EDITOR'S CHOICE

Advancements in de Quervain Tenosynovitis Management: A Comprehensive Network Meta-Analysis

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Purpose This study presents a network meta-analysis aimed at evaluating nonsurgical treatment modalities for de Quervain tenosynovitis. The primary objective was to assess the comparative effectiveness of nonsurgical treatment options.

Methods The systematic review was conducted following Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Searches were performed in multiple databases, and studies meeting predefined criteria were included. Data extraction, risk of bias assessment, and statistical analysis were carried out to compare treatment modalities. The analysis was categorized into short-term (within six weeks), medium-term (six weeks up to six months), and long-term (one year) follow-up.

Results The analysis included 14 randomized controlled trials encompassing various treatment modalities for de Quervain tenosynovitis. In the short-term, extracorporeal shockwave therapy demonstrated statistically significant improvement in visual analog scale pain scores compared with placebo. Extracorporeal shockwave therapy also ranked highest in the treatment options based on its treatment effects. Corticosteroid injections (CSIs) combined with casting and laser therapy with orthosis showed favorable outcomes. Corticosteroid injection alone, platelet-rich plasma injections alone, acupuncture, and orthosis alone did not significantly differ from placebo in visual analog scale pain score. In the medium-term, extracorporeal shockwave therapy remained the top-ranking option for visual analog scale pain score, followed by CSI with casting. In the long-term (one year), CSI alone and platelet-rich plasma injections demonstrated sustained pain relief. Combining CSI with orthosis also appeared promising when compared with CSI alone.

Conclusions Corticosteroid injection with a short duration of immobilization remains the primary and effective treatment for de Quervain tenosynovitis. Extracorporeal shockwave therapy can be considered a secondary option. Alternative treatment modalities, such as isolated therapeutic injection, should be approached with caution because they did not show substantial benefits over placebo. *(J Hand Surg Am. 2024;49(6):557–569.*

Type of study/level of evidence Therapeutic I.

Key words Comparative effectiveness, de Quervain's, DQT, network meta-analysis, outcome.

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De Quervain tenosynovitis (DQT) is a condition characterized by the thickening and myxoid degeneration of the tendon sheath located within the first dorsal compartment of the wrist.[1,2] This leads to painful entrapment of the abductor pollicis longus and extensor pollicis brevis tendons. This condition is often attributed to repetitive overuse of the wrist in ulnar deviation while extending or abducting the thumb, although it is also associated with conditions such as pregnancy and rheumatoid arthritis.[3,4] A study by Walker-Bone et al[5] revealed that the prevalence of DQT is approximately 1.3% in women and 0.5% in men, with peak prevalence among those in their 40s and 50s.

A range of treatment options are available for DQT, encompassing both nonsurgical and surgical approaches.[6,7] Initial treatment typically involves rest, ice, nonsteroidal anti-inflammatory drugs (NSAIDs), physiotherapy, and splinting. Corticosteroid injections (CSIs) are considered the best practice for patients who do not respond adequately to these nonsurgical measures. Other reported treatments include acupuncture, platelet-rich plasma (PRP) injections, NSAID injections, laser therapy, and extracorporeal shockwave therapy (ECSWT).[8–13] Surgical intervention is reserved for cases where nonsurgical treatments have proven ineffective and may involve various techniques for releasing the first dorsal compartment.[14]

Although recent systematic reviews have focused on the efficacy of CSI as a treatment for DQT, most published randomized controlled trials (RCTs) have primarily compared CSI against splinting or casting.[14–17] Limited evidence exists for comparing other nonsurgical or surgical treatments. This has resulted in a gap in the evidence regarding the optimal treatment pathway for DQT. We therefore conducted a systematic review and network meta-analysis (NMA) to comprehensively evaluate the comparative effectiveness of various available DQT treatments. This approach allowed us to combine both direct and indirect evidence from a network of published treatments, providing a more comprehensive assessment of their relative efficacy.

METHODS

We conducted and reported this systematic review in adherence to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (Table S1, available online on the *Journal*'s website at www.jhandsurg.org).[18,19]

Search strategy

The search strategy was conducted by a clinical librarian, as described in Appendix S1 (available online on the *Journal*'s website at www.jhandsurg.org). We performed searches in MEDLINE, Embase, Emcare, Cochrane Central Register of Controlled Trials, and Cumulative Index to Nursing and Allied Health Literature, covering the period from their inception up to August 2023. Additionally, we reviewed the reference lists of identified studies and previous systematic reviews to identify further relevant studies for potential inclusion.

Selection of studies

Four authors (A.P., M.D., W.L., and M.Y.T.H.) conducted the screening and selection of studies. The authors collaborated in pairs, with each pair allocated an equal distribution of identified articles for review. This approach minimized the number of articles that each pair needed to review, with the aim to decrease bias and improve inter-rater reliability. The articles retrieved through the searches underwent an initial screening based on a review of their titles and abstracts, followed by a more comprehensive review of the full texts. Any disagreements that arose during this process were resolved by the senior authors (H.H.C. and R.S.). The inter-rater reliability was assessed using Cohen κ score.

Eligibility criteria

To ensure the comparability of the studies included in our analysis, we considered RCTs or quasi-RCTs that compared various treatments for DQT patients. These studies were deemed eligible if they met the following criteria:

- Available in English or English-translated articles.
- Sample: adult patients (aged ≥18 years) with clinical diagnosis of DQT.
- Interventions: removable orthosis, casting (plaster of Paris or fiberglass), physiotherapy, injection therapy (eg, NSAID, CSI, and PRP), ECSWT, laser therapy, ultrasound therapy, and acupuncture.
- Comparison: control/placebo or other included interventions mentioned.
- Primary outcome: visual analog scale (VAS) pain score.
- Secondary outcome: Disabilities of the Arm, Shoulder, and Hand (DASH)/*Quick*DASH score.

Quasi-RCT is a study design resembling an RCT, but participant allocation to treatment and control groups is not strictly randomized. Instead,

nonrandom methods such as alternation, birth dates, hospital identification, or availability are employed.

Studies were required to provide sufficient data for extraction and pooling, ideally reporting mean and SD.[19] In cases where studies reported outcomes using the median and range, we calculated the relevant mean and SD using the statistical calculator developed by Tong et al,[20] Luo et al,[21] Shi et al,[22] and Wan et al.[23]

Data extraction

Information from the included studies was retrieved and organized into a standardized data extraction template. The extracted data encompassed study characteristics, treatment modalities, comparative interventions, the outcome of interest, and the duration of follow-up.

Risk of bias assessment

Four authors (A.P., M.D., W.L., and M.H.) conducted independent assessments of the risk of bias (RoB) for each study using the Cochrane Risk of Bias tool 2.0 (ROB 2).[24] In cases where disagreements arose among the authors, consensus was reached through discussion with senior authors (H.H.C. and R.S.). The results were visually represented through both traffic light plots and summary plots using the robvis online tool.[25]

Statistical analysis

Age and follow-up duration were presented in the form of either means (SD; range) or medians (range), consistent with the original articles. In our analysis, we performed direct and indirect comparisons of interventions through the frequentist NMA utilizing a random effects model with Metainsight V1.1.[26] To convey the results for continuous data, we utilized the mean difference along with a 95% CI. Network league tables were produced to show details of the results of the comparisons between the interventions. Heterogeneity among studies was evaluated through a thorough examination of the articles, visual inspection of forest plots illustrating treatment effects and their CIs, and an assessment of inconsistency.

The timeline for analysis follow-up was divided into three categories: studies that evaluated the outcome within six weeks, at six weeks and up to six months, and at one year after intervention. In cases where studies provided multiple outcome time points within the same category (eg, both three and six months), the later follow-up time point was selected for analysis. Separate analysis models were executed for each outcome during each of the three specified time periods.

RESULTS

The initial search produced a total of 2,754 results. Following the screening and comprehensive review of full-text articles, 14 RCTs were identified that met the predefined inclusion criteria (Fig. 1); no quasi-RCTs were encountered for inclusion.[8–12,27–35] During the screening process, there was agreement on 94% of screened studies between primary reviewers, resulting in the κ score of 0.56, suggesting moderate agreement.

These 14 studies encompassed a collective sample size of 823 patients, with individual study sample sizes ranging from five to 67 participants. The analysis compared 12 distinct treatment modalities. Table 1 summarizes the characteristics of the included studies.

RoB analysis

Figure S1 (available online on the *Journal*'s website at www.jhandsurg.org) shows the RoB scores for the included studies. Overall, three studies were classified as serious RoB, three as moderate RoB, and eight as low RoB.

Short-term: follow-up within 6 weeks

Nine studies were included to construct a comprehensive NMA of the VAS pain score within six weeks of follow-up, with a total of 499 patients (range between five and 60) included and eight different treatment modalities.[9,11,12,27,30–33,35] Figure S2 (available online on the *Journal*'s website at www.jhandsurg.org) comprises both the network plot and the forest plot.

We generated a ranking matrix that relied on the comparative treatment effects, as presented in Table 2. Among all the interventions, ECSWT emerged as the top-ranking option, displaying superior treatment effects in terms of VAS pain score when compared with the alternatives. Following closely were CSI in conjunction with casting and laser therapy combined with removable orthosis, both of which demonstrated favorable outcomes. In contrast, CSI alone, PRP injection alone, acupuncture, and orthosis alone were positioned below the placebo in the rankings.

The study by Sharma et al[8] was excluded from the NMA because their study did not establish a network connection with the other studies (ultrasound therapy vs laser therapy). Both interventions demonstrated significant improvements in VAS

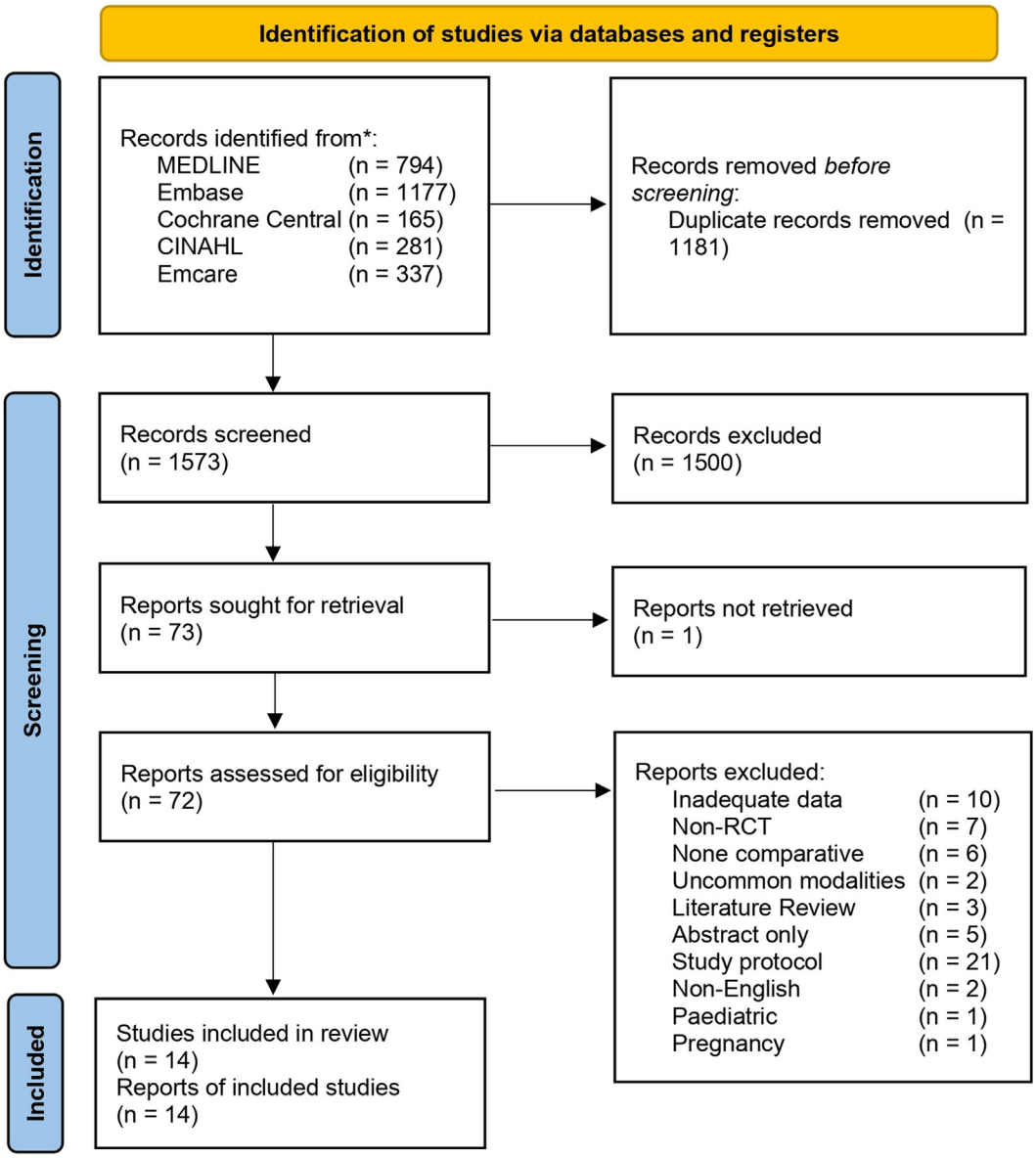

FIGURE 1: Preferred Reporting Items for Systematic Reviews and Meta-Analysis flowchart. CINAHL, Cumulative Index to Nursing and Allied Health Literature.

pain score at the 2-week post intervention mark. However, there was no statistically significant difference observed when comparing these two interventions with each other.

Six studies were included to construct a comprehensive NMA of the DASH/*Quick*DASH score within six weeks of follow-up, with a total of 291 patients (range between nine and 32) included and six different treatment modalities (Figure S3, available online on the *Journal*'s website at www.jhandsurg.org).[11,12,27,30,31,33] CSI with or without casting ranked above all other interventions, followed by PRP injection, laser therapy with orthosis, acupuncture, and orthosis alone (Table 3).

The scarcity of data resulted in limited loop closure within the network, causing a lack of overlap between direct and indirect evidence. The incapacity to conduct a consistency assessment restricts robust evaluation of the coherence regarding the comparative effectiveness of different interventions.

Medium-term: follow-up at 6 weeks and up to 6 months

Eleven studies were included to construct a comprehensive NMA of the VAS pain score at six weeks and up to six months of follow-up.[9,10,12,27–33,35] These studies encompassed a total of 654 patients, with individual study sample sizes ranging from five to 67 participants, and investigated nine distinct treatment

TABLE 1. Characteristics of Studies*

Study/Year	Inclusion Criteria	Exclusion Criteria	Age (y)	Duration of Onset	Intervention	Sample Size (n)	Reported Outcome of Interest	Follow-Up
Peters-Veluthamaningal et al,[32] 2009	Age >18 y, radial border pain, crepitus over radial styloid, +ve Finkelstein test, no previous CSI in last 6 mo	Trauma, neoplastic, complications/reactions, unable to follow-up	52.3 (SD, 12.6) 51.2 (SD, 20.2)	Not specified	Sham (NaCl) CSI	5 7	VAS	1 y
Mehdinasab and Alemohammad,[28] 2010	Radial border pain, tenderness at the first dorsal compartment, +ve Finkelstein test/WHAT test, no previous CSI	Trauma, history of fracture, rheumatological disorder, pregnancy	32.6 (21−61)	5.59 wk (SD, 3.61) 6.45 wk (SD, 3.43)	CSI + cast Cast	37 36	VAS	6 mo
Hadianfard et al,[12] 2014	Radial border pain and/or swelling, +ve Finkelstein test, no previous CSI/NSAID	Onset <4 wk, trauma, history of fracture/surgery, systemic disorder, abnormal blood test/radiography, pregnant	40.7 (22−76)	>4 wk	CSI Acupuncture	15 15	VAS, *Quick*DASH	6 wk
Mardani-Kivi et al,[27] 2014	Age >18 y, radial border pain, tenderness at the first dorsal compartment, +ve Finkelstein test, pain score >6, no previous CSI in last 6 mo	Trauma, history of surgery, rheumatological/neurological/dermatological disorder, pregnant, complications/reaction, infection	44 (SD, 13)	Not specified	CSI CSI + cast	30 29	VAS, *Quick*DASH	6 mo
Sharma et al,[8] 2015	+ve Finkelstein test	History of fracture, cervical spondylosis, rheumatological/systemic disorder	36.6 (21−45)	2.7 mo (SD, 1.6) 3.4 mo (SD, 1.6)	USS therapy LILT	15 15	VAS	2 wk
Kumar,[35] 2020	Radial border pain, tenderness at the first dorsal compartment, +ve Finkelstein test, pain score >6, no previous CSI in last 6 mo	Trauma, history of fracture/surgery, rheumatological/neurological disorder, pregnant	42.5 (SD, 16) 47 (SD, 17)	Not specified	CSI + cast CSI	60 60	VAS, *Quick*DASH	6 mo
Akhtar et al,[29] 2020	Age 30−60 y, radial border pain, +ve Finkelstein test, failed 6 wk of conservative therapy (oral or local NSAIDs), no CSI	Trauma, history of surgery, neoplasm, absolute contraindication	40.73 (SD, 9.2) 41.44 (SD, 8.5)	Not specified	CSI + cast Cast	67 67	VAS, *Quick*DASH	6 wk
Ippolito et al,[31] 2020	Age >18 y, radial border pain, tenderness at the first dorsal compartment, +ve Finkelstein test, VAS pain score >4, no previous CSI in last 6 mo	Trauma, history of surgery, rheumatological/dermatological/neurological disorder, taking analgesia, pregnant, complications/reactions	46	Not specified	CSI + cast CSI	11 9	VAS, DASH	6 mo

(Continued)

TABLE 1. Characteristics of Studies* (Continued)

Study/Year	Inclusion Criteria	Exclusion Criteria	Age (y)	Duration of Onset	Intervention	Sample Size (n)	Reported Outcome of Interest	Follow-Up
Das et al,[30] 2021	Age 30−50 y, no CSI in last 6 mo	Trauma, history of fracture, rheumatological/congenital/ systemic disorder, local infection, pregnant	Not specified	<6 wk	Orthosis CSI	30 30	VAS, *Quick*DASH	6 mo
Haghighat et al,[9] 2021	Age >18 y, radial border pain, +ve Finkelstein test, no previous physiotherapy/CSI in last 1 mo	Trauma, history of fracture/ surgery, neurological/ rheumatological/coagulation disorder, unable to follow-up, complications	44.61 (SD, 11.36) 48.21 (SD, 14.45)	Not specified	ECSWT Sham	13 13	VAS, DASH	6 wk
Başar et al,[34] 2021	Tenderness at the first dorsal compartment, +ve Finkelstein/ WHAT test, no previous CSI	Trauma, history for fracture/ surgery, rheumatological/ systemic disorder, pregnant	50.6 (SD, 12.5) 43.8 (SD, 11.6)	Not specified	CSI + orthosis CSI	42 34	VAS, *Quick*DASH	1 y
Suwannaphisit et al,[10] 2022	Age >18 y, radial border pain, +ve Finkelstein test/ WHAT test, no previous CSI in last 6 mo	Trauma, history of surgery, neoplastic, inflammatory disorder, complications/ reaction, unable to follow-up	54.5 (SD, 10) 54 (SD, 14)	30 d (SD, 37) 30 d (SD, 47.1)	NSAID injection‡ CSI	31 29	VAS, DASH	6 wk
Kumar et al,[33] 2022	+ve Finkelstein test, no previous CSI	Trauma, presence or arthritis, Dupuytren disease, rheumatological/inflammatory/ systemic disorder, pregnant	37.8 9 (SD, 6.44) 35.83 (SD, 8.48)	Not specified	CSI PRP	30 30	VAS, DASH	1 y
Dundar Ahi and Sirzai,[11] 2023†	Unilateral wrist pain with clinical diagnosis of DQT	Trauma, history of CSI/surgery, cervical radiculopathy/ myelopathy, neurological/ systemic/rheumatological disorder	40.4 (SD, 8.9) 37.9 (SD, 8.4)	6 mo (3−18) 6 mo (3−24)	HILT + orthosis Sham + orthosis	30 32	VAS, *Quick*DASH	5 wk

+ve, positive; HILT, high-intensity laser therapy; LILT, low-intensity laser therapy; NaCl, sodium chloride; PRP, platelet-rich plasma; USS, ultrasound; WHAT, wrist hyperflexion and abduction of the thumb.
*Data are presented as n, mean (range) or mean (SD), unless otherwise indicated.
†Median and range were used to report VAS result. Data were converted to mean and SD using Tong[20] calculator.
‡NSAID injection used by author was ketorolac.

TABLE 2. Results (Mean Differences With 95% CIs) of the Pairwise and NMA for VAS Pain Score Within 6 Weeks of Follow-Up

ECSWT			−3.25 (−4.31 to −2.19)*				
−2.18 (−4.62 to 0.25)	CSI + TSC			−1.20 (−1.62 to −0.77)*			
−2.98 (−5.92 to −0.04)*	−0.80 (−2.54 to 0.95)	HILT + Orthosis					−1.70 (−3.16 to −0.24)*
−3.25 (−4.31 to −2.19)*	−1.07 (−3.26 to 1.13)	−0.27 (−3.01 to 2.47)	Placebo	−0.13 (−2.29 to 2.03)			
−3.38 (−5.78 to −0.98)*	−1.20 (−1.62 to −0.77)*	−0.40 (−2.10 to 1.30)	−0.13 (−2.29 to 2.03)	CSI	−0.40 (−1.75 to 0.95)	−1.37 (−2.71 to −0.03)*	−1.30 (−2.17 to −0.43)*
−3.78 (−6.53 to −1.03)*	−1.60 (−3.01 to −0.18)*	−0.80 (−2.97 to 1.37)	−0.53 (−3.07 to 2.01)	−0.40 (−1.75 to 0.95)	PRP Injection		
−4.75 (−7.50 to −2.00)*	−2.57 (−3.97 to −1.16)*	−1.77 (−3.93 to 0.39)	−1.50 (−4.04 to 1.04)	−1.37 (−2.71 to −0.03)*	−0.97 (−2.87 to 0.93)	Acupuncture	
−4.68 (−7.23 to −2.13)*	−2.50 (−3.46 to −1.53)*	−1.70 (−3.16 to −0.24)*	−1.43 (−3.76 to 0.90)	−1.30 (−2.17 to −0.43)*	−0.90 (−2.50 to 0.70)	0.07 (−1.53 to 1.67)	Orthosis

HILT, high-intensity laser therapy; PRP, protein-rich plasma; TSC, thumb spica cast.
*Statistically significant difference.

TABLE 3. Results (Mean Differences With 95% CIs) of the Pairwise and NMA for DASH/*Quick*DASH Score Within 6 Weeks of Follow-Up

CSI + TSC	−5.30 (−15.28 to 4.67)				
−5.30 (−15.28 to 4.67)	CSI	−0.53 (−11.65 to 10.59)		−10.60 (−23.42 to 2.22)	−15.08 (−28.16 to −2.00)*
−5.83 (−20.77 to 9.10)	−0.53 (−11.65 to 10.59)	PRP Injection			
−13.88 (−34.50 to 6.73)	−8.58 (−26.62 to 9.46)	−8.05 (−29.24 to 13.14)	HILT + Orthosis		−6.50 (−18.93 to 5.93)
−15.90 (−32.15 to 0.34)	−10.60 (−23.42 to 2.22)	−10.07 (−27.04 to 6.90)	−2.02 (−24.15 to 20.11)	Acupuncture	
−20.38 (−36.83 to −3.94)*	−15.08 (−28.16 to −2.00)*	−14.55 (−31.72 to 2.62)	−6.50 (−18.93 to 5.93)	−4.48 (−22.79 to 13.83)	Orthosis

HILT, high-intensity laser therapy; PRP, protein-rich plasma; TSC, thumb spica cast.
*Statistically significant difference.

modalities (Figure S4, available online on the *Journal*'s website at www.jhandsurg.org).

On the network league table (Table 4), ECSWT remained the top-ranking option, followed by CSI with casting when compared with placebo. Corticosteroid injection alone, PRP injection, acupuncture, casting alone, and orthosis alone were all ranked below the placebo. Notably, NSAID injection occupied the lowest position in the table, demonstrating a statistically significant worsening in VAS pain scores compared with the other interventions during the follow-up period of up to six months.

We included data from eight studies to construct a comprehensive NMA focusing on the DASH/*Quick*-DASH score within a follow-up period of six weeks up to six months.[10,12,27,29–31,33,35] These studies involved a total of 543 patients, with individual study sample sizes ranging from nine to 67 patients, and examined seven distinct treatment modalities (Figure S5, available online on the *Journal*'s website at www.jhandsurg.org). The ranked league table (Table 5) showed a similar trend to the VAS pain score table, with CSI with casting ranking above all other interventions as the top-performing option.

Haghighat et al[9] was not considered in the NMA because of the absence of a network connection with the other studies, specifically in comparing ECSWT versus placebo. It is noteworthy that at the 6-week follow-up, ECSWT demonstrated a statistically significant superiority in improving the DASH score when compared with placebo.

The sparse data resulted in minimal loop closure and an inability to perform a consistency assessment, constraining a thorough evaluation of coherence in terms of comparative effectiveness between interventions.

Long term: follow-up at 1 year

Peters-Veluthamaningal et al[32] (2009) (CSI vs placebo), Başar et al[34] (2021) (CSI vs CSI with orthosis), and Kumar et al[33] (2022) (PRP vs CSI) reported their outcomes at one year after intervention. In summary, the improvement in VAS pain scores was observed to be sustained for up to one year with CSI alone and PRP injection. Additionally, there is a possibility of achieving a better outcome when combining CSI with orthosis when compared with CSI alone as reported by Başar et al.[34]

DISCUSSION

Despite the plethora of RCTs and subsequent meta-analyses conducted, the search for an optimal treatment strategy for DQT remains inconclusive, with a

TABLE 4. Results (Mean Differences With 95% CIs) of the Pairwise and NMA for VAS Pain Score at 6 Weeks and up to 6 Months of Follow-Up

ECSWT		−3.50 (−5.89 to −1.11)*						
−3.67 (−8.03 to 0.68)	CSI + TSC			−1.06 (−2.42 to 0.31)			−3.32 (−5.37 to −1.27)*	
−3.50 (−5.89 to −1.11)*	0.17 (−3.46 to 3.81)	Placebo		−1.23 (−4.60 to 2.14)				
−4.33 (−9.07 to 0.41)	−0.66 (−3.36 to 2.04)	−0.83 (−4.93 to 3.27)	PRP Injection	−0.40 (−2.73 to 1.93)				
−4.73 (−8.86 to −0.60)*	−1.06 (−2.42 to 0.31)	−1.23 (−4.60 to 2.14)	−0.40 (−2.73 to 1.93)	CSI	−0.10 (−2.43 to 2.23)	−0.87 (−3.46 to 1.72)		−4.60 (−7.20 to −2.00)*
−4.83 (−9.57 to −0.09)*	−1.16 (−3.86 to 1.54)	−1.33 (−5.43 to 2.77)	−0.50 (−3.79 to 2.79)	−0.10 (−2.43 to 2.23)	Orthosis			
−5.60 (−10.48 to −0.72)*	−1.93 (−4.85 to 1.00)	−2.10 (−6.35 to 2.15)	−1.27 (−4.75 to 2.21)	−0.87 (−3.46 to 1.72)	−0.77 (−4.25 to 2.71)	Acupuncture		
−6.99 (−11.81 to −2.18)*	−3.32 (−5.37 to −1.27)*	−3.49 (−7.67 to 0.68)	−2.66 (−6.05 to 0.72)	−2.26 (−4.73 to 0.20)	−2.16 (−5.55 to 1.22)	−1.39 (−4.97 to 2.18)	TSC	
−9.33 (−14.21 to −4.45)*	−5.66 (−8.59 to −2.72)*	−5.83 (−10.09 to −1.57)*	−5.00 (−8.49 to −1.51)*	−4.60 (−7.20 to −2.00)*	−4.50 (−7.99 to −1.01)*	−3.73 (−7.40 to −0.06)*	−2.34 (−5.92 to 1.25)	NSAID Injection

PRP, protein-rich plasma; TSC, thumb spica cast.
*Statistically significant difference.

TABLE 5. Results (Mean Differences With 95% CIs) of the Pairwise and NMA for DASH/*Quick*DASH Score at 6 Weeks and up to 6 Months of Follow-Up

CSI + TSC		−7.58 (−11.74 to −3.42)*			−16.55 (−23.42 to −9.68)*	
−6.94 (−13.62 to −0.26)*	PRP Injection	−0.64 (−5.87 to 4.59)				
−7.58 (−11.74 to −3.42)*	−0.64 (−5.87 to 4.59)	CSI	−2.04 (−11.84 to 7.76)	−3.70 (−11.82 to 4.42)		−29.70 (−38.54 to −20.86)*
−9.62 (−20.27 to 1.02)	−2.68 (−13.78 to 8.42)	−2.04 (−11.84 to 7.76)	Orthosis			
−11.28 (−20.40 to −2.16)*	−4.34 (−13.99 to 5.31)	−3.70 (−11.82 to 4.42)	−1.66 (−14.38 to 11.06)	Acupuncture		
−16.55 (−23.42 to −9.68)*	−9.61 (−19.19 to −0.02)*	−8.97 (−17.00 to −0.93)*	−6.93 (−19.60 to 5.74)	−5.27 (−16.69 to 6.15)	TSC	
−37.28 (−47.05 to −27.51)*	−30.34 (−40.61 to −20.07)*	−29.70 (−38.54 to −20.86)*	−27.66 (−40.86 to −14.46)*	−26.00 (−38.00 to −14.00)*	−20.73 (−32.68 to −8.79)*	NSAID Injection

PRP, protein-rich plasma; TSC, thumb spica cast.
*Statistically significant difference.

lack of robust evidence favoring one intervention over the others. Extracorporeal shockwave therapy leads to short and medium-term outcomes, but limited trials against placebo necessitate further research. Corticosteroid injection with casting has demonstrated moderate evidence, supporting its efficacy in improving VAS pain scores and DASH/*Quick*DASH outcomes, both in the short and medium term when compared with placebo and other modalities. Despite receiving a higher ranking, indicating potential superior effectiveness, the presence of the 95% CI including zero suggests insufficient statistical evidence for a definitive conclusion, particularly in comparisons against placebo. Therefore, these results should be interpreted cautiously, taking into account other pertinent information and factors when deciding on interventions.

Orthosis alone, casting alone, CSI alone, laser therapy, and PRP injection rank lower than placebo in VAS pain scores, signaling less preference and uncertain benefits. Similarly, in DASH/*Quick*DASH scores, orthosis alone, casting alone, laser therapy, and PRP injection fare worse than CSI alone. Lower rankings and the 95% CI including zero imply, on average, less preference and uncertainty in their effectiveness. Patients considering these treatments for DQT should be informed that they may not provide substantial benefits. NSAID injection showed a statistical trend toward worsening the outcome measures. We would therefore recommend caution with the use of these treatment modalities for DQT.

The Cochrane review conducted in 2009 provided an initial evaluation of the available evidence, albeit with limitations.[17] It concluded that there was low-level evidence supporting the superiority of CSI over the use of splints for pain relief in DQT. This conclusion was primarily based on a single small-scale RCT characterized by poor study quality. Following this initial review, subsequent RCTs studied various interventions for DQT, some of which are included in our NMA. Ashraf and Devadoss[15] conducted a study that directly compared CSI with splinting and reached a similar conclusion to our findings, favoring CSI injection alone as an effective treatment option. Rowland et al[16] investigated CSI in comparison to both placebo and other active treatments. Their study concluded in favor of the superiority of CSI, further supporting the evidence in this direction.[16]

Cavaleri et al[36] explored the effectiveness of CSI when combined with hand therapy, concluding that CSI alongside orthosis provided better outcomes than either intervention alone. However, it is noteworthy

that in their study, orthosis, casting, acupuncture, and dry needling were all classified under the umbrella of "hand therapy." Although there is existing literature suggesting positive outcomes associated with physiotherapy for DQT, it is important to note that these studies often feature small sample sizes and exhibit methodological shortcomings.[36–38] We also noted a gap in the literature because no RCTs were identified that directly compared physiotherapy with any other interventions.

In our analysis, we noted a lack of agreement among the included studies regarding the type, duration, and strictness of immobilization for DQT treatment. It is important to highlight that the included studies that implemented immobilization primarily employed a thumb spica cast with either Plaster of Paris or fiberglass with varying durations (2−5 weeks). In clinical practice, rigid immobilization is often considered excessive owing to limited patient acceptance. The Menendez et al[39] RCT comparing full-time splinting to patient-desired splinting found no significant outcome difference at 7.5 weeks, indicating that strict rest is not disease-modifying for DQT. This indirectly questions the necessity of rigid casting for immobilization.

In 2014, the European HANDGUIDE Study group conducted a Delphi study involving 112 experts, including 52 hand surgeons, 47 hand therapists, and 13 physical medicine and rehabilitation physicians.[40] Their expert consensus outlined a treatment hierarchy, suggesting initial instructions with NSAIDs, followed by splinting, CSI, and, if necessary, surgery. The experts often recommended a combination of modalities, considering factors like pain severity, symptom duration, and prior interventions. Their systematic review aligns with our NMA results, emphasizing limitations in guiding DQT treatment decisions due to available evidence constraints. The experts' consensus emphasizes the importance of a tailored approach based on individual patient characteristics and clinical circumstances while also underscoring the need for further research to establish more robust treatment guidelines for DQT, addressing existing uncertainties in this field.

Network meta-analysis offers the advantage of allowing comparisons between every treatment method for DQT against each other, in contrast to the traditional pairwise meta-analysis. We categorized our investigation into different follow-up timings, focusing on treatment effectiveness at these specific time points. To ensure comparability, we strictly adhered to predefined criteria for study design, population, intervention, and outcomes during study selection. Additionally, we conducted a meticulous review of the methodology and characteristics of the included studies to confirm their suitability for integration into the NMA. Our assessment indicated that these studies exhibited sufficient methodological similarity to be included in the NMA.

Our NMA has several limitations that should be taken into consideration when interpreting the findings. First, the studies included in our analysis exhibited heterogeneity, which could potentially affect the reliability and generalizability of our results. One possible source of this heterogeneity is the variation in symptom duration among the studies because the response to treatment may differ between acute and chronic cases of DQT. Despite categorization efforts, differences in treatment protocols, including injection dosage and orthosis types, were observed. Data limitations prevent accounting for these variations, emphasizing the need to consider these sources of heterogeneity when interpreting our findings.

Six of the 14 studies had a RoB categorized as "moderate" or "serious", potentially affecting the reliability and robustness of our review findings. The absence of a thorough evaluation of publication bias may also affect the overall robustness, acknowledging potential selective reporting that could influence synthesized evidence. This limitation should be considered when interpreting and generalizing the findings.

In the context of individual treatment arms, the majority of RCTs compared interventions against CSI, with only one RCT comparing against PRP, ECSWT, and laser therapy. Consequently, the wide CIs associated with these comparisons limit the strength of any definitive conclusions that can be drawn. The restricted loop closure in the network resulted in insufficient overlap between direct and indirect evidence, thereby constraining the capacity to evaluate consistency across various interventions. We anticipate that future research will provide additional RCTs focusing on these treatments, which will contribute to more robust evidence.

It is worth noting that there were no available RCTs comparing physiotherapy against other treatment options in our analysis. Additionally, the studies included in our analysis did not provide sufficient evidence to ascertain whether the patient cohort had previously undergone any form of physiotherapy intervention. This gap in the literature highlights the need for further research in these areas to better understand their comparative effectiveness in managing DQT.

To address the ongoing controversies surrounding DQT treatment, there is a need for further high-quality RCTs. One aspect to consider is the comparison of the efficacy of specific, standardized physiotherapy, CSI with removable orthosis, and ECSWT in treating DQT across various stages (acute, subacute, and chronic). Such research initiatives would contribute substantially to resolving the uncertainties in this pathology and guide clinicians in making informed treatment decisions.

CONFLICTS OF INTEREST

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

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