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Conservative management of trigger finger: A systematic review

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ABSTRACT

Study Design: Systematic review
Introduction: Trigger finger (TF) is a common condition in the hand. The primary purpose of this systematic review was to evaluate the current evidence to determine the efficacy of orthotic management of TF. A secondary purpose was to identify the characteristics of the orthotic management. The tertiary purpose of this study was to ascertain if the studies used a patient-reported outcome to assess gains from the patient's perspective.
Methods: All studies including randomized controlled trials, prospective, and retrospective cohort studies were included in this review due to limited high-level evidence.
Results: Four authors demonstrated moderate to large effect sizes ranging from 0.49 to 1.99 for pain reduction after wearing an orthotic device. Two authors demonstrated a change in the stages of stenosing tenosynovitis scale scores showing a clinically important change with a large effect size ranging from 0.97 to 1.63. Seven authors immobilized a single joint of the affected digit using a variety of orthoses.
Conclusion: All authors reported similar results regardless of the joint immobilized; therefore for orthotic management of the TF, we recommend a sole joint be immobilized for 6-10 weeks. In assessing TF, most authors focused on body structures and functions including pain and triggering symptoms, 2 authors used a validated functional outcome measure. In the future therapists should use a validated patient report outcome to assess patient function that is sensitive to change in patients with TF. Furthermore, more randomized controlled trials are needed.

Introduction

Trigger finger (TF), also called stenosing flexor tenosynovitis, can be described as a discrepancy in size between the flexor tendon/tendon sheath and the A1 pulley, located at the metacarpal head.[1] TF is a common condition of the hand occurring in 2%-3% of the population with an increased incidence when comorbid conditions, such as diabetes, exist.[1,2] TF causes functional limitations in grasping and holding objects with handles, manipulating coins, and performing buttoning tasks.[2,3] TF often coexists with other common disorders such as carpal tunnel syndrome, de Quervain's tenosynovitis, and Dupuytren's contracture.[2,4] TF is most common in middle-aged women[3] with the dominant hand being affected more often.[2] The most common fingers involved are the long and ring fingers.[1] Various causes of TF have been described in the literature. One cause is thought to be repetition of digital flexion and power gripping causing friction and inflammation as the tendon passes beneath the A1 pulley.[3] It is also suggested that there is a discrepancy in size between the flexor tendon and A1 pulley believed to be the result of inflammation or thickening of the tissues.[1] There may be a painful, palpable nodule present in the palm that can be exacerbated by pressure on the A1 pulley.[1,2] In more advanced cases, significant pain, while "catching" or even locking of the digit in flexion or extension, may occur with composite finger flexion.

Conservative treatment for TF includes the use of nonsteroidal anti-inflammatory medications, corticosteroid injections, and immobilization utilizing varying orthoses, typically through a regime of hand therapy. A consensus guideline of management and referral for TF was conducted, and the following treatments were analyzed throughout: Nonsteroidal anti-inflammatory drugs, orthoses, steroid injection, percutaneous TF release, and surgery.[5] No evidence was found to support the independent use of nonsteroidal anti-inflammatory drugs for TF pain relief. There was support and consensus for orthotic use among individuals with TF; however,

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this was considered the "lightest" form of intervention.[5] An orthosis immobilizes 1 finger joint to prevent the occurrence of triggering. The postoperative outcomes were not identified in the review.[5] Through comparison of both treatment methods (orthosis use and injection), it was concluded that corticosteroid injections are beneficial for short-term symptom relief, but surgical intervention may be beneficial for those who do not see results from conservative treatment and desire a definitive intervention.[5] A recent systematic review found strong evidence that corticosteroid injection is associated with increased rates of ongoing or recurrent symptoms at 6 months after intervention.[6] They also found strong evidence suggesting that trigger digit can be managed safely by surgical release.[6] They reported that there is weak evidence to support the use of splinting or other nonoperative modalities.[6] However, Nimigan et al. found that the success rate of steroid injection is lower for subjects with diabetes and that injection therapy for type 1 diabetes was ineffective.[7] It has also been determined that patients prefer orthosis use for surgery in the management of TF.[8]

Purpose of the study

The primary purpose of this systematic review was to evaluate the current evidence to determine the efficacy of therapy and orthosis management of TF. A secondary purpose was to identify characteristics of the orthotic management. The tertiary purpose of this study was to ascertain if the studies used a patient-reported outcome to assess gains from the patient's perspective.

Methods

Identification and selection of studies

All studies including randomized controlled trials (RCTs), prospective, and retrospective cohort studies that evaluated the use of orthoses were included in this review due to the limited amount of available high-level evidence. Inclusion criteria included the studies in English, with adult participants which were published between the dates of 1950 to June 2016. Studies were excluded if the study participants were younger than 18 years of age. Case studies and studies that did not evaluate an orthotic intervention for TF were also excluded.

Search strategy

Two authors DL and KV independently searched the databases using the inclusion criteria to determine the studies to be reviewed. The following databases were searched: MEDLINE, CINHAL, PubMed, Cochrane Library, and Clinicaltrials.gov. A hand search was performed by the authors for additional articles from the references of the chosen studies. Search terms (key words and MESH terms) included stenosing tenosynovitis, TF, inflammation, flexor tenosynovitis, splinting, orthosis, therapy, and conservative treatment.

Subjects

Demographic data retrieved from the studies included age, finger/fingers affected by TF, and gender of the participants. The type of study and number of participants were also extracted.

Interventions

All components of the conservative interventions were extracted from the studies. If the study assessed the efficacy of orthotic intervention, the following data were extracted: the type of orthosis, the length of time when the orthosis was worn, and complications reported if a compliance monitoring system was in place. A description of the orthotic device and the qualifications of the person administering the intervention were also extracted when available.

Outcomes

The primary and secondary outcomes assessed by the studies were extracted. The validity and reliability of the outcome measures chosen were classified if available. If the study measured activity and participation restrictions, that data are included. The length of follow-up time was also extracted from the studies. Finally, the method that the studies used to determine if a satisfactory outcome of the intervention was achieved was extracted. Summary data from each study, including the mean and standard deviation of the postintervention results, were extracted if provided.

Study quality assessment

The PEDro scale was used to determine the methodological quality of all studies used. PEDro scale scores range from 0 to 11 with 11 being the highest quality study.

Data analysis

Data were analyzed with SPSS statistical package (version 22.0; IBM, NY). The effect size of each treatment intervention was calculated for every group in each of the studies that provided enough information. If the studies' authors did not provide the mean and standard deviation of the outcomes assessed, these authors calculated the mean and standard deviation using the data provided in the studies.

Effect sizes were interpreted using Cohen's scale with 0.5 considered to be moderate and 0.8 being considered large.[9] None of the studies were homogenous; therefore, we were unable to pool the data to allow meta-analysis to present a series of central values and their confidence intervals.

Results

Search results

Our initial search for articles on the conservative management of TF identified 131 articles. Following the removal of duplicates and a review of the abstracts and titles, a total of 9 articles remained. One article was removed because it was not considered research but informative/expert opinion.[10] Another article was removed because it was a consensus guideline.[5] The 7 remaining articles met the inclusion criteria and were systematically reviewed for this study[11-17] including 1 RCT,[16] 4 prospective cohort studies,[12,13,15,17] 1 retrospective cohort study,[14] and 1 pilot study.[13] Figure 1 depicts the Prisma flow diagram outlining the flow of articles reviewed and removed. See Appendix A for PubMed search strategy.

Subjects

There were a total of 297 subjects in the studies. Subjects had a mean age of 63 years old, and the range of age was between 23[11] and 80[12,13] years. There were 107 males (36%) and 190 females (64%) represented in the studies (Table 1). The subjects were followed up for 6[13] weeks to 1 year.[11,14,15] The following fingers were affected in the included studies: 34 index, 114 middle, 93 ring, 20 small, and 46 thumbs.

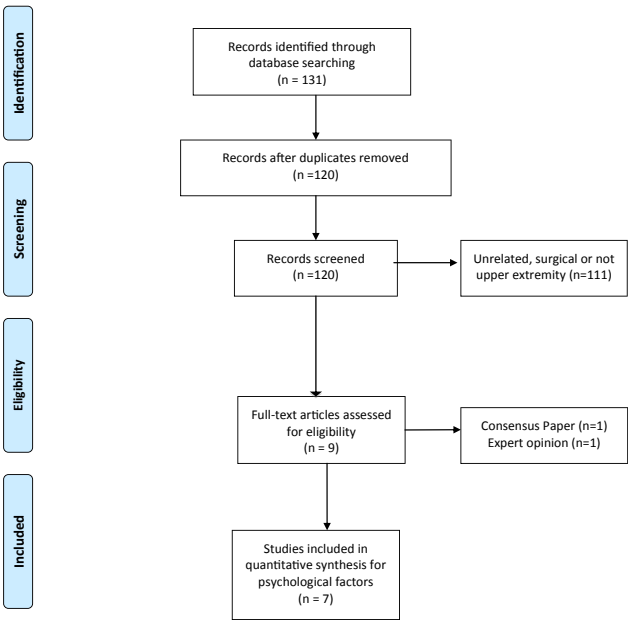

Fig. 1. Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) flow diagram. Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097. For more information, visit www.prisma-statement.org.

Interventions

Orthosis

Six included studies immobilized the metacarpal phalangeal (MCP) joint.[12-17] Valdes also solely immobilized the proximal interphalangeal joint (PIP) joint for some subjects.[14] Another study[16] indicated the use of a distal interphanageal (DIP) joint blocking orthotic in addition to the MCP joint blocking orthosis. One study advocated for solely using a DIP orthosis.[11] Six of the studies[12-17] included custom-made thermoplastic orthoses including Polyform,[14] Thermoplast,[15] and solid Orfilight (1/8 inch.).[12] However, prefabricated DIP joint orthoses including Stax, and Alumafoam were also used.[11] (Table 2)

Orthosis wearing schedule

The average amount of time a subject was instructed to wear the orthosis was day and night for 6 weeks, with a range of 3[13,17] up to 12[15,16] weeks, which was dependent on pain and triggering episodes. One study had their subjects wear the orthosis only at night for 6 weeks.[17] If the subject had no improvement after the minimum amount of time required in the device, each subject was directed either to continue the wearing schedule for additional weeks or were given additional options (Table 2).

Exercise

Exercise home program instruction varied throughout the chosen studies. Some studies[12,14] allowed for subjects to remove device 3 times a day for 5 repetitions of tendon gliding exercises, whereas another study[13] instructed the participants to perform 20 repetitions of flexion extension every 2 hours without device removal but allowed for removal during “full-fist” exercise. This was refuted in other studies[11,15,16] who did not include exercise instructions for the subjects (Table 2).

Outcomes

The primary outcome assessed by all studies was the incidence of triggering using 2 different scales and observed incidence of triggering episodes. Either the Quinnell scale or the scale for the stages of stenosing tenosynovitis (SST) was used by 6 studies.[11-17] Four studies assessed secondary outcomes of pain[12,14,16,17] and grip,[12,16] 2 studies assessed function one using the Canadian Occupational Performance Measure (COPM)[16] and the other using QuickDASH.[17] The study that used the COPM did not report a difference between pretest and posttest scores of the COPM and indicated that the subjects had no deficits identified by the COPM.[16] The study that used the COPM also assessed the functional impact of TF using a 0- to 10-point scale.[16] The MCP group had a large effect size (2.82) indicating positive change in functional impact.[16] The DIP immobilization group demonstrated a negative effect size (−0.11).[16] The study that used the QuickDASH reported that the score decreased from a mean of 24 to 16 following the treatment. One study addressed treatment satisfaction with the orthotic device and self-reported treatment compliance[17] (Table 3).

The Quinnell scale is a system based on the severity of triggering and the stages of stenosing tenosynovitis (SST) scale is based on the mechanics of the disorder. For the Quinnell scale, 0 indicates no triggering episodes and 5 indicates the finger locks into flexion. Five grades of triggering were identified based on the severity of symptoms.[18] The grades include “normal movement, uneven movement, actively correctable, passively correctable and, finally, fixed deformity”[18] (Appendix B).

A modified version of Quinnell is a grading or classification system that has been described as the SST.[15] This system includes the following stages: stage 1-normal, stage 2-uneven motion of the tendon, stage 3-triggering = clicking = catching, stage 4-locking of the finger in flexion or extension unlocked by active finger motion, stage 5-locking of the finger in flexion or extension unlocked by passive finger motion, and stage 6-a finger locked in flexion and extension. Effect size could only be calculated by 3 of the studies due to the lack of data provided by the authors.[12,14,17] Two authors found clinically important differences in the change scores between baseline and final scores of the SST that produced large effect sizes that ranged from 0.97 to 1.63.[12,14]

Pain was assessed by 4 authors using the visual analog scale (VAS) or Numeric Pain Rating Scale (NPRS).[12,14,16,17] The change in pain scores range from 1.2 to 4.45 points.[12,14,17] These studies demonstrated a moderate to large effect sizes ranging from 0.49 to 1.99 for the reduction of pain after wearing an orthotic device.

All authors assessed the success rate of the interventions using the patient report of reduction of symptoms or satisfaction with results after treatment.[11-17] Success rates ranged from 47% to 93%.[11-17] One author assessed patient-reported satisfaction with the orthosis and found that the mean thumb orthotic satisfaction was 6.2 out of 10 possible points.[17] The mean finger orthotic satisfaction score was 5.5 points out of 10. Seventy percent of the subjects reported that they wore their orthotic device nearly every night in the 1 study that assessed self-reported compliance.[17]

Study quality assessment

The PEDro scores of the studies in this systematic review ranged from 2 to 9 (Table 1). Since many of the studies were cohort studies, they lost points because there was not a comparator group. Older studies scored lower on the PEDro scale than more recent studies.

Discussion

The primary purpose of this systematic review was to evaluate the current evidence to determine the efficacy of orthosis management of TF. The success rate according to the patient report ranged between 47% and 93%. Most studies demonstrated a positive benefit of orthosis for the management of TF.[11-17] Based on the large effect sizes of the pain rating and the scores of the SST, orthosis intervention is an

Table 1
Summary of evidence for conservative management of trigger finger

Author	Number of subjects	Age range	Symptom severity at baseline	Type of study	PEDro score	Primary outcome	Secondary outcomes
Colbourn et al.[12] (2008)	28 (21 females and 7 males)	44 to 80 y; mean: 64.6	SST score of 1-4	Prospective cohort	6	Trigger finger rating scale (SST)	Grip strength, NPRS, the number of triggering events in 10 active fists, and participant-perceived improvement in symptoms
Drijkoningen et al.[17] (2017)	34 (12 male and 22 female)	41 to 85 y. mean: 61	Quinnell grade 1-2 for no more than 3 mo	Prospective cohort	5	QuickDASH	Number of triggering events, NPRS treatment satisfaction with orthotic self-reported treatment compliance
Evans et al.[13] (1988)	38 (25 females and 13 males)	25 to 80 y; mean: 60	Not provided	Prospective pilot study	3	Digits were classified as 1) Resolved or asymptomatic 2) Improved occasional triggering without pain 3) Failed if symptoms persisted	The presence of pain was assessed without being quantified
Patel and Bassini [15] (1992)	100 total; 50 treated with splinting(14 males and 36 females), and 50 treated with cortisone injection(18 males and 32 females)	Splint mean: 60 Injection mean: 61	Not provided	Cohort	4	SST	Success: free of symptoms or minimal pain or uneven movements that did not interfere with hand function Failure: continued pain, clicking, or locking
Rodgers et al.[11] (1998)	21 (12 males and 9 female)	23 to 34 y; mean 30	SST score of 2-5	Prospective cohort	2	SST	Success: resolution or painless clicking that did not interfere with hand function Failure: continued pain or locking
Tarbhai et al.[16] (2012)	30 participants (13 male and 17 female)	MCP: 37-79 y; mean: 58 DIP: 36-79 y; mean: 68	Duration of triggering from 1 to 24 mo	Prospective randomized trial	7	VAS	Severity of triggering (10-point scale) Frequency of triggering Functional impact of triggering (10-point scale)
Valdes[14] (2012)	46 charts (18 male and 28 female) 17 participants (> 1 digit), 29 participants (1 digit)	Mean: 68.48 y	SST score of stage 3 or higher	Retrospective cohort	4	VAS and SST	

SST = stages of stenosing tenosynovitis; NPRS = Numeric Pain Rating Scale; MCP = metacarpal phalangeal joint; DIP = distal interphanageal joint; VAS = visual analog scale.

Table 2
Orthotic intervention table

Author	Orthotic satisfaction	Characteristics of orthosis	Wearing schedule and exercise instructions	Compliance and complications
Colbourn et al.[12] (2008)	Not applicable	Hand-based ring orthosis that restricts MCP joint flexion, MCP positioned in 15° of flexion Custom fabricated	Full time for 6 wk. • If triggering still occurred after 6 wk, they continued to 10 wk. Exercise: • They were also instructed to remove the splint 3 times a day to complete tendon gliding exercises for 5 repetitions each.	Compliance: • Sixteen participants reported that they did not wear their splint continuously day and night • Ten said that they completed the required exercise. Complications: • Participants reported interference with various functional activities • Five participants were determined by the authors to be in a stage of flare-up of chronic inflammatory arthritis.
Drijkoningen et al.[17] (2017)	Patient selection of 0 = complete dissatisfaction to 10 = complete satisfaction Thumb mean: 6.2 Finger mean: 5.5	Hand-based ring orthosis that restricts MCP joint at 0° for TFHand-based thumb spica that extended past tip of thumb for trigger thumbCustom fabricated by a certified hand therapist	Night only for 6 wk	Self-reported "How much time did you wear your orthosis?" Several nights: 5 (17%) More than ½: 4 (13%) Nearly every 21 (70%)
Evans et al.[13] (1988)	Not applicable	Hand-based static orthosis that immobilizes the MCP joint at 0°Custom fabricated	Full time for 3 wk. • If no improvement (not defined) after 3 wk, patient is reevaluated by physician for injection or surgical release. • Continuation of conservative management to 6 wk if demonstrating improvement (not defined) Exercise: • While wearing orthosis, 20 reps of flexion extension every 2 h while awake. Orthosis was removed for "place and hold" full-fist exercises.	Compliance: • Not applicable Complications: • 8 patients had swelling and incomplete proximal interphalangeal flexion after initiating strengthening exercises with putty or gripping tool
Patel & Bassini[15] (1992)	Not applicable	Hand-based orthosis that immobilized the MCP joint at 10 to 15 degrees of flexion. Custom Fabricated	Full time for 3, 6, 9, or 12 wk. Allowed to remove splint for hygiene. Exercise: Not applicable	Not applicable
Rodgers et al.[11] (1998)	Not applicable	Finger-based orthosis that immobilized the DIP joint in full extension. Stax or Alumafoam	Full time for 6 wk Exercise: Not applicable	Not applicable
Tarbhai et al. [16] (2012)	After 1 wk, the subjects were asked to rate the splint as comfortable or uncomfortable. Comfortable: • MCP: 10 (77%) • DIP: 9 (60%) Uncomfortable: • MCP: 3(23%) • DIP: 6 (40%)	Hand-based ring orthosis that restricts MCP joint flexion, MCP positioned in 0° or finger-based orthosis that immobilized the DIP joint in full extension • 1 of 3 options used: Stax, Alumafoam, or Custom Fabricated thermoplastic	Full time for 6 wk • If participant did not have relief of pain, triggering, or swelling at 6 wk, they were given the option for alternate treatment. • If they had decreased relief of pain, triggering, or swelling, the continued the orthosis for 6 more wk. Exercise: Not applicable	Compliance: • 10 participants in the MCP group and 11 in the DIP group wore the splints for greater than 18 h a day. • Three participants in the MCP group and 4 in the DIP group wore the splints for less than 12 h a day. Complications: • Joint stiffness developed in both groups but resolved once the splint was removed. • DIP device comments: awkward, causes stiffness, slips off easily • MP device comments: awkward, takes too long to do things, and edges digging • Three subjects with MCP joint blocking reported it as being uncomfortable, • Six subjects with DIP blocking device reported it as uncomfortable

Valdes [14] (2012)	Not applicable	If only 1 digit was involved: • Static finger–based circumferential orthosis that only blocked proximal interphalengeal joint motion If more than 1 digit triggered: • Wore a hand-based orthosis that immobilized the MCP joints of the involved digits in 10-15° of flexion Custom fabricated	Full time for a minimum of 6 wk. Exercise: • Given an exercise sheet and instructed to remove orthosis for 5 reps of exercises, 3 times a day.	Compliance: • Twenty-four subjects who had isolated TF reported wearing orthosis continuously day and night and 12 who had multiple TF reported continuous use of their orthosis day and night. Complications: • No complications reported

MCP = metacarpal phalangeal joint; DIP = distal interphanageal joint; Reps = repetitions; TF = trigger finger.

effective conservative treatment of TF. This is in agreement with a consensus report that recommended the use of an orthosis for conservative management, however, did not specify a particular orthotic design.[5] Two different pain scales are noted in the literature: the NPRS and the VAS. Both have been found to have reliability and validity. Both tests are easy to understand and use and are appropriate for consistent and reliable use. Either pain outcome measure can be used; however, it is important that the same test be used consistently. Also, to determine the level of triggering, the SST scale[15] is more detailed than that of Quinnell[18] and therefore is recommended for use.

The long-term effects (effects noted at 1 year) were noted by 4 authors.[11,14-16] In 1 study, there was a recurrence of symptoms in 12% of the orthosis group within 1 year.[15] Another study reported that after 1 year, a follow-up phone call asked patients whether or not they required surgical intervention or received a steroid injection for the TF. In this study, 13% required steroid injection or surgical intervention despite use of the orthosis, but there was an 87% success rate with the orthosis application.[14] Another study reported that 81% of the patients were treated successfully with most patients returning to work in 6 weeks.[11] The study that had subjects wear their orthosis only at night reported a 53% success rate with orthotic intervention.[17] A prospective randomized study indicated that there was long-term relief for those who continued with their orthosis wear at 1 year, but there was no numeric data provided and these patients were self-selected.[16]

A secondary purpose was to identify characteristics of the orthotic management. There is some disagreement in the literature regarding the type of the orthosis used in the conservative management of TF. Some authors used a metacarpal block orthosis.[12-16] Other authors discuss orthotic intervention for immobilization at the distal interphalangeal joint as an option.[11,16] Another author used a finger-based orthosis which immobilized the PIP joint.[14] In a study comparing 2 different orthotic designs, the MP block orthosis was more effective than the DIP block orthosis.[16] The therapist must use clinical judgment to choose the orthotic. Additional research is needed to determine whether a finger-based orthotic device or hand-based device is more efficacious. Patient preference and functional tasks should also be taken into consideration when providing an orthosis. As long as the orthoses limits the amount of tendon excursion through the sheath, only a single joint needs to be immobilized.

The suggested time frame for TF orthosis wearing also varies in the literature, from 3 to 12 weeks with the average being 6 weeks.[11-16] Most studies' participants wore their orthosis at all times with minimal removal during the duration of the study. One reason for removal is for hygiene purposes. Another reason to remove the orthosis is for exercise. However, stiffness was not reported to be an issue in any of the studies which may support full-time wearing of the orthosis. This may lead to improved results if the tendon is truly resting.

One study had their participants solely use the orthosis at night.[17] The authors who used a night orthosis indicated that their rationale for nighttime use only was to increase compliance with the wearing schedule.[17] Some authors are proponents of active range of motion of the interphalangeal joints with the orthosis in place as well as a "place and hold" composite fist with the orthosis removed to prevent stiffness.[12-14] Exercise and removal of the orthosis were not addressed by all authors.[11,15,16]

Other inconsistencies in the literature include the number of digits per patient that were immobilized and success of thumb immobilization. Some studies included those patients with multiple digits,[14,15] whereas other studies only included patients who suffered from symptoms of single digits.[12,15] It was noted that those patients who had multiple digits immobilized by a TF orthosis had overall, poorer results than those with just a single finger involvement.[11-16] Trigger thumbs were excluded in some studies.[12]

Table 3
Results of interventions

Author	Functional status reported at baseline	Functional status reported at follow-up	Outcomes baseline (SD)	Outcomes at follow-up (SD)	Within-group change and effect size of outcome
Colbourn et al.[12] (2008)	Not applicable	Not applicable	Grip-not reported SST score Mean: 3.53 (1) Triggering events Mean: 4.82 (4.42) NPRS Mean: 5.92 (2.85)	6 wk or 10 wk SST score Mean: 1.96 (0.92) Triggering events Mean: 2.14 (3.83) NPRS Mean: 2.76 (2.02) 26/28 participants (92.9%) believed that their triggering had improved after treatment	SST score Change from baseline: 1.57 ES: 1.63 Triggering events Change from baseline: 2.68 ES: 0.65 NPRS Change from baseline: 3.16 ES: 1.28
Drijkoningen et al.[17] (2017)	QuickDASH mean score: 24	QuickDASH mean score: 16	Triggering events 100% 34 subjects NPRS: 3.8	Triggering events 47% 16 subjects NPRS: 2.6 Orthotic satisfaction Mean 5.8 out of 10 Self-reported compliance 70% wore orthosis nearly every night	QuickDASH Change from baseline: 8 ES: 0.46 NPRS Change from baseline: 1.2 ES: 0.49
Evans et al. [13] (1988)	Not applicable	Not applicable	Not provided	8.8 mo 29 digits (52%), symptoms resolved 12 digits (21%), good 14 digits (27%), failed	Unable to calculate
Patel and Bassini[15] (1992)	Not applicable	Not applicable	Not provided	1 y 33 (66%), successful Only 5/10 thumbs successful	Unable to calculate
Rodgers et al.[11] (1988)	Not applicable	Not applicable	Not provided	12 mo 25 (81%) successful 6 (29%) failure Success group more likely to have stage 2 triggering Failure group more likely to have stage 3 or higher	Unable to calculate
Tarbhai et al.[16] (2012)	None as assessed by the COPM Functional impact: 0-10 scale MCP group: 3.9 (0.6) DIP group: 3.6 (0.6)	Not addressed Functional impact: 0-10 scale MCP group: 2.7 (0.9) DIP group: 3.3 (1.1)	NPRS MCP orthotic 4.6 (0.7) DIP orthotic 4.3 (0.8) Severity of trigger finger: MCP: 9.3 (0.8) DIP: 8.9 (0.3)	NPRS MCP orthotic 3.0 (0.9) DIP orthotic 2.6 (0.9) 1 y MCP splint resulted in a 77% success rate at 6 wk DIP splint resulted in a 47% success rate at 6 wk	NPRS MCP change from baseline: 1.6 ES: 1.98 DIP change from baseline: 1.7 ES: 1.99 Functional impact MCP: change from baseline: 1.2 ES: 2.82 Functional impact DIP: change from +0.1 ES: −0.11 Severity of trigger finger MCP change from baseline: 5 ES: 4.39 DIP change from baseline: 4.2 ES: 3.65
Valdes[14] (2012)	Not applicable	Not applicable	SST Score: Mean: 3.93 VAS: 5.63	1 y SST score: 1.22 VAS: 1.19 40 (87%) did not require further intervention	SST Change from baseline: 2.72 ES: 0.97 VAS Change from baseline: 4.45 ES: 0.92

SST = stages of stenosing tenosynovitis; NPRS = Numeric Pain Rating Scale; MCP = metacarpal phalangeal joint; DIP = distal interphanageal joint; ES = effect size; COPM = Canadian Occupational Performance Measure; VAS = Visual analogue scale; SD = standard deviation.

One study which included thumbs noted that thumbs had the poorest outcomes.[15] However, another study which included thumbs within the data felt as though the results are generalizable for multiple trigger digits as well as thumb.[14]

The risks of using a TF orthosis are minimal. Joint stiffness may be one of these side effects; however, this can be addressed with prescribed active and passive exercise.[12-14] "Awkwardness" was noted in 1 study in regard to use of the MP block orthosis during functional use of the hand.[16] In this same study, the DIP block orthosis was reported to be slightly less comfortable than the MP block orthosis.[16] In 1 study that addressed orthotic satisfaction, increased satisfaction was found with subjects that had trigger resolution.[17]

TF is a common and functionally limiting disorder that occurs frequently in the general population. Some people are unwilling and unable to receive cortisone injections, and surgical intervention increases overall health risks. The use of an orthosis for TF is a viable, unobtrusive, and beneficial option. There is minimal cost associated with TF orthosis with minimal follow-up therapy visits needed. Orthoses can be fabricated by a qualified clinician, and there are commercially available options as well which do not require fabrication. Education should be provided to referral sources for this option.

The tertiary purpose of this study was to ascertain if the studies used a patient-reported outcome to assess gains from the patient's perspective. A variety of assessments were used to measure clinical outcomes. Most outcomes assessed measured components of body structures and functions as identified by the International Classification of Functioning. These included the SST classification system,[11,12,14,15] visual analog scale (VAS),[14,16] NPRS,[12,17] grip strength,[12,16] and frequency of triggering (subjective per patient)[12,16,17] The COPM was used to determine a change in patient's functional abilities over time in 1 study, although they reported a lack of functional limitations of their subjects.[16] The study that assessed function using the QuickDASH found a 8-point change in QuickDASH score. Although this does not meet the minimal clinical important difference, the effect of the change score of 0.49 approached the medium interpretation when using Cohen's descriptors for the magnitude of change.[9] Both the COPM and QuickDASH are valid and reliable outcome measures. However, the COPM may not be sensitive enough to detect functional limitations in individuals with TF. The same study that used the COPM also used a patient-reported functional impact 0-10 scale.[16] In this study, the MCP block orthosis group had improved function scores using this scale.[16] The DIP block orthosis group reported functional limitations increased by 0.1.[16] A study that assessed the benefits of therapy alone for the treatment of TF reported that approximately 50% of the patients had activity restrictions with a buttoning shirt, washing dishes, and doing laundry prior to therapy.[19] Limited use of functional measures in assessment as well as the importance of addressing TF has been noted in the literature.[20,21]

Clinical recommendations

1. It is recommended that orthotic intervention be considered as a conservative option for individuals who experience TF and thumb in stages 2-6 of SST scale.
2. Better results have been found when patients wear their device at all times, but 53% success has been shown with nighttime only use.
3. It is recommended that a single joint should be immobilized (not the DIP joint) using therapist clinical judgment and patient preference. A PIP blocking orthosis has been found to be successful if 1 digit is involved.
4. It is recommended that the orthosis be worn constantly with removal only for hygiene with an average duration of 6 weeks and to be continued up to 12 weeks if triggering symptoms are present at the 6-week follow-up.
5. It is recommended that a patient-reported outcome measure, sensitive to patients with TF such as the QuickDASH, be used to appropriately assess the patient functional capacity in daily tasks.

Limitations

A limitation of our systematic review is the small number of studies included in the review. There is a limited number of studies available specifically addressing the benefits of conservative orthotic treatment for TF. There are also very limited high-level studies available. Patient-reported outcome measures were also included in this review and have not been validated for TF.

Conclusion

Orthotic management is a viable option for treatment of TF. Most authors reviewed in this study focused on body structures and functions including pain and triggering symptoms, and only 1 author used a validated functional outcome measure. In the future, authors should use a validated patient-reported outcome that is sensitive to change in patients with TF in order to assess patient function. Furthermore, more RCTs are needed to guide treatment for TF.

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Appendix A. PubMed search

Search	Query	Items found	Time
#3	Search (((adults) AND conservative management)) AND ((((stenosing tenosynovitis) OR trigger finger) AND splints) OR orthosis)	131	15:50:29
#2	Search (adults) AND conservative management	13,891	15:50:16
#1	Search (((stenosing tenosynovitis) OR trigger finger) AND splints) OR orthosis	12,210	15:49:22

Appendix B. Outcome measures

Outcome measures	Short description	Authors that use the outcome measure
Numeric Pain Rating Scale (NPRS)	Scale used to gather a verbal description of pain on a scale of 0 (no pain) to 10 (most pain felt)	• Colbourn et al.[12] (2008) • Drijkoningen et al.[17] (2017)
Visual analogue scale (VAS) 1) Pain 2) Patient-perceived disability	Measurement instrument that measures attitude across a continuum with 2 end points and is measured in centimeters (0-10 cm) or millimeters (0-100 mm)	• Tarbhai et al.[16] (2012) • Valdes[14] (2018)
Quinnell stages of triggering	Outcome measure used to determine the stage of triggering, describing movement in 5 grades of flexion/extension as follows: normal; uneven; actively correctable; passively correctable; and fixed deformity	• Evans et al.[13] (1988) • Drijkoningen et al.[17] (2017)
Stages of stenosing tenosynovitis (SST)	Outcome measure modified from Quinnell used to grade triggering in participants by stages (1-6). One being normal triggering to 6 being the PIP joint remained locked in a flexed position.	• Colbourn et al.[12] (2008) • Valdes[14] (2012) • Patel and Bassini[15] (1992) • Rogers et al.[11] (1998)
Frequency of triggering or severity of triggering	Nonstandardized measure used to record the number of triggering events in 10 = active full fists. If a participants' finger remained locked, they were asked to stop and given a score of 10/10.	• Colbourn et al.[12] (2008) • Tarbhai et al.[16] (2012) • Drijkoningen et al.[17] (2017)
Opening and closing fist		
Participant-perceived improvement in symptoms or functional impact	Participants categorized their perceived improvement into 1 of 5 responses such as 1 (resolved) to 5 (resolved at 10 wk vs 6)	• Colbourn et al.[12] (2008) • Drijkoningen et al.[17] (2017) • Tarbhai et al.[16] (2012)
Success rate	Measured by improvement of symptoms such as absence of pain and/or triggering after completion of treatment and/or satisfaction with results.	• Colbourn et al.[12] (2008) • Tarbhai et al. [16] (2012) • Valdes[14] (2012) • Evans et al.[13] (1988) • Patel and Bassini [15] (1992) • Rodgers et al.[11] (1998) • Drijkoningen et al.[17] (2017)
Canadian Occupational Performance Measure (COPM)	Used to assess change in function over time. It is designed to measure patient-identified issues in self-care, productivity, and leisure.	• Tarbhai et al.[16] (2012)
QuickDASH	Used to assess the change in function over time. It is designed to measure patient-identified issues in self-care	• Drijkoningen et al.[17] (2017)
Grip strength	Hydraulic measurement of grip strength in kilograms (kgs), pounds (lbs), or an electronic measurement of grip in newtons (N)	• Colbourn et al.[12] (2008)

DASH = Disabilities of Shoulder Arm, and Hand.

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Quiz: # 609

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#1. The study design is
   a. RTCs
   b. qualitative
   c. prospective cohort
   d. a systematic review

#2. The recommended immobilization time is
   a. 2 weeks
   b. 4-6 weeks
   c. 6-10 weeks
   d. 12 weeks

#3. A discrepancy in size between the flexor tendon and the _____ pulley is felt to be a primary cause of trigger finger
   a. A1
   b. A2
   c. C1
   d. C2

#4. _____ were found to be ineffective in managing trigger finger
   a. steroid injections
   b. NSAIDs
   c. surgical releases
   d. resting orthotics

#5. There was a sufficient enough number of RCTs to limit this study to only RCTs
   a. true
   b. false

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