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INPLASY

Hydrodilatation for Adhesive Capsulitis: A Systematic Review and Meta-Analysis Comparing the Anterior and Posterior Approaches

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ADMINISTRATIVE INFORMATION

Support - This study did not receive any external funding or financial support.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 December 2025 and was last updated on 14 December 2025.

INTRODUCTION

Review question / Objective In patients with adhesive capsulitis, does hydrodilatation via the anterior approach provide superior outcomes compared with hydrodilatation via the posterior approach?

Rationale Adhesive capsulitis is a common cause of chronic shoulder pain and functional limitation, characterized by capsular fibrosis and progressive loss of range of motion. Hydrodilatation is widely used to distend the contracted capsule and restore shoulder mobility. However, two primary injection approaches—the anterior (rotator interval) approach and the posterior glenohumeral approach—are both commonly performed in clinical practice, and the optimal technique remains unclear. Although several randomized controlled trials have directly compared these two approaches, their findings are inconsistent regarding pain relief, range of motion recovery, and functional outcomes. A comprehensive systematic review and meta-analysis is therefore necessary to synthesize the best available evidence and clarify whether the anterior or posterior approach offers superior therapeutic benefit for patients with adhesive capsulitis.

Condition being studied Adhesive capsulitis (frozen shoulder), a condition characterized by progressive shoulder stiffness and pain due to capsular fibrosis and contracture. Hydrodilatation is increasingly used to restore joint distensibility and improve function. However, there is no consensus on whether the anterior or posterior approach yields superior therapeutic outcomes.

METHODS

Participant or population Adults (≥18 years) diagnosed with adhesive capsulitis.

Intervention Hydrodilatation via the anterior approach, specifically targeting the rotator interval, performed under ultrasound or fluoroscopic guidance.

Comparator Hydrodilatation via the posterior glenohumeral joint approach, performed under ultrasound or fluoroscopic guidance.

Study designs to be included Randomized controlled trials (RCTs).

Eligibility criteria This review will include studies involving adult patients diagnosed with adhesive capsulitis that directly compare hydrodilatation performed through the anterior (rotator interval) approach with the posterior glenohumeral approach. Only randomized controlled trials reporting at least one clinical outcome related to pain, shoulder range of motion, or functional improvement will be eligible.

Studies will be excluded if they do not involve hydrodilatation, if the injected volume is less than 10 mL, if there is no direct comparison between anterior and posterior approaches, or if non-comparative or observational designs are used. Cadaveric, animal, biomechanical studies, and abstracts without extractable data will also be excluded. When multiple publications arise from the same trial, the most complete dataset will be used.

Information sources PubMed, Embase and Cochrane Central Register of Controlled Trials (CENTRAL) will be systematically searched from inception to December 14, 2025. In addition, the reference lists of all eligible studies and relevant reviews will be screened manually to identify additional studies. No restrictions will be applied regarding publication year or language.

Main outcome(s) Pain intensity (e.g., Visual Analog Scale (VAS), Numeric Rating Scale (NRS)) Shoulder range of motion (ROM).

Additional outcome(s) Functional scores (e.g., Shoulder Pain and Disability Index (SPADI), American Shoulder and Elbow Surgeons score(ASES)).

Quality assessment / Risk of bias analysis The methodological quality of included studies will be independently assessed by two reviewers using the Cochrane Risk of Bias 2 (RoB 2) tool for randomized controlled trials. The assessment will cover key domains including the randomization process, deviations from intended interventions, missing outcome data, measurement of outcomes, and selection of reported results. Any disagreements between reviewers will be resolved through discussion or consultation with a third reviewer.

Strategy of data synthesis Data from eligible studies will be synthesized quantitatively using meta-analytic techniques when outcomes are reported by at least two comparable trials. Because included studies may report results as either endpoint scores or change-from-baseline scores, all continuous outcomes will be pooled using the standardized mean difference (SMD) with corresponding 95% confidence intervals, in accordance with Cochrane recommendations. A random-effects model will be applied for all analyses to account for methodological and clinical variability among studies, including differences in injectate volume, imaging guidance, follow-up duration, and disease stage. Statistical heterogeneity will be assessed using the I^2 statistic, with higher values indicating greater inconsistency between studies; the magnitude of heterogeneity will also be interpreted in the context of study characteristics and clinical plausibility.

Subgroup analysis If a sufficient number of studies are available, subgroup analyses will be performed to explore potential sources of clinical and methodological heterogeneity. These analyses will be conducted according to the imaging guidance modality used for hydrodilatation (ultrasound-guided versus fluoroscopy-guided procedures), the injected volume administered during capsular distension, and the composition of the injectate (e.g., inclusion of corticosteroids, local anesthetics, or saline alone).

Sensitivity analysis Sensitivity analyses will be conducted to evaluate the robustness of the pooled results by examining the impact of study quality and methodological assumptions.

Language restriction No language restriction.

Country(ies) involved Taiwan.

Keywords adhesive capsulitis, frozen shoulder, hydrodilatation, hydrodilation, capsular distension.

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