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# One-stage surgical treatment for concomitant rotator cuff tears with shoulder stiffness has comparable results with isolated rotator cuff tears: a systematic review

Soheil Sabzevari, MD<sup>a,b</sup>, Amir Reza Kachooei, MD<sup>b</sup>, Juan Giugale, MD<sup>a</sup>, Albert Lin, MD<sup>a,\*</sup>

<sup>a</sup>Department of Orthopedic Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA, USA

<sup>b</sup>Department of Orthopedic Surgery, Mashhad University of Medical Sciences, Iran

**Background:** Addressing preoperative shoulder stiffness before rotator cuff repair (RCR) is advocated, but the effectiveness of this approach is debatable. We hypothesized that 1-stage treatment of concomitant rotator cuff tear (RCT) with shoulder stiffness has comparable results with isolated RCT.

**Methods:** Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, the databases including MEDLINE, Embase, Cochrane Library, and Scopus were searched using the keywords of “shoulder stiffness” OR “adhesive capsulitis” OR “frozen shoulder” AND “rotator cuff.” Studies that met all the criteria compared the 2 arms of isolated RCT vs. RCT with concomitant shoulder stiffness, received no physical therapy before surgery, and reported data of preoperative and postoperative range of motion (ROM) and functional outcomes after surgery.

**Results:** Four level III studies met the inclusion criteria. The non-stiff group (isolated RCT) included 460 patients who underwent RCR; the stiff group (RCT with concomitant shoulder stiffness) included 111 patients who underwent RCR and manipulation under anesthesia with or without capsular release. There were significant differences in preoperative ROM between stiff and non-stiff groups. At final follow-up, there were no statistical differences in all ROM between the 2 groups. There was no significant difference in comparing preoperative and postoperative outcome scores including visual analog scale for pain, Constant, modified American Shoulder and Elbow Surgeons, and University of California–Los Angeles scores.

**Conclusions:** Concomitant surgical treatment of nonmassive RCT and moderate shoulder stiffness in 1 stage may have comparable results to the surgical treatment of RCT in patients without preoperative stiffness. Therefore, a physical therapy regimen before surgical intervention may not be necessary.

**Level of evidence:** Level III; Systematic Review

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**Keywords:** Shoulder stiffness; rotator cuff tear; adhesive capsulitis; frozen shoulder; one-stage treatment; systematic review

No Institutional Review Board or Ethical Committee approval is needed for this study.

\*Reprint requests: Albert Lin, MD, Division of Shoulder Surgery and Sports Medicine, Department of Orthopaedic Surgery, UPMC Center for

Sports, University of Pittsburgh, 3200 South Water Street, Pittsburgh, PA 15203, USA.

E-mail address: [lina2@upmc.edu](mailto:lina2@upmc.edu) (A. Lin).

Rotator cuff tear (RCT) with concomitant shoulder stiffness is a common and challenging clinical scenario.<sup>18</sup> A rotator cuff repair (RCR), by nature of a protected postoperative rehabilitation protocol, may be considered a shoulder tightening procedure, and some authors advise regaining full range of motion (ROM) before RCR.<sup>1,14,18,19</sup> Nonoperative treatments to regain ROM may delay surgery for months with consequent tear propagation, tendon retraction, muscle atrophy, and fatty degeneration.<sup>8,10,21</sup> A repairable tear could progress to an irreparable tear during this delay to surgical intervention.<sup>7,9</sup> The need of preceding physical therapy and the required ROM before surgery is controversial. Moreover, some patients may not even tolerate physical therapy because of the increasing pain.

Addressing preoperative shoulder stiffness before RCR is also advocated, but the effectiveness of this approach is debatable. Two-stage procedures to address ROM before surgical repair may lead to further delay of treatment for the rotator cuff and subject the patient to multiple operations. Some authors have reported satisfactory outcomes after 1-stage treatment of RCR and simultaneous manipulation under anesthesia (MUA) with or without capsular release, including in patients who remained persistently stiff after preoperative physical therapy. Therefore, a 1-stage approach may avoid the need for preoperative physical therapy and 2-stage approaches.<sup>4,11,15,16</sup> The purpose of this study was to compare ROM and functional outcomes of combined surgical treatment of RCT with shoulder stiffness vs. the isolated surgical treatment of RCT without shoulder stiffness. We hypothesized that 1-stage treatment of concomitant RCTs with shoulder stiffness (without prior physical therapy) has comparable results with isolated RCTs.

## Methods

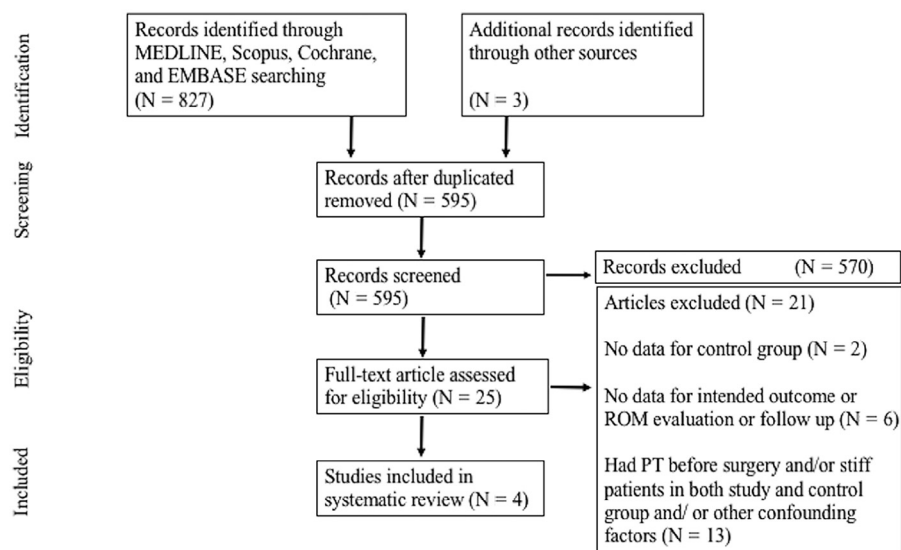
We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline to extract the data for this systematic review.

### Search strategy

We searched the databases including MEDLINE, Embase, Cochrane Library, and Scopus using the keywords of “shoulder stiffness” OR “adhesive capsulitis” OR “frozen shoulder” AND “rotator cuff.” All papers including non-English papers were included in the search. The last search was performed on September 3, 2016. Each article was reviewed for the references, resulting in 3 more papers that could potentially be included in this systematic review.

### Selection criteria

We included studies with level of evidence of I to IV that met all 3 following criteria: (1) compared the 2 arms of isolated RCT vs. RCT with concomitant shoulder stiffness, (2) received no physical therapy before surgery, and (3) reported data of preoperative and postoperative ROM and functional outcomes at 3, 6, and at least 12 months after arthroscopic surgery. Exclusion criteria were studies with 1 arm other than the specified arms, follow-up of <1 year, and lacking data of functional outcome and ROM. Two reviewers (S.S. and A.K.) separately searched for abstracts and extracted the data. Full text of the relevant studies was reviewed, and consensus was made on the eligibility to include the studies. In case of disagreement between the authors, the senior author (A.L.) was consulted. Four studies met the inclusion criteria. Selection protocol based on the PRISMA guideline is shown in Figure 1.



**Figure 1** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart. ROM, range of motion; PT, physical therapy.

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