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Spencer Technique versus Mobilization Techniques in Patients with Adhesive Capsulitis: A Systematic Review of Randomized and Quasi-Experimental Studies

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ABSTRACT

Background: Adhesive capsulitis causes shoulder pain, stiffness and disability. The Spencer technique and mobilization techniques such as Mulligan mobilization with movement (MWM) are both widely used, yet it is unclear which works better. This review compared the Spencer technique with mobilization techniques for pain, range of motion (ROM), functional disability and quality of life in adults with adhesive capsulitis.

Methods: Five databases (PubMed/MEDLINE, Cochrane CENTRAL, Scopus, Web of Science, PEDro) were searched from January 2015 to March 2026 and supplemented by Google Scholar, trial registers and citation tracking. Eligible studies were randomized and quasi-experimental studies in adults with adhesive capsulitis in which the Spencer technique was compared with MWM or passive accessory mobilization. Screening, data extraction and risk-of-bias appraisal (RoB 2 and ROBINS-I V2) were each performed independently by two reviewers. Findings were synthesized narratively following the SWiM guideline, and the certainty of evidence was rated using GRADE.

Results: Of 1,500 records, ten studies (436 participants) were included: eight randomized controlled trials (RCTs) comparing the Spencer technique with MWM, and one RCT and one quasi-experimental study comparing it with passive accessory mobilization. Against MWM, the Spencer technique produced less abduction in all seven trials that measured it (significantly in six) and significantly less external rotation in six of seven. Shoulder Pain and Disability Index scores were 7–12 points lower after MWM in the six trials with interpretable data. Pain differences were inconsistent and mostly below clinically important thresholds. Against passive accessory mobilization, the RCT favored mobilization and the quasi-experimental study favored the Spencer technique. Risk of bias raised some concerns in six RCTs and was high in three. Certainty was low for abduction, external rotation and disability, and very low for other outcomes.

Conclusion: MWM may give greater short-term gains in shoulder mobility and function than the Spencer technique. However, this finding rests on small, unregistered trials, and the comparison with passive accessory mobilization remains very uncertain. Larger registered trials with blinded assessment and longer follow-up are needed.

Keywords: *Bursitis; Musculoskeletal Manipulations; Osteopathic Medicine; Physical Therapy Modalities; Shoulder Pain*

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INTRODUCTION

Adhesive capsulitis, commonly called frozen shoulder, is a condition of uncertain cause in which active and passive glenohumeral motion are progressively lost while plain radiographs remain essentially normal[1]. It affects an estimated 2–5% of the general population, is most common between 40 and 60 years of age and occurs more often in women[2]. The risk is considerably higher in people with diabetes mellitus and thyroid disease[3,4], which makes the condition a frequent presentation in outpatient physiotherapy clinics.

The underlying pathology is fibroproliferative. Fibroblasts and myofibroblasts lay down dense collagen in the joint capsule in a pattern that resembles Dupuytren's contracture[1], and the coracohumeral ligament and rotator interval thicken and contract[1,2]. These changes produce the typical capsular pattern, in which external rotation is lost first and most, followed by abduction and internal rotation[2]. The condition passes through overlapping painful (freezing), stiff (frozen) and recovery (thawing) phases[2]. It was long regarded as self-limiting, but follow-up studies show that many patients still report pain or restricted movement years after onset[2]. Difficulty with dressing, grooming, reaching overhead and sleeping on the affected side therefore places a lasting burden on patients and on health services.

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Conservative care is the first line of management. Current guidance recommends education, stretching and joint mobilization matched to the stage and irritability of the shoulder, with surgery kept for the minority who do not respond[3]. In early-stage disease, intra-articular corticosteroid and platelet-rich plasma injections improve pain and function at 12 weeks more than physiotherapy alone[5], but they do not remove the need to restore movement. Exercise therapy improves ROM, function and pain[6], and several mobilization approaches, including Maitland, end-range and Mulligan techniques, have been reported to help[7]. Even so, an umbrella review of systematic reviews found no evidence that one rehabilitation approach is better than another[8]. In everyday practice, the choice of manual technique therefore tends to follow the therapist's training more than comparative evidence.

The Spencer technique is an osteopathic articulatory procedure first described by Charles Spencer in the early twentieth century[9]. With the patient side-lying and the scapula fixed, the therapist moves the shoulder through a set sequence of seven stages: extension, flexion, circumduction with compression, circumduction with traction, abduction with internal rotation, adduction with external rotation, and a final pumping or distraction stage. Each stage uses slow, rhythmic passive movement up to the restrictive barrier and is often paired with a muscle energy component, in which a gentle isometric contraction is followed by relaxation. In a recent pilot study of people with stage 2 or 3 frozen shoulder, three weeks of the Spencer technique with moist heat and pendulum exercises was followed by improvements in pain, ROM and disability that were still present at six months[10].

Mulligan's mobilization with movement (MWM) works differently. The therapist holds a sustained, pain-free accessory glide while the patient actively performs the restricted movement. The rationale is that a small positional fault of the joint surfaces limits motion and provokes pain, and that correcting it during movement restores pain-free range. A meta-analysis of MWM for shoulder conditions found that adding MWM to other conservative care improved pain, flexion, abduction and disability in frozen shoulder, although the included trials were heterogeneous and at high risk of bias[11]. Conventional passive accessory glides in the Maitland and Kaltenborn traditions remain the other main form of mobilization used in clinics[7].

The two approaches differ in an important way. The Spencer technique is therapist-driven and largely passive, whereas MWM depends on active movement by the patient. Over the past decade, several small trials have compared the Spencer technique directly with MWM or with passive accessory mobilization[12–21]. Their findings point in different directions: most favour the mobilization technique, one favours the Spencer technique, and others find little difference between techniques. The trials also differ widely in treatment dose (from five daily sessions to 40 sessions over ten weeks), co-interventions, disease stage and outcome tools. A recent narrative review described the Spencer technique and scapular mobilization as promising[9], but it did not use a systematic search, did not appraise risk of bias and did not focus on head-to-head comparisons. To our knowledge, no systematic review has synthesized the trials that directly compare the Spencer technique with other mobilization techniques in adhesive capsulitis.

We therefore conducted this systematic review to synthesize the evidence from randomized and quasi-experimental studies comparing the Spencer technique with mobilization techniques in adults with adhesive capsulitis. Our question was: in adults with adhesive capsulitis, does the Spencer technique differ from mobilization techniques (Mulligan MWM or passive accessory joint mobilization) in its effects on pain, shoulder ROM, functional disability and quality of life? We aimed to (i) describe the direction and size of the between-group differences for each outcome, (ii) compare how the techniques were delivered across studies, including dose, duration and co-interventions, and (iii) appraise the risk of bias and certainty of the evidence to guide future trials. The review is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement[22].

METHODOLOGY

Protocol and Reporting

The review was conducted following the Cochrane Handbook for Systematic Reviews of Interventions[22] and reported according to the PRISMA 2020 statement[23]. The review question, eligibility criteria, risk-of-bias tools and synthesis plan were agreed before the search began. The protocol was not registered in PROSPERO or any other registry. Ethical approval was not required because only published data were used.

Review Question and Eligibility Criteria

The review question was framed with the PICOS (Population, Intervention, Comparator, Outcomes, Study design) framework: *in adults with adhesive capsulitis, does the Spencer technique differ from mobilization techniques in its effects on pain, shoulder ROM, functional disability and quality of life?* The eligibility criteria were as follows.

Population

Adults (≥ 18 years) of either sex with a clinical diagnosis of primary or idiopathic adhesive capsulitis, including diabetes-associated cases, at any stage and with restriction of both active and passive shoulder movement. Studies were excluded if stiffness followed fracture, dislocation or surgery, if participants had a full-thickness rotator cuff tear, inflammatory arthritis or neurological disease, or if a mixed shoulder population was reported without separate data for adhesive capsulitis.

Intervention and Comparator

The intervention was the Spencer technique, an osteopathic articulatory sequence of up to seven stages with or without a muscle energy component, given alone or with co-interventions that the comparator group also received. Mobilization techniques were defined as Mulligan MWM and passive accessory joint mobilization (anterior, posterior or inferior glides of the humeral head, including Maitland and Kaltenborn approaches). Studies were excluded when the Spencer technique was combined with another manual technique in the same group, or when the only comparator was stretching, exercise, electrotherapy, injection or no treatment. In multi-arm trials, only the Spencer and mobilization arms were considered.

Outcomes

Primary outcomes were pain intensity (visual analogue scale, Numeric Pain Rating Scale or the pain subscale of the Shoulder Pain and Disability Index), shoulder ROM measured with a goniometer, and functional disability (Shoulder Pain and Disability Index or another validated scale). Secondary outcomes were health-related quality of life (e.g., SF-36) and adverse events. Studies had to report at least one primary outcome for both groups.

Study Design and Reports

Randomized controlled trials (parallel or multi-arm) and quasi-experimental studies with a concurrent comparison group were eligible. Single-group pre-post studies, case reports and series, reviews, protocols, conference abstracts without full data and unpublished theses were excluded. Full-text articles in English published in peer-reviewed journals between January 2015 and March 2026 were included. When a trial appeared in more than one report, the most complete report was kept.

Information Sources and Search Strategy

PubMed/MEDLINE, Scopus, Web of Science Core Collection, the Cochrane Central Register of Controlled Trials (CENTRAL) and the Physiotherapy Evidence Database (PEDro) were searched from January 2015 to March 2026. Google Scholar (first 200 records ranked by relevance) was searched to find articles from regional journals that are poorly indexed in bibliographic databases, which is particularly relevant for small manual therapy trials. ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform were searched for registered, ongoing or unpublished trials. The reference lists of all included studies and of related reviews were hand-searched, and forward citation searching of included studies was carried out in Google Scholar.

The search combined three concept blocks (adhesive capsulitis, the Spencer technique and mobilization techniques) using Medical Subject Headings (MeSH) and free-text terms, joined with OR within blocks and AND between blocks. No study-design filter was applied, so that quasi-experimental studies would not be missed. Because some trials name the Spencer technique only in the full text, a second, more sensitive search (#1 AND #2) was also screened. The full PubMed strategy is given in Supplementary Table S1; it was adapted for each database using the corresponding field tags (TITLE-ABS-KEY in Scopus; TS= in Web of Science). For PEDro, the simple search terms "Spencer" and "frozen shoulder" or "adhesive capsulitis" were used.

Study Selection

Records from all sources were imported into Mendeley Reference Manager (Elsevier, London, UK), and duplicates were removed. Two reviewers (AM and FM) independently screened titles and abstracts against the eligibility criteria and then read the full texts of potentially relevant records. Reasons for excluding full-text articles were recorded. Disagreements at either stage were resolved by discussion and, when needed, by a third reviewer (IK). The selection process is presented in a PRISMA 2020 flow diagram (Figure 1)[22]. For multi-arm trials that also included a conventional-therapy-only group[13,14], only the Spencer and mobilization arms were considered. Studies that described their design as randomized were classified as

quasi-experimental when the methods section reported convenience allocation with no random sequence generation.

Data Extraction

Two reviewers extracted data independently using a standardized Microsoft Excel form that was piloted on two included studies and refined before full use. Extracted data were cross-checked, and discrepancies were resolved by re-reading the full text. Intervention details were extracted using the items of the Template for Intervention Description and Replication (TIDieR) checklist[24]. The following items were collected:

- ***Study Identifiers:*** first author, year, journal, country, setting, study period, funding and trial registration.
- ***Design and Population:*** study design and number of arms; number of participants randomized or allocated and analyzed in each group; age; sex; diabetes status; stage and duration of symptoms; and key inclusion and exclusion criteria.
- ***Interventions:*** for the Spencer and comparator groups, the stages or glides used, repetitions and sets, the muscle energy component, the number of sessions per week, total duration, the treating therapist and any co-interventions (heat, ultrasound, exercise, home program) given to both groups.
- ***Outcomes:*** instrument for pain (visual analogue scale [VAS], Numeric Pain Rating Scale [NPRS] or the SPADI pain subscale), shoulder ROM (movements measured, active or passive, goniometer type), functional disability (Shoulder Pain and Disability Index [SPADI]) and quality of life (36-Item Short Form Health Survey [SF-36]), with assessment time points.
- ***Results:*** mean ± standard deviation (SD) for each group before and after treatment, within-group change, between-group difference with 95% confidence interval (CI) where reported, the statistical test and p-value, dropouts and adverse events.
- ***Authors' Conclusions*** and the limitations stated by the authors.

Values were transcribed as reported. Where a study reported only within-group mean change[13], the difference in mean change between groups was used. Values presented only in figures were read from the figure and labelled as approximate. SPADI was interpreted with higher scores indicating worse pain and disability[25,26]; reported values that ran against the direction of the scale were recorded and flagged rather than reinterpreted. Data not reported in the full text were recorded as "not reported".

Risk-of-Bias Assessment

Risk of bias in the randomized controlled trials (RCTs) was assessed with the revised Cochrane risk-of-bias tool for randomized trials (RoB 2)[27], applied to the effect of assignment to the intervention. Five domains were judged: (1) the randomization process, (2) deviations from intended interventions, (3) missing outcome data, (4) measurement of the outcome and (5) selection of the reported result. Each domain and the overall result were rated as low risk, some concerns or high risk, following the RoB 2 algorithm. Because pain and SPADI are self-reported by participants who could not be blinded to manual therapy, while goniometric ROM can be measured by a blinded assessor, domain 4 was considered separately for self-reported and assessor-measured outcomes, and the more serious judgment was carried to the study level.

The quasi-experimental study was assessed with the Risk of Bias In Non-randomized Studies of Interventions, version 2 (ROBINS-I V2)[28], across seven domains: (1) confounding, (2) classification of interventions, (3) selection of participants into the study, (4) deviations from intended interventions, (5) missing data, (6) measurement of outcomes and (7) selection of the reported result. Judgments were low, moderate, serious or critical risk of bias. The following confounders were pre-specified: age, sex, diabetes, stage and duration of symptoms, baseline pain and disability, and co-interventions such as analgesic use and adherence to home exercise.

Two reviewers (AM and FM) completed all risk-of-bias assessments independently and resolved disagreements by discussion, consulting a third reviewer (IK) when needed. Judgments were presented as traffic-light and summary plots in the style of the robvis tool[29].

Data Synthesis

A meta-analysis was not undertaken. The studies were few and small, the comparator differed in two studies, treatment dose ranged from five to 40 sessions, outcomes were measured with different instruments and at different time points, several studies did not report SDs or group means for all outcomes, and two studies had data that could not be interpreted with confidence. A structured narrative synthesis was therefore carried out and reported according to the Synthesis Without Meta-analysis (SWiM) guideline[30].

Studies were grouped first by comparator (Spencer technique versus Mulligan MWM; Spencer technique versus passive accessory joint mobilization) and then by outcome: pain, ROM (abduction, external rotation, flexion internal rotation and other movements), functional disability and quality of life. The direction of effect was used as the standardized metric across studies, and vote counting based on the direction of effect was used to summarize the evidence[31]. For each outcome, the number of studies favouring each technique and the number in which the difference was statistically significant were tabulated. Magnitude was described using post-intervention between-group differences and judged against minimal clinically important differences of about 2 points on the NPRS[32] and 8–13 points on the SPADI[25,26]. Heterogeneity was explored descriptively across treatment duration (one week, four weeks or six weeks or more), co-interventions, stage of the condition and overall risk of bias. Robustness was examined by restricting the synthesis to trials judged at some concerns.

Certainty of Evidence

The certainty of the evidence for each outcome was rated with the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach[33]. Evidence from RCTs started at high certainty. In line with GRADE guidance for studies assessed with ROBINS-I, evidence from the non-randomized study also started at high certainty and was rated down mainly through the risk-of-bias domain[34]. Certainty was rated down for risk of bias, inconsistency, indirectness, imprecision and publication bias and was expressed as high, moderate, low or very low. Funnel plots and formal tests for publication bias were not possible because fewer than ten studies contributed to each outcome.

RESULTS

Study Selection

The database searches identified 1,425 records, and 75 further records were identified through Google Scholar and citation searching. After removing 300 duplicates, 1,200 titles and abstracts were screened, of which 1,100 were excluded. The full texts of 100 articles were assessed for eligibility, and 90 were excluded, most often because there was no Spencer arm, the comparator was not a mobilization technique, or the study was a single-group study or case report. Ten studies met the

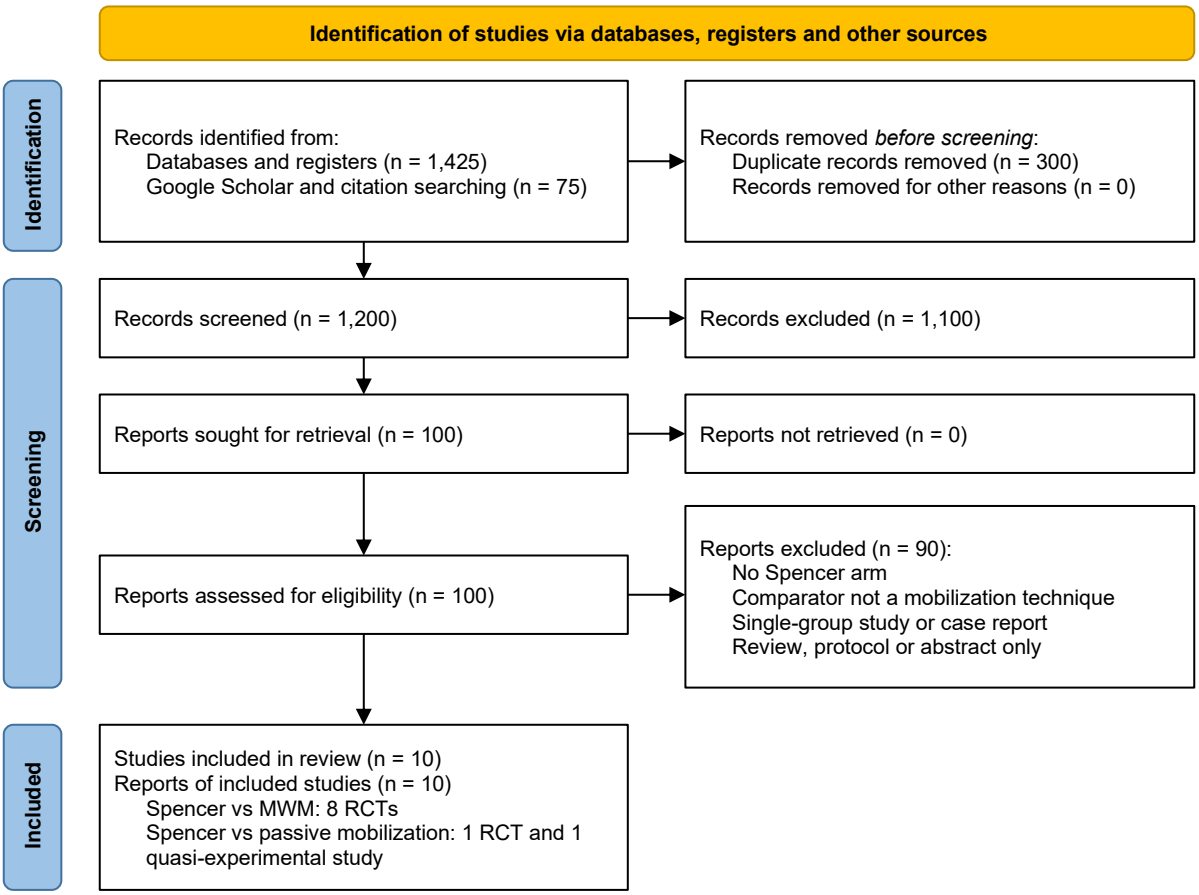


Figure 1. PRISMA 2020 flow diagram of study selection

eligibility criteria and were included[12–21]: eight randomized controlled trials (RCTs) comparing the Spencer technique with Mulligan mobilization with movement (MWM)[12–16,18,19,21], one RCT comparing the Spencer technique with passive accessory joint mobilization (Gong's mobilization)[20], and one quasi-experimental study comparing the Spencer technique with passive accessory joint mobilization[17]. The study selection process is illustrated in (Figure 1).

Characteristics of The Included Studies

The ten studies were published between 2015 and 2026 (Table 1). Together they allocated 444 participants to the relevant arms, of whom 436 were analyzed: 218 in Spencer groups, 193 in MWM groups and 25 in passive mobilization groups. Sample sizes in the relevant arms ranged from 20 to 72 (median 48). All were single-centre studies conducted in hospital or college physiotherapy outpatient departments.

Seven RCTs had two parallel arms[12,15,16,18–21], and two had a third arm that received conventional therapy alone[13,14], which was not considered in this review. Kalphidaa et al.[17] described their study as a pre-test post-test quasi-experimental design with convenience sampling, although the abstract stated that participants were randomized. Participants were aged between 30 and 65 years across studies. Two trials restricted inclusion to stage II (frozen phase) adhesive capsulitis[18,19]. Diabetes was handled inconsistently: one trial excluded people with diabetes[13], one listed diabetes as an inclusion criterion[14], one reported that about a third of its participants had diabetes[18], and the rest did not report it.

The Spencer protocol ranged from the full seven-stage sequence[13,18–21] to two or three selected stages aimed at abduction and external rotation[12,16]. Four studies combined the stages with a muscle energy component[17,18,20,21], and one did not describe the technique[15]. MWM was applied as sustained posterolateral, lateral or inferior glides, usually with a mobilization belt, in three sets of ten repetitions. The passive comparators were anteroposterior glides of the humeral head in 90° of abduction with Maitland grade III–IV oscillations and a sustained end-range stretch (Gong's mobilization)[20], and low-grade posterior, anterior and inferior glides[17]. Treatment dose varied widely: one session a day for five days[12,20], three sessions a week for four weeks[14,18,21], five sessions a week for four weeks[19], three sessions a week for six weeks[13,16] and four sessions a week for ten weeks[15]. Kalphidaa et al.[17] reported a four-week programme without the session frequency. Both groups in every study also received the same co-interventions, typically heat, Codman's pendulum and range-of-motion exercises, in two trials therapeutic ultrasound[13,20], and in one trial scapular stabilization exercises[21].

Pain was measured with the NPRS in four studies[13,14,18,19], the VAS in three[12,20,21] and the SPADI pain subscale alone in one[15]. Shoulder ROM was measured with a universal goniometer in eight studies[12,13,15,16,18–21]; Shera et al.[14] described ROM measurement in their methods but did not report the results, and Kalphidaa et al.[17] did not measure ROM. Functional disability was assessed with the SPADI in nine studies; Imran et al.[19] instead used the SF-36 to measure quality of life. Every study assessed outcomes only at the end of treatment (five days to ten weeks), and none reported follow-up after treatment ended

Table 1. Characteristics of the included studies (n = 10; nine RCTs and one quasi-experimental study)

Study (year)	Setting	Design	Participants analyzed (Spencer/ comparator)	Spencer protocol	Comparator protocol	Co-intervention; dose	Outcomes; time points	Authors' conclusion
Khyathi et al. (2015)[12]	KTG Hospital and rehabilitation centres, Bangalore	Single-blind RCT, 2 arms	40 (20/20); 40–60 y; mean age 50.9/50.4 y	Circumduction with compression and traction; abduction stage; 8–10 repetitions	MWM: posterolateral glide with belt during active abduction and ER; 3 × 10	Conventional exercises; 1 session/day × 5 days	VAS; goniometer (abduction, ER; active and passive); SPADI; baseline, day 5	Both effective short term; MWM better for mobility and disability
Haveela et al. (2018)[13]	Nizam's Institute of Medical Sciences, Hyderabad	RCT, 3 arms (conventional control not extracted)	56 of 60 (28/28); 35–65 y; non-diabetic	Seven-stage sequence in side-lying; 3 × 10	MWM for flexion, IR, ER and abduction; 3 × 10	Ultrasound, exercise, home programme; 3/week × 6 weeks	NPRS; goniometer (flexion, abduction, IR, ER, extension); SPADI; baseline, week 3, week 6	MWM gave greater functional improvement than Spencer and control

Shera et al. (2023)[14]	Mayo Hospital, Lahore	RCT, 3 arms (conventional control not extracted)	24 of 36 (12/12); 30–55 y; diabetic patients	Passive sequence in side-lying; 3 × 10	MWM: accessory glide with active movement; 3 × 10	Hot pack and exercise; 3/week × 4 weeks	NPRS; SPADI; ROM planned but not reported; baseline, week 4	MWM more effective than Spencer
Prasanth et al. (2023)[20]	Co-operative Institute of Health Sciences, Thalassery, Kerala	RCT (envelope draw from concealed box), 2 arms	30 (15/15); 50–60 y; no dropouts	Seven stages in side-lying with muscle energy component; 3–5 repetitions	Gong's mobilization: AP glide in 90° abduction, grade III–IV oscillations and sustained grade IV stretch	Pulsed ultrasound and Codman's pendulum home programme; 1 session/day × 5 days	VAS; goniometer (abduction, flexion, IR); SPADI; baseline, day 5	Gong's mobilization more effective than Spencer
Riaz et al. (2025)[15]	Mian Munshi DHQ and Mian Meer THQ hospitals, Lahore	RCT, 2 arms	38 (19/19); 40–55 y; symptoms > 2 months	Not described	Not described	Not reported; 4/week × 10 weeks	SPADI (pain, disability, total); goniometer (six movements); baseline, post-treatment	MWM more effective for pain, disability and ROM
Sundar Rajan et al. (2025)[16]	Saveetha College of Physiotherapy, Chennai	Randomized (computer block), 2 arms	40 (20/20); age not reported	Circumduction with compression and traction; abduction stage; 8–10 repetitions	MWM for abduction, IR and ER; 3 × 10	Exercise programme; 3/week × 6 weeks	Goniometer (abduction, IR, ER); SPADI; baseline, week 6	MWM more effective for pain and function
Kalphidaa et al. (2026)[17]	Sree Abirami Hospital, Coimbatore	Quasi-experimental , 2 groups, convenience sampling	20 (10/10); 40–55 y	Spencer muscle energy technique (flexion, extension, circumduction with compression and traction, abduction with 7-s hold)	Passive posterior, anterior and inferior glides	Pendular exercises; 4 weeks (frequency not reported)	SPADI; baseline, week 4	Spencer more effective than joint mobilization
Kumar et al. (2026)[18]	institution not named	Assessor-blinded RCT, 2 arms	56 of 60 (28/28); 40–65 y; stage II; 34% with diabetes	Seven stages with muscle energy component; 3–5 repetitions per stage	MWM for flexion, abduction, ER and hand-behind-back IR; 3 × 10	Moist heat and home programme; 3/week × 4 weeks	NPRS; goniometer (flexion, abduction, ER, IR); SPADI; baseline, week 2, week 4	MWM superior for pain, abduction, ER and disability
Imran et al. (2026)[19]	Ibn-e-Sina Hospital and City Hospital, Multan	Single-blind (assessor) RCT, 2 arms	72 (36/36); 30–55 y; stage II idiopathic	Seven-stage sequence in side-lying	MWM with active movement	Moist heat and exercise; 5/week × 4 weeks	NPRS; goniometer (eight movements); SF-36; baseline, week 4	Both effective; differences only in horizontal adduction and SF-36 General Health
Wajid et al. (2026)[21]	Government General Hospital, Neshatabad, Peshawar	Assessor-blinded RCT (computer-generated; sealed opaque envelopes), 2 arms	60 (30/30); 40–65 y; symptoms ≥ 3 months; no dropouts	Sequential stages with isometric hold of 3–5 s; 5–10 repetitions	MWM: posterior and inferior glides with active movement; 3 × 10	Scapular stabilization exercises; 3/week × 4 weeks	VAS; goniometer (flexion, abduction, IR, ER); SPADI; baseline, week 4	MWM superior for pain, ROM and disability

ER, external rotation; IR, internal rotation; MWM, Mulligan mobilization with movement; NPRS, Numeric Pain Rating Scale; RCT, randomized controlled trial; ROM, range of motion; SF-36, 36-Item Short Form Health Survey; SPADI, Shoulder Pain and Disability Index; VAS, visual analogue scale; y, years. Repetitions given as sets × repetitions.

Risk of Bias in The Included Studies

Of the nine RCTs, six were judged at some concerns[12,13,18–21] and three at high overall risk of bias[14–16] (Figure 2a, b). No trial was at low risk of bias. The quasi-experimental study was judged at serious risk of bias with ROBINS-I V2[17] (Figure 2c).

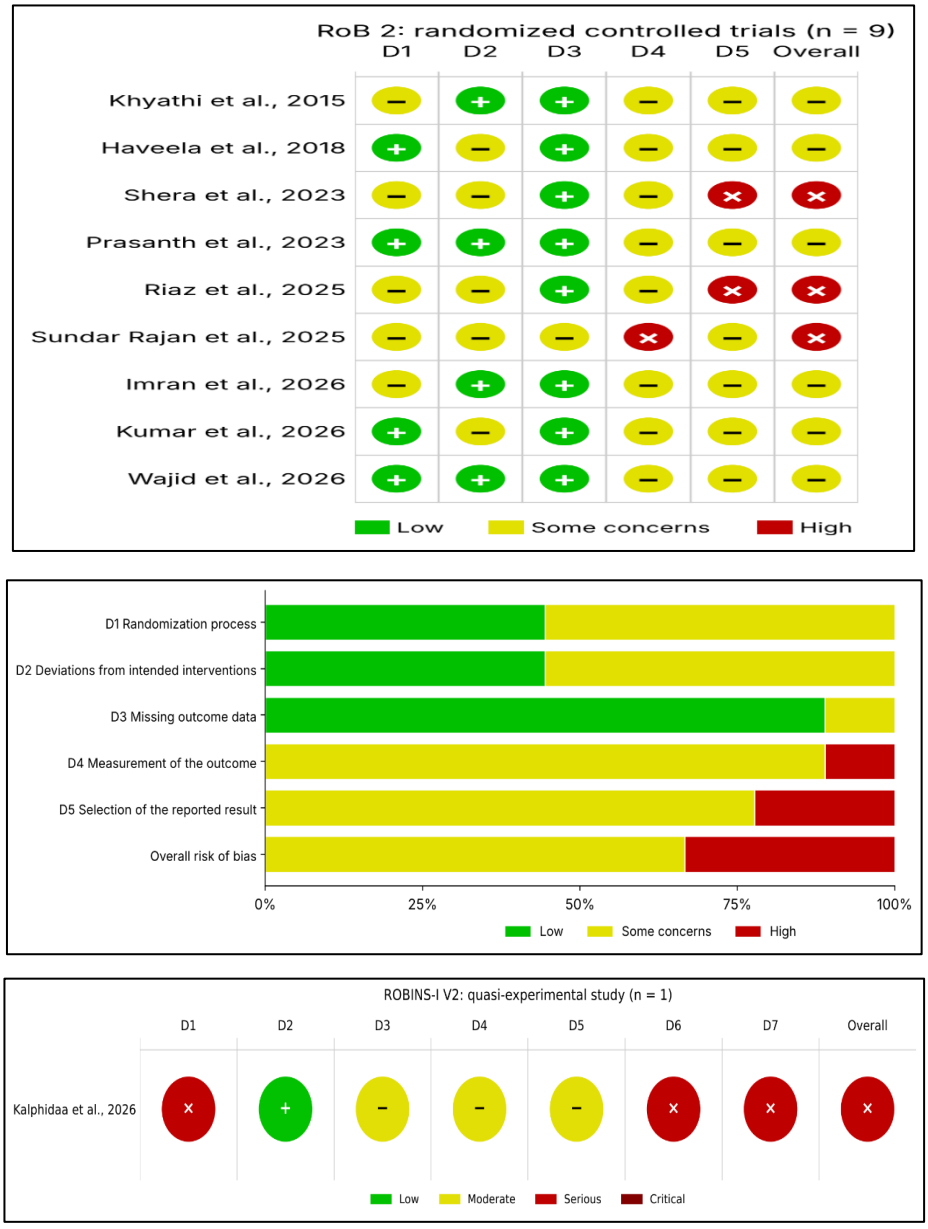


Figure 2. Risk-of-bias assessment of the included studies. *(a) Traffic-light plot and (b) summary plot for the nine randomized controlled trials assessed with RoB 2 (D1, randomization process; D2, deviations from intended interventions; D3, missing outcome data; D4, measurement of the outcome; D5, selection of the reported result). (c) Domain-level judgments for the quasi-experimental study (Kalphidaa et al., 2026) assessed with ROBINS-I V2 (D1, confounding; D2, classification of interventions; D3, selection of participants; D4, deviations from intended interventions; D5, missing data; D6, measurement of outcomes; D7, selection of the reported result).*

Randomization Process (D1)

Four trials were at low risk: two used computer-generated sequences with sealed, opaque envelopes and reported comparable groups at baseline[18,21], one used a lottery with concealed allocation and comparable groups at baseline[13], and one had participants draw an envelope containing a coloured card from a concealed box held by a person not involved in the study, with no significant baseline differences[20]. The other five were judged at some concerns, mainly because allocation concealment was not described[14–16,19]. Khyathi et al.[12] used closed envelopes but reported significant baseline differences in SPADI disability, SPADI total, active abduction and passive external rotation, and compared post-intervention means without adjusting for them. Shera et al.[14] described a computer-generated list but also "purposive non-probability sampling", and baseline NPRS and SPADI values appeared unbalanced.

Deviations from Intended Interventions (D2) and Missing Outcome Data (D3)

Participants and treating therapists could not be blinded in any trial. Four trials were at low risk

for D2 because all participants received the allocated treatment and were analyzed[12,19–21]; the rest were at some concerns because adherence was poorly described or the analysis was per protocol[13,18]. Losses to follow-up were small (none in two trials[20,21] and two per arm in two trials[13,18]), and D3 was at low risk in eight trials. Sundar Rajan et al.[16] did not clearly report the number analyzed.

Measurement of the Outcome (D4)

All nine trials were at least at some concerns, because pain and SPADI were self-reported by participants who knew which treatment they had received. Blinded outcome assessors were reported in four trials[13,18,19,21], which protects goniometric ROM but not self-reported outcomes. Sundar Rajan et al.[16] were at high risk: their blinding statement was written hypothetically ("could be blinded"), and SPADI scores rose from about 22 to 58–79 in both groups while being described as improvement, which suggests an error in scoring or recording the outcome.

Selection of The Reported Result (D5)

None of the trials was prospectively registered or referred to a published analysis plan. Two trials were at high risk[14,15]. Shera et al.[14] measured ROM but did not report it, and Riaz et al.[15] reported quality-of-life results that were never described as an outcome in their methods.

ROBINS-I V2 (Kalphidaa et al.)

The study was at serious risk of bias due to confounding, because groups were formed from a convenience sample, no baseline characteristics were reported and no confounders were controlled for. Measurement of the outcome was also at serious risk (self-reported SPADI with no assessor blinding), as was selection of the reported result, because results were presented only as bar-chart means without SDs. Classification of interventions was at low risk, and selection of participants, deviations from intended interventions and missing data were at moderate risk.

Spencer Technique Versus Mulligan Mobilization with Movement

Eight RCTs with 386 analyzed participants compared the Spencer technique with MWM[12–16,18,19,21]. Both techniques were followed by significant within-group improvement in every outcome in every trial. The between-group results are summarized in (Table 2).

Pain

Seven trials (346 participants) compared pain between groups. In all six trials that reported group means, the point estimate favoured MWM[12–15,18,21], and the difference was statistically significant in four[13,15,18,21]. In Kumar et al.[18], NPRS at four weeks was 1.0 point lower with MWM (95% CI −1.6 to −0.4), in Wajid et al.[21] VAS was 1.2 points lower after four weeks (2.3 vs 3.5), and in Haveela et al.[13] the NPRS fell by 6.0 points with MWM compared with 3.8 points with the Spencer technique over six weeks. Riaz et al.[15] reported a SPADI pain subscale score of 18.4 with MWM versus 25.8 with the Spencer technique after ten weeks. Shera et al.[14] reported a lower NPRS with MWM (4.4 vs 5.2), but tested only across all three groups and did not give a pairwise comparison. Two trials found no difference: Khyathi et al.[12] after five days (VAS 3.4 vs 3.6; $p = 0.80$) and Imran et al.[19], the largest trial, after four weeks ($p = 0.18$; group means not reported). Only the difference in Haveela et al.[13] exceeded the 2-point minimal clinically important difference for the NPRS[32].

Range of Motion

Seven trials (362 participants) reported ROM between groups[12,13,15,16,18,19,21]. For **abduction**, all seven favoured MWM, significantly in six. Post-treatment differences ranged from 5.7° in Imran et al.[19] (not significant) through 10.0° in Khyathi et al.[12], 11.2° in Kumar et al.[18] (95% CI 6.1 to 16.3) and 14.1° in Wajid et al.[21] to 24.0° in Sundar Rajan et al.[16] and 38.6° in Riaz et al.[15]. Haveela et al.[13] reported a gain of 44.5° with MWM against 38.0° with the Spencer technique. The pattern for **external rotation** was almost the same: six of the seven trials favoured MWM, all significantly, with differences of 7.8° to 16.0°, while Imran et al.[19] found virtually no difference (76.8° vs 76.6°).

Findings for other movements were less consistent. For **flexion**, all five trials that measured it favoured MWM, but the difference was significant only in Riaz et al.[15] (126.6° vs 97.3°) and Wajid et al.[21] (149.2° vs 136.5°); it was not significant in Haveela et al.[13], Kumar et al.[18] or Imran et al.[19]. For **internal rotation**, all six trials favoured MWM, significantly in four[13,15,16,21]. Extension favoured MWM significantly in one trial[15] and not in two[13,19], and adduction did not differ between groups[15,19]. Imran et al.[19] found a significant difference only for horizontal adduction (125.0° vs 118.2°; $p = 0.003$). The largest ROM differences came from the two trials at high risk of bias with the longest treatment programmes[15,16].

Table 2. Between-group results for each outcome (Spencer technique vs comparator, post-treatment unless stated)

Study	Pain	Abduction	ER	Flexion	IR	SPADI	Other outcomes
Spencer vs MWM							
Khyathi et al. (2015)[12]	VAS 3.58 vs 3.37 p = 0.80 ▲	**85.8 vs 95.8 p = 0.005 ▲**	**20.5 vs 28.4 p < 0.001 ▲**	—	—	**25.3 vs 13.3 p < 0.001 ▲**	SPADI pain 26.7 vs 16.9, p < 0.001
Haveela et al. (2018)[13,a]	**NPRS −3.75 vs −6.04 p < 0.05 ▲**	**+38.0 vs +44.5 p < 0.05 ▲**	**+34.1 vs +38.4 p < 0.05 ▲**	+53.0 vs +63.0 p = 0.162 ▲	**+26.1 vs +36.3 p < 0.05 ▲**	**−42.8 vs −50.4 p < 0.05 ▲**	Extension +24.8 vs +29.5, p = 0.088
Shera et al. (2023)[14]	NPRS 5.16 vs 4.41[b] ▲	NR	NR	NR	NR	51.2 vs 43.0[b] ▲	—
Riaz et al. (2025)[15]	**SPADI pain 25.8 vs 18.4 p = 0.006[c] ▲**	**87.8 vs 126.4 p < 0.001 ▲**	**75.3 vs 83.2 p < 0.001 ▲**	**97.3 vs 126.6 p < 0.001 ▲**	**78.3 vs 83.1 p = 0.003 ▲**	**59.7 vs 49.0 p = 0.007[c] ▲**	Extension 56.8 vs 59.7, p = 0.034; adduction NS
Sundar Rajan et al. (2025)[16]	—	**112.8 vs 136.8 p < 0.001 ▲**	**61.8 vs 77.8 p < 0.001 ▲**	—	**65.2 vs 78.0 p < 0.001 ▲**	58.2 vs 78.6[d] ?	—
Kumar et al. (2026)[18]	**NPRS 3.9 vs 2.9 MD −1.0 (−1.6 to −0.4) ▲**	**112.3 vs 123.5 MD 11.2 (6.1 to 16.3) ▲**	**47.6 vs 55.4 MD 7.8 (4.4 to 11.2) ▲**	145.2 vs 149.1 p = 0.123 ▲	51.3 vs 53.0 p = 0.321 ▲	**42.7 vs 35.6 MD −7.1 (−11.2 to −3.0) ▲**	Transient soreness: 2 vs 1 participants
Imran et al. (2026)[19]	NPRS means NR p = 0.184 ◆	157.8 vs 163.6 p = 0.816[e] ▲	76.6 vs 76.8 p = 0.113 ◆	162.5 vs 163.8 p = 0.206 ▲	63.8 vs 66.0 p = 0.112 ▲	—	Horizontal adduction 118.2 vs 125.0, p = 0.003; SF-36 General Health p = 0.015 (7 domains NS)
Wajid et al. (2026)[21]	**VAS 3.5 vs 2.3 p < 0.001 ▲**	**118.3 vs 132.4 p < 0.001 ▲**	**50.6 vs 62.5 p < 0.001 ▲**	**136.5 vs 149.2 p < 0.001 ▲**	**52.1 vs 63.9 p < 0.001 ▲**	**39.7 vs 28.4 p < 0.001 ▲**	Scapular stabilization added in both groups
Summary	6/6 favour MWM 4 sig.	7/7 favour MWM 6 sig.	6/7 favour MWM, 1 no diff. 6 sig.	5/5 favour MWM 2 sig.	6/6 favour MWM 4 sig.	6/6 interpretable favour MWM 5 sig.	—
Spencer vs passive joint mobilization							
Prasanth et al. (2023)[20]	VAS 4.67 vs 3.80 reported p < 0.05[f] ▲	**65.3 vs 81.0 p < 0.05 ▲**	—	**89.3 vs 105.0 p < 0.05 ▲**	**34.0 vs 44.3 p < 0.05 ▲**	**38.7 vs 31.7 p < 0.05 ▲**	Five sessions; no dropouts or adverse events
Kalphidaa et al. (2026)[17]	Within SPADI only	—	—	—	—	**45.6 vs 51.2 p = 0.001 ▼**	SDs NR

Values are Spencer vs comparator. Bold, significant between-group difference (p < 0.05). ▲, favours the mobilization technique; ▼, favours the Spencer technique; ◆, no meaningful difference (< 1° or < 0.5 points); ?, not interpretable; —, not measured. ER, external rotation; IR, internal rotation; MD, mean difference (MWM − Spencer) with 95% CI; MWM, Mulligan mobilization with movement; NPRS, Numeric Pain Rating Scale; NR, not reported; NS, not significant; SF-36, 36-Item Short Form Health Survey; sig., significant; SPADI, Shoulder Pain and Disability Index; VAS, visual analogue scale. [a] Mean change, day 1 to week 6. [b] p < 0.001 across three groups (ANOVA); pairwise test not reported. [c] p-values from the abstract; SPADI domain labels unclear. [d] SPADI rose from about 22 in both groups, contrary to the scale. [e] Reported p inconsistent with reported means and SDs. [f] Recalculated p ≈ 0.08 (two-sample t-test).

Functional Disability

Seven trials reported SPADI between groups. In the six with interpretable data (274 participants), disability was lower after MWM than after the Spencer technique[12–15,18,21], and the pairwise difference was significant in five[12,13,15,18,21]. The post-treatment difference was 7.1 points in Kumar et al.[18] (95% CI −11.2 to −3.0), 8.2 points in Shera et al.[14], 10.8 points in Riaz et al.[15], 11.3 points in Wajid et al.[21] and 12.0 points in Khyathi et al.[12]; in Haveela et al.[13], SPADI improved by 50.4 points with MWM against 42.8 points with the Spencer technique.

These differences lie close to the 8–13-point minimal clinically important difference of the SPADI[25,26]. In Khyathi et al.[12], however, the MWM group started with about 3 points less disability, which accounts for part of the post-treatment gap. Sundar Rajan et al.[16] reported SPADI scores of 78.6 with MWM and 58.2 with the Spencer technique after starting from about 22 in both groups. Because higher SPADI scores indicate greater disability, these results could not be interpreted, and the authors' conclusion that MWM was superior on this outcome could not be verified.

Quality of Life and Adverse Events

Only Imran et al.[19] measured quality of life. All eight SF-36 domains improved within both groups, but only General Health differed between groups (p = 0.015, favouring MWM); the other seven domains did not. Adverse events were reported in only one trial[18]: transient post-treatment soreness in two participants after the Spencer technique and one after MWM, which resolved within 24 hours. None of the other studies reported whether adverse events were monitored.

Sensitivity Analysis and Heterogeneity

When the synthesis was restricted to the five trials comparing the Spencer technique with MWM at some concerns[12,13,18,19,21], MWM still produced significantly greater abduction and external rotation in four of the five trials and lower disability in all four that measured SPADI. For pain, MWM was significantly better in three trials[13,18,21] and not in two[12,19], and the largest trial found no meaningful difference on any primary outcome[19]. The direction of effect did not depend clearly on treatment duration: the shortest trial (five sessions)[12] favoured MWM for ROM and disability, whereas the trial with the most sessions per week[19] found no difference. Differences between trials in disease stage, diabetes status and co-interventions were too poorly reported to explain the variation in effect size.

The quasi-experimental study, with 20 participants, compared the Spencer technique with posterior, anterior and inferior glides of the humeral head, each combined with pendular exercises for four weeks[17]. SPADI fell from 82.0 to 45.6 after the Spencer technique and from 84.9 to 51.2 after joint mobilization, and the post-treatment difference of 5.6 points favored the Spencer technique ($p = 0.001$). SDs were not reported, the results text mislabeled the groups, and the study was at serious risk of bias, so this result is very uncertain. Pain was captured only within the SPADI, and ROM was not measured. Taken together, the two studies point in opposite directions for this comparison.

Certainty of Evidence

The GRADE assessment is summarized in Table 3. Compared with the Spencer technique, MWM may produce greater gains in shoulder abduction and external rotation (**low** certainty) and may reduce functional disability slightly more (**low** certainty), by an amount close to the SPADI minimal clinically important difference. Evidence was rated down for risk of bias, and for inconsistency in the ROM estimates or imprecision in the disability estimates. The evidence for pain, flexion and internal rotation was of **very low** certainty, because estimates were inconsistent and imprecise and most differences were below clinically important thresholds. Evidence for quality of life came from a single trial, and the two small studies comparing the Spencer technique with passive accessory mobilization gave conflicting results; both were of **very low** certainty. All studies were small and published in regional journals, and every study reported results favoring one technique, so small-study effects and publication bias cannot be ruled out.

Spencer Technique Versus Passive Accessory Joint Mobilization

Two studies with 50 participants compared the Spencer technique with passive accessory joint mobilization[17,20]. In the RCT, 30 participants received either the Spencer technique or Gong's mobilization (anteroposterior glides with grade III–IV oscillations), each with pulsed ultrasound and pendulum exercises, once a day for five days[20]. After one week, the mobilization group had less pain (VAS 3.8 vs 4.7), greater abduction (81.0° vs 65.3°), flexion (105.0° vs 89.3°) and internal rotation (44.3° vs 34.0°), and lower SPADI scores (31.7 vs 38.7), all reported as statistically significant. Abduction and flexion were 8° and 10° higher in the mobilization group at baseline, so part of the post-treatment gap reflects starting values, and the pain difference was not significant when recalculated from the reported means and SDs ($p \approx 0.08$).

DISCUSSION

Summary of Main Findings

This review brought together ten comparative studies of the Spencer technique in adhesive capsulitis[12–21]. Against Mulligan MWM, the Spencer technique produced smaller gains in shoulder abduction and external rotation and slightly smaller reductions in disability, with low certainty for each of these outcomes. Differences in pain, flexion and internal rotation were inconsistent and of very low certainty. Against passive accessory mobilization, one small RCT favored mobilization[20] and one quasi-experimental study favored the Spencer technique[17], so this comparison remains very uncertain. Both techniques were followed by marked within-group improvement in every study. Because none of the trials included an untreated group and all groups received heat, ultrasound or exercise, these within-group gains cannot be separated from co-interventions or from the natural course of the condition[2].

Spencer Technique Versus Mulligan Mobilization with Movement

The advantage of MWM for abduction and external rotation is in line with the wider evidence. In a meta-analysis of shoulder conditions, adding MWM to other conservative care improved abduction, flexion and disability in frozen shoulder[11]. Abduction and external rotation are the movements lost most in the capsular pattern[2], and they were also the

Table 3. GRADE summary of the certainty of evidence

Outcome	Studies (n)	Risk of bias	Inconsistency	Indirectness	Imprecision	Other	Certainty	Summary of findings
				Spencer vs MWM				
Pain	7 RCTs (346)	Serious (−1)[b]	Serious (−1)[c]	Not serious	Serious (−1)[d]	SSE possible	⊕◯◯◯ Very low	MWM may reduce pain slightly more than the Spencer technique; evidence very uncertain
Abduction and ER	7 RCTs (362)	Serious (−1)	Serious (−1)[e]	Not serious	Not serious	SSE possible	⊕⊕◯◯ Low	MWM may produce greater gains in abduction and ER
Flexion and IR	6 RCTs (322)	Serious (−1)	Serious (−1)	Not serious	Serious (−1)	—	⊕◯◯◯ Very low	Very uncertain whether there is any difference
Disability (SPADI)	6 RCTs (274)[a]	Serious (−1)	Not serious	Not serious	Serious (−1)[f]	SSE possible	⊕⊕◯◯ Low	MWM may reduce disability slightly more than the Spencer technique
Quality of life (SF-36)	1 RCT (72)	Serious (−1)	N/A	Not serious	Very serious (−2)	—	⊕◯◯◯ Very low	The evidence is very uncertain
				Spencer vs passive accessory mobilization				
Disability (SPADI)	1 RCT + 1 QE (50)	Very serious (−2)[g]	Serious (−1)	Not serious	Very serious (−2)	—	⊕◯◯◯ Very low	Very uncertain; the RCT favoured mobilization and the QE study favoured the Spencer technique

Certainty started at high for both designs (ROBINS-I V2 for the QE study) and was rated down as shown. [a] Sundar Rajan et al. excluded (SPADI data not interpretable). [b] 2 of 7 trials at high risk; self-reported, unblinded outcome. [c] 4 trials significant, 2 no difference. [d] Most differences below the 2-point NPRS MCID. [e] Differences from < 1° to 38.6°; the largest trial found no difference. [f] Differences of 7–12 points straddle the 8–13-point MCID. [g] QE study at serious risk of bias. Abbreviations as in Table 2; MCID, minimal clinically important difference; n, number of participants; N/A, not applicable; QE, quasi-experimental; RCT, randomized controlled trial; SSE, small-study effects.

movements that the MWM glides in these trials were most often designed to restore. Flexion and internal rotation were targeted less consistently, which may partly explain why the results for these movements were less clear.

The two techniques probably work through overlapping but different mechanisms. Manual therapy reduces pain through a mix of mechanical, neurophysiological and contextual effects, including changes in central pain processing[35]. MWM adds active, pain-free movement under a sustained glide, which loads the capsule at the end of the available range while the patient learns that the movement is safe[11]. The Spencer technique relies instead on passive articulation and post-isometric relaxation, which may act mainly on protective muscle guarding. Guarding can contribute to lost motion in the painful phase, but in the stiff phase the thickened capsule and coracohumeral ligament form the main barrier[1,2]. A technique that combines end-range loading with active movement may therefore suit the stiff phase better. This could explain the advantage of MWM in one of the two trials limited to stage II disease[18], although the other found no difference[19].

Dose and fidelity also need to be considered. Two trials applied only two or three of the seven Spencer stages[12,16], so the Spencer groups may have been under-treated relative to MWM. The largest trial, which used the full seven-stage sequence five times a week, found no meaningful difference on any primary outcome[19]. The largest differences, 24° to 39° of abduction, came from two trials at high risk of bias[15,16]. Differences of this size between two active manual techniques are larger than those usually reported between mobilization approaches[7,8], and small trials are prone to inflated effects[36], so these estimates are probably exaggerated.

For pain, most between-group differences were below the 2-point minimal clinically important difference for the NPRS[32], which suggests that both techniques give similar short-term pain relief. For disability, the differences of 7–12 SPADI points sit at the lower end of the range usually cited as clinically important[25,26], so the advantage of MWM may matter for some patients but is small on average. Reviews of conservative care for frozen shoulder have found the supporting evidence to be largely short term and of limited quality[6,8]. Because no included study followed patients after treatment ended, it is not known whether the differences seen here last.

Spencer Technique Versus Passive Accessory Mobilization

Two small studies compared the Spencer technique with conventional passive glides, and

their results conflict. The RCT, which used grade III–IV oscillations with a sustained end-range stretch, favoured mobilization on every outcome after five daily sessions[20], although the groups were not perfectly balanced at baseline. The quasi-experimental study, which used low-grade glides with pendular exercises, favoured the Spencer technique by 5.6 SPADI points[17], which is below the minimal clinically important difference[25,26], and it neither reported SDs nor controlled for confounding. The difference in glide grade may partly explain the conflict, since end-range loading of the capsule is the usual rationale for mobilization once the shoulder is stiff[7]. With only 50 participants in total and follow-up of one to four weeks, this comparison remains largely untested.

Quality and Trustworthiness of The Evidence

No included study was at low risk of bias. Pain and SPADI were self-reported by participants who knew which treatment they had received, and meta-epidemiological work in rehabilitation shows that lack of blinding can distort effect estimates, especially for patient-reported outcomes[37]. None of the trials was prospectively registered, and reporting fell well short of CONSORT recommendations[38]: allocation concealment, participant flow and adverse events were often missing, and in some trials the reported values or p-values could not be reconciled with the scale or with each other. All studies were small and single-centre, which limits how far the findings can be generalized.

Implications for Practice and Research

For clinicians, both techniques appear safe and were associated with improvement when combined with heat and exercise. Where restoring abduction and external rotation is the main goal, MWM may be the better first choice, but the Spencer technique remains a reasonable option, for example for patients who cannot tolerate active end-range movement. The choice should follow the staged, irritability-based approach recommended in clinical guidelines[3] and the patient's response to treatment.

Future trials should be prospectively registered, adequately powered and reported according to CONSORT[38]. They should describe both interventions in enough detail to be replicated, using TIDieR[24], and deliver the full Spencer sequence at a dose comparable to MWM. Participants should be stratified by stage and diabetes status[4], outcomes should be measured by blinded assessors with follow-up of at least three to six months, and adverse events and costs should be recorded. Direct comparisons with high-grade passive mobilization are also needed.

Strengths and Limitations

To our knowledge, this is the first systematic review of head-to-head comparisons between the Spencer technique and mobilization techniques in adhesive capsulitis. It was reported according to PRISMA 2020[22], used design-appropriate risk-of-bias tools for randomized and non-randomized studies[27,28] and graded the certainty of evidence for each outcome[33,34]. Regional journals, where most trials of this technique are published, were searched through Google Scholar.

The review also has limitations. The protocol was not registered, so post hoc changes to the methods cannot be completely ruled out. Only ten small, single-centre studies were found. Heterogeneity in dose, co-interventions and outcome reporting precluded meta-analysis, and vote counting by direction of effect does not account for study size or precision[31]. Including a quasi-experimental study widened the scope of the review but contributed only very low-certainty evidence. Study authors were not contacted for missing data, only English-language reports were included, and publication bias could not be assessed formally because fewer than ten studies contributed to each outcome.

CONCLUSION

In adults with adhesive capsulitis, Mulligan MWM may produce greater short-term gains in shoulder abduction and external rotation, and slightly greater reductions in disability, than the Spencer technique, although the certainty of this evidence is low. Any difference in pain, flexion, internal rotation or quality of life is very uncertain, and the comparison of the Spencer technique with passive accessory mobilization rests on two small studies with conflicting results. Both techniques were associated with improvement when combined with conventional therapy, so either can be used within a staged treatment plan. Larger, registered and transparently reported trials with blinded assessment and longer follow-up are needed before firm recommendations can be made.

Author Contributions

AM: Conception and design, literature search, study selection, data extraction, risk-of-bias assessment, and manuscript writing

FM: Study selection, data extraction, and risk-of-bias assessment

IK: Resolution of reviewer disagreements and critical review

SM: Critical review and final approval

SSAJ: Supervision, critical review, and final approval

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