.
Rodgers et al[23]	DIP splinting and/or corticosterone injections vs splinting alone: Successfully treated 25 of 31 digits (81%) vs 17 of 31 digits (55%). Successfully treated 15 of 21 overall patients (71%) vs 11 of 21 patients (52%).	-
Colbourn et al[17]	Average improvement in SST of 1.535 ± 1.23, average improvement in NPRS of 2.231 ± 2.75, and average decrease in NTTAF of 2.679 ± 3.72. All statistically considerable changes, except grip strength.	26 participants (92.9%) believed that triggering had improved.
Nadar et al[16]	6-week PIPJ-BO group: Green classification score decrease from 2.68 to 0.93. Mean *Quick*DASH score considerably reduced from 37.6 to 20.26. Mean NPRS considerably decreased from 5.18 to 2.32.	PIPJ-BO vs control hand therapy resolved all triggering in 53.6% of the participants vs 0% at 6 wk.
Tarbhai et al[15] (2012)	MCPJ-BO vs DIPJ-BO: Complete or partial relief of triggering was seen in 77% (10 of 13) of patients vs 47% (7 of 15) at 6 wk. Joint stiffness in 1 of 13 patients vs 7 of 15. Reduction in grip strength in 4 of 13 patients vs 5 of 15. Described splint as comfortable by 77% of patients vs 60%.	Little difference was observed between groups regarding time spent wearing splint and splint effect on functioning.
Pataradool et al[22]	At 6 wk: *Quick*DASH scores reduced by a mean of 29.0. SST reduced by 1.4. VAS reduced by 3.4. NTTAF reduced by 4.0.	29 of 30 patients were satisfied with their treatment.
Drijkoningen et al[21]	After 4–6 wk: *Quick*DASH score reduced from 24 to 16. NPRS reduced from 3.8 to 2.6.	Mean reported patient satisfaction was 5.8 on a scale from 0 to 10. 53% (18 of 34) patients reported complete resolution of triggering.
Yendi et al[8]	MCPJ-BO vs RME-O at 6 wk: 60% vs 27% overall success (improvement in mean NPRS score >2 and DASH score >11) Mean NPRS reduced from 5 to 0 vs 7 to 0. DASH reduced from 25.1 to 12.4 vs 27.6 to 25.1 Within-group comparisons showed both orthoses relieved pain, but MCPJ-BO to a greater extent.	Both groups reported mean QUEST scores of 4.7, indicating high satisfaction.

MCPJ-BO, metacarpophalangeal joint blocking orthosis; MHQ, Michigan Hand Outcomes Questionnaire; NPRS, Numeric Pain Rating Scale; NTTAF, Number of Triggering Events in Ten Active Fists; PIP, proximal interphalangeal; QUEST, Quick Evaluation of Satisfaction with Treatment.

found both MCP-BO and steroid injections effective, with success rates of 66% for splinting and 84% for injections.

Patient-report outcomes

Eleven articles used at least one patient-reported outcome (PRO), with 10 using a PRO as a primary outcome. The most commonly used was "degree of symptom improvement" in five papers (Table 2).[7,8,15–25] All 11 of the articles that used at least one PRO showed improvements in outcomes whether the article was comparing orthotic devices to each other or comparing orthotics to other treatment modalities. The articles that did not use PROs reported measures such as success rates, or Stages of Stenosing Tenosynovitis, which stage the severity of stenosing tenosynovitis from mild to severe on a scale of 1 to 6. The follow-up period for the PROs is listed in Table 5.[7,8,15–25]

Table 4
Outcomes by Category of Study

	Orthosis vs orthosis	Which orthosis was better?
Yendi et al[8]	MCP vs RME	Both similar in pain relief, MCP better in improving function
Teo et al[18]	MCP vs PIP	PIP more effective in pain reduction and better functional outcome than MCP
Tarbhai et al[15]	MCP vs DIP	MCP had positive outcomes in 77% of patients vs ~50% for DIP
Alsancak et al[24]	Two thumb protocols	IP, MCP, and CMC joint BO (Group A, splint 1) was better than the MCP and CMC joint BO (Group B, splint 2)
	Orthosis vs other treatment	Which treatment was better?
Nadar et al[16]	PIP vs physical therapy	PIP better - physical therapy without splitting did not result in any considerable improvements
Atthakomol et al[19]	MCP vs steroid vs both	No statistical difference between the three groups in VAS pain reduction or MHQ at any time point (6, 12, or 52 wk); therefore, the authors recommend MCP-BO as first-line treatment
Patel et al[20]	MCP vs steroid for thumb	Both splitting and steroid injection effective, with splinting group 66% successful, injection group 84% successful
	One orthotic	Did splinting work?
Pataradool et al[22]	PIP	Yes - Single digit idiopathic trigger finger, wore PIP-BO for 6 wk full time, 32/33 saw considerable improvement in function (*Quick*DASH), SST, pain (VAS), and triggering and a high rate of acceptance among patients
Drijkoningen et al[21]	MCP (DIP for thumb)	Yes - Night time splinting for 6 wk for idiopathic trigger digits with a Quinnell grade 1 or 2 trigger and symptoms for fewer than 3 mo resulted in 53% of patients with reduced or resolved symptoms
Valdes et al[7]	PIP, IP, MCP	Yes - Valdes et al[7] reported an 87% success rate with orthotic intervention
Colbourn et al[17]	MCP	Yes - 92.9% believed that their trigger finger symptoms resolved after 6–10 wk of splinting
Rodgers et al[23]	DIP	Yes - 81% of digits and 71% of patients were treated successfully
Evans et al[25]	MCP	Yes - No further treatment was need for 73% of the treated digits

CMC, carpometacarpal; DIP, distal interphalangeal; IP, interphalangeal; MCP, metacarpophalangeal; PIP, proximal interphalangeal.

Time of day of use, length of orthotic use, and follow-up

Six studies instructed participants to wear the orthosis 24/7, with some making exceptions to remove the orthotics for hygiene or exercise.[7,15,18,19,21,22] Drijkoningen et al[21] had patients wear the orthosis at night only for 6 weeks. Atthakomol et al[19] had patients wear the orthosis at night for 8 hours. Teo et al[18] instructed adults to wear the orthosis during the day for 8 weeks, with additional night wear if they experienced locked digit(s) during sleep.

The most advised duration for orthosis wear was at least 6 weeks. The total duration of orthosis wear ranged from 3 weeks to 12 weeks. The most common interval for follow-up was at 6 weeks, with some including repeat evaluations at 3 months and 1 year to assess longer-term outcomes or need for referral.[7,15] Table 5 summarizes data on use, length of wear, and follow-up.[7,8,15–25] Pataradool et al[22] found an inverse linear relationship between compliance and *Quick*DASH scores, which suggests functional outcomes improve with longer duration of wear. This corroborates recommendations by other studies comparing orthoses that recommend continuous wear as much as possible.[8,15,18,22]

Concurrent therapy

Eight of the 13 studies employed concurrent hand therapy as shown in Table 1. Therapies ranged from educational materials, hand gliding exercises, massage, thermal and electrical therapy, and passive and active range of motions exercises.

Compliance with use

Eight of the 13 studies commented on compliance (Drijkoningen et al,[21] Pataradool et al,[22] Tarbhai et al,[15] Colbourn et al,[17] Valdes et al,[7] Teo et al,[18] Alsancak et al,[24] Atthakomol et al[19]) as shown in Table 5.[7,8,15–25] Metrics to track compliance varied by study. Adherence to the instructed orthosis wearing schedule was measured, or for studies that did not specify a specific parameter or minimum wear duration, patients reported how often they wore their orthosis daily during the study period.[18,21] Tarbhai et al[15] noted a higher percentage of individuals with the MCP-BO wore their orthosis for more than 18 hours per day, compared to DIP-BO. Teo et al[18] found study participants wearing the PIP-BO had longer daily wear (13.3 hours/day) compared to the MCP-BO cohort (9.6 hours/day). The authors suggested that higher compliance with PIP-BO may be attributed to less restriction and better appearance because of its smaller profile. Atthakomol et al[19] reported 70% of participants wore the orthotic for at least 8 hours per night.[19] Alsancak et al[24] had the highest rate of compliance at 100%. Colbourn et al[17] had the highest rate of noncompliance with 57% of participants reporting they did not wear their splint continuously.

Referral to other therapies

In four studies, patients were referred for other therapies (surgery/steroid injections). In most cases, it was because of failure of the orthotic to resolve the patients' symptoms or unresolved hand conditions. In Valdes et al,[7] 4.3% (two patients) had surgery and 8.5% (four patients) received a steroid injection in the year after orthotic application.[7]

In Evans et al,[25] six digits (11%) in six patients (16%) were classified as failed, requiring injection or surgery, excluding failures associated with unresolved carpal tunnel syndrome, osteoarthritis, or persistent tenosynovitis.[25] There were six treatment failures in Rodgers et al,[23] including four who were referred for surgery and two who declined operative treatment.

In a study by Drijkoningen et al,[21] in which night time only splinting was used, 55% of patient triggering resolved completely at their second visit (6–8 weeks post initial visit), whereas 45% of patients whose symptoms did not fully resolve were offered an injection at the second visit.[21] The higher cross-over rate to steroid treatment in this study is likely due to only night-time wear, which reduced splinting efficacy and reduced patient satisfaction with splinting.

Certainty of evidence and risk of bias assessment

Given the heterogeneity of the studies, indirect comparisons contributed to the moderate certainty of evidence found using

Table 5
Time of Day, Length of Wear, and Compliance with Orthotic Use

Study	Time of Day of Orthotic Use	Length of Orthotic Use	Compliance with Orthotic Use	Follow-up Times
Yendi et al[8]	Full time wear, instructed to remove orthosis for hygiene and flexor tendon gliding exercises	6 wk	Not explicitly stated	6 wk
Drijkoningen et al[21]	Night only	6 wk	Self-reported responses Several nights: 5 (17%) More than 1/2: 4 (13%) Nearly every 21 (70%)	6–8 wk in clinic, 3 mo
Pataradool et al[22]	24/7, instructed to remove orthosis twice a day for hygiene and gliding exercises	6 wk	66.1%	6 wk
Tarbhai et al[15]	"As much as possible" over a 24-hour period Instructed to log reasons why orthosis was removed whenever patient elected to remove orthosis	6 wk	MCP-J BO: 77% >18 hours/day DIP-J BO: 73% >18 hours/day	Weeks 1, 3, 6, and 12 and 1 y
Nadar et al[16]	24/7	6 wk	Not explicitly stated	6 wk and 3 mo
Colbourn et al[17]	24/7, instructed to remove orthosis three times a day for tendon gliding exercises	6 wk	16 participants (57%) reported they did not wear their splint continuously day and night 10 participants (35.7%) reported completing the exercises daily as prescribed	6 wk
Valdes et al[7]	24/7, instructed to remove orthosis three times a day for tendon gliding exercises	6 wk minimum (28/46); 10 wk for patients with persisting triggering at 6 wk (18/46)	24 participants (83%) with isolated occurrence trigger finger reported continuous orthosis wear (day and night) 12 participants (71%) with multiple trigger fingers reported continuous orthosis wear	10 wk, 1 y
Teo et al[18]	During daily activities, patients track hours of orthosis usage Instructed patients to night splint if they experienced locking digit(s) during sleep	8 wk	MCPJ-BO average wear: 9.6 hours/day PIPJ-BO average wear: 13.3 hours/day	2 mo
Alsancak et al[24]	24/7	10 wk	1	10 wk
Atthakomol et al[19]	8 h minimum (night only)	6 wk	70% wore at least 8 h per night	6, 12, and 52 wk
Patel et al[20]	Not explicitly stated Allowed to remove orthosis for hygiene	Average of 6 wk (range: 3–12 wk)	Not explicitly stated	1 y
Rodgers et al[23]	Not explicitly stated	Average of 8 weeks	Not explicitly stated	Seen in-clinic avg 3.5 mo (range: 0.33–7 mo) Final follow-up avg 12 mo (range: 5–20.5 mo)
Evans et al[25]	Full time: Advised patients to wear orthosis continuously during waking hours Instructed to remove orthosis for place and hold exercises	3 wk, 6 wk if showing improvement but lack of resolution	Not explicitly stated	The patients were reviewed at 2 days, 3 wk, 6 wk and final follow-up, as stated in the results

Table 6
Summary of Findings of GRADE Assessment of Certainty of Evidence for the Effect of Splint Type on Pain and Functional Outcomes in Patients with Trigger Finger

Participants (Studies)	Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations	Overall Certainty of Evidence
How does splint type affect pain and functional outcomes in patients with trigger finger?						
440 (RCTs, retrospective and prospective cohort studies, pilot studies)	Not serious	Not serious	Serious	Not serious	Undetected	Moderate
Explanation	Risk of bias found among included studies was determined to not substantially lower confidence in the results of this systematic review	High heterogeneity was not factored into the GRADE as a quantitative statistical analysis was not performed Heterogeneity in this review is described in prior sections	Comparing the efficacy of different splint types using different protocols among patients with differing baseline characteristics			

GRADE criteria. The GRADE criteria and explanation for any decisions to downgrade the quality of evidence are detailed in Table 6.[7,8,12,15–25] Other factors that are considered for upgrading quality of evidence (ie, large effect size, dose-response gradient, and plausible confounders that would have reduced effect size) were not applicable to the outcomes that were examined. The Risk of Bias assessment revealed moderate concerns with risk of bias in 10 out of 13 included studies, which was due to confounding variables, deviations from intended intervention, and measurement outcomes. A description of the domains and their respective determinations for each study is included in Figure 3, which were generated using robvis.

Discussion

The results of this systematic review suggest that splinting is an effective conservative treatment option for trigger finger. Across multiple studies, splints consistently demonstrated successful outcomes in terms of pain relief and functional improvement. Notably, the success rates of splinting were comparable to those of corticosteroid injections, as seen in Atthakomol et al,[19] but without the associated risks of side effects like skin atrophy, infection, or steroid flare.

MCP was the most studied orthotic, with it outperforming RME and DIP orthotics, but has limitations in terms of compliance of wear and patient satisfaction. Teo et al[18] demonstrated the PIP-BO to be superior to MCP-BO, with greater pain and *Quick*DASH score reduction. Patients also found the PIP-BO to be more comfortable and aesthetically less noticeable, resulting in a considerably longer duration of wear. Pataradool et al[22] demonstrated high satisfaction with the PIP-BO and a statistically considerable improvement in *Quick*DASH score from enrolment over 6 weeks. Pataradool et al[22] also noted the PIP-BO limited finger flexion more than the MCP-BO, enhancing results. Given this, we recommend practitioners consider a PIP-BO as first-line treatment when treating trigger finger with splinting.

Teo et al[18] compared a custom-made MCP joint orthosis with a commercially available PIP-BO, whereas Pataradool et al[22] studied a custom-made adjustable PIP-BO. Both effectively treated trigger finger. The custom-made orthotic took less than 30 minutes to manufacture in the clinic and provided customizability for larger hand sizes and ensured a low-profile fit, enhancing wear compliance.[18,22] PIP-BOs are also more cost effective than MCP-BOs, requiring less material to make and fitting more patients off-the-shelf. Oval-8 Finger Splints, a slim fitting type of PIP-BO, used by Teo et al,[18] can be easily ordered and stocked for practitioners and come in sizes 2–15, increasing off-the-shelf customizability.[22]

Splinting outcomes were closely tied to patient compliance and wear time. Studies indicated that the success of splinting increases considerably when patients adhere to a continuous wear schedule for at least 6 weeks and up to 10 weeks.[18,22] If no improvement is seen by 10 weeks—longest wear time reported across studies, with the exception of Patel et al,[20] which reported a maximum of 12 weeks but an average of 6—practitioners should consider switching treatment modalities. Inconsistent use or restricting the splint to night-time wear alone reduced efficacy, highlighting the importance of patient education in achieving optimal outcomes. For patients where splinting does not work, the need for subsequent steroid injection or surgery will extend their treatment time.

Beyond clinical outcomes, cost-effectiveness is an important consideration in determining the role of splinting for trigger finger. Splinting is more cost effective than surgical intervention. Drijkoningen et al[21] posited that the costs of a hand therapy visit and a corticosteroid injection are comparable. However, in patients who

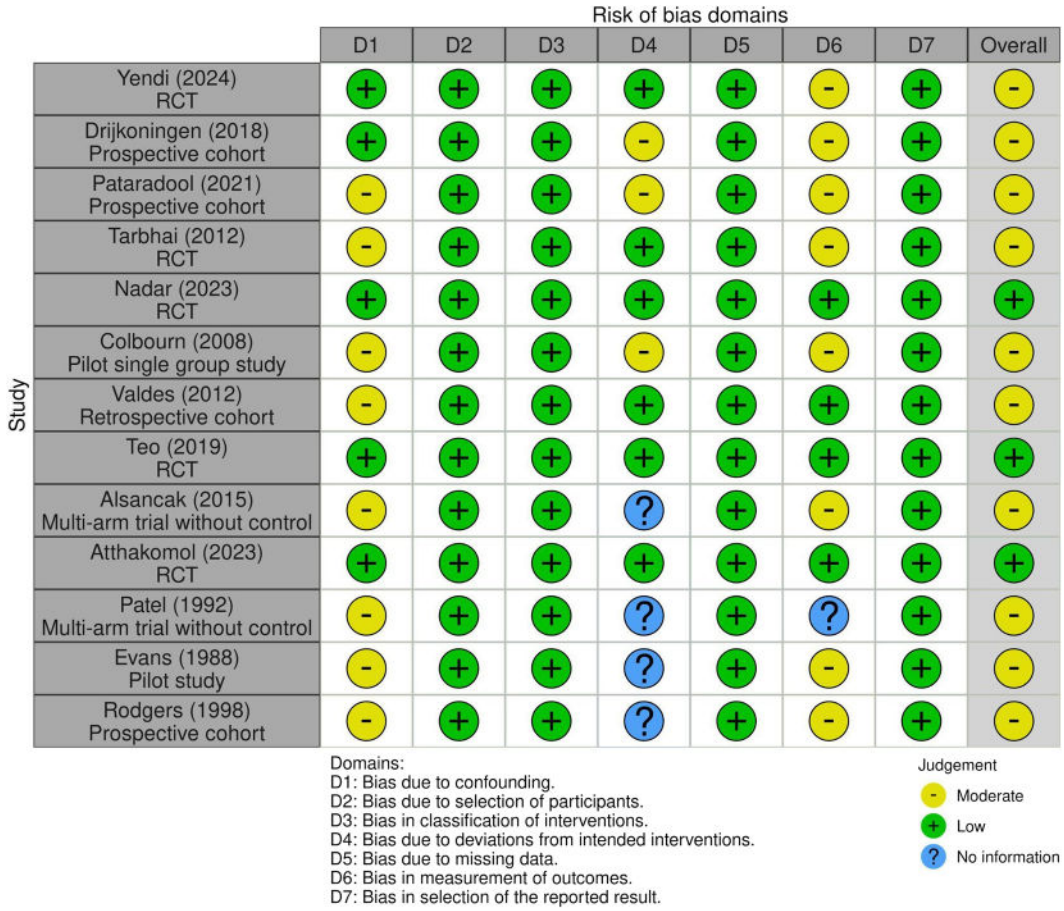

Figure 3. Risk Of Bias In Nonrandomized Studies of Interventions traffic light plot.

fail to respond to splinting, the cumulative expense of an initial hand therapy visit followed by an injection increases overall healthcare expenditures. Although splinting is marginally more costly than hand therapy alone, Nadar et al[16] highlighted the clinical relevance of this incremental cost. No patients in the hand therapy alone arm achieved complete resolution of triggering, whereas 53.6% of patients in the combination arm experienced full symptom resolution.[16] Taken together, these findings suggest that while splinting may incur higher costs for the patients who fail treatment, it can provide meaningful clinical benefit while remaining economically efficient for patients looking to avoid an injection or surgery.

The heterogeneity of the patient selection criteria and concurrent hand therapy is another key limitation. For patient selection, all 13 of the studies employed different selection criteria. This included varying degrees of disease severity, prior treatment history, concurrent diseases and length of prior triggering. In addition, eight of 13 studies employed concurrent hand therapy, with the protocol varying widely. The five studies that did not employ concurrent hand therapy had success rates from 53% (Drijkoningen et al.[21] night splinting) to 81% (Rodgers et al[23]). No clear positive or negative conclusion can be drawn from the concurrent use of therapy given the variability in study parameters. These variables, in addition to the varying compliance with treatment protocols, can confound the results.

Additionally, the most frequent follow-up time of the reported PROs was 6 weeks, making it challenging to evaluate the long-term effectiveness of splinting as a treatment. Some studies had short follow-up times, whereas others had follow-up times up to a year. Although the initial success rates are promising, the limited amount of data beyond 1 year does not definitively answer questions about recurrence and sustained functional improvement. Longer-term studies past 1 year are needed to determine whether splinting provides lasting relief or if patients will eventually need additional interventions, such as corticosteroid injections or surgery.

Lastly, whereas patient-reported outcomes are valuable, they are not a standardized measure of outcomes because of differences in pain perception and levels of adherence to treatment protocols. Additionally, the use of different measurement tools such as the VAS and DASH, across studies makes it difficult to compare results consistently. Standardizing these outcome measures and improving patient adherence could enhance the consistency of future research.

In conclusion, this systematic review demonstrates that splinting remains an effective and cost-efficient treatment option for short-term management of trigger finger for those desiring noninvasive treatment, offering pain relief and functional improvement with minimal adverse effects. The results indicate that splinting can achieve success rates comparable to corticosteroid injections, making it a viable first-line therapy for patients seeking conservative treatment options. A custom-made or off-the-shelf PIP-BO should be considered as a first-line intervention for splinting given its high rate of symptom resolution in the short term, patient satisfaction, and cost-effectiveness. However, the success of splinting is closely linked to patient compliance, and optimal outcomes are achieved when splints are worn continuously for a minimum of 6–10 weeks.

Conflicts of Interest

No benefits in any form have been received or will be received related directly to this article.

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