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REVIEW ARTICLE (META-ANALYSIS)

# Subacromial Impingement Syndrome: Effectiveness of Pharmaceutical Interventions—Nonsteroidal Anti-Inflammatory Drugs, Corticosteroid, or Other Injections: A Systematic Review

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**Abstract**

**Objective:** To present an evidence-based overview of the effectiveness of pharmaceutical interventions, including nonsteroidal anti-inflammatory drugs, corticosteroid injections, and other injections, used to treat the subacromial impingement syndrome (SIS). An overview can help physicians select the most appropriate pharmaceutical intervention, and it can identify gaps in scientific knowledge.

**Data Sources:** The Cochrane Library, PubMed, Embase, PEDro, and CINAHL databases.

**Study Selection:** Two reviewers independently selected relevant reviews and randomized clinical trials.

**Data Extraction:** Two reviewers independently extracted the data and assessed the methodologic quality.

**Data Synthesis:** A best evidence synthesis was used to summarize the results. Three reviews and 5 randomized clinical trials were included. Although we found limited evidence for effectiveness in favor of 2 sessions with corticosteroid injections versus 1 session, for the effectiveness of corticosteroid injections versus placebo, nonsteroidal anti-inflammatory drugs, or acupuncture, only conflicting and no evidence for effectiveness was found. Moderate evidence was found in favor of immediate release oral ibuprofen compared with sustained-released ibuprofen in the short-term. Also, moderate evidence for effectiveness was found in favor of glyceryltrinitrate patches versus placebo patches in the short-term and mid term. Furthermore, injections with disodium ethylene diamine tetraacetic acid plus ultrasound with ethylene diamine tetraacetic acid gel were more effective (moderate evidence) than was placebo treatment in the short- and long-term.

**Conclusions:** This article presents an overview of the effectiveness of pharmaceutical interventions for SIS. Some treatments seem to be promising (moderate evidence) to treat SIS, but more research is needed before firm conclusions can be drawn.

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Musculoskeletal disorders of the shoulder, including tendinitis and bursitis, are difficult to differentiate in clinical practice. In the Complaints of the Arm, Neck, and/or Shoulder (CANS) model, the term subacromial impingement syndrome (SIS) is used for the rotator cuff syndrome, tendonosis of the Musculus infraspinatus, Musculus supraspinatus, and Musculus subscapularis, and bursitis in the shoulder area.[1] More than 50% of the patients suffering from chronic CANS reported complaints of the shoulder.[2] The relation between shoulder complaints and work-related factors, such as repetitive work, working with the hand above the shoulder, and high psychosocial job demands, has been found positive by several authors.[3]

In general practice, SIS is the most frequently reported diagnosis of the shoulder, with a cumulative incidence of 5 per 1000 patients per year.[4] Patients with SIS are characterized by pain localized in the shoulder that is exacerbated when performing overhead activities.[5] The first step in treatment for SIS by a general practitioner often includes an analgesic.[6] Also, corticosteroid injections are an often-used intervention in primary care.[7] New treatment modalities such as tenoxicam injections[8]

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have been studied for their effectiveness. A systematic review on this subject is necessary to give an evidence-based overview of (new) studies[8-12] and the effectiveness of pharmaceutical interventions, that is, nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroid injections, and other injections, to treat SIS.

## Methods

### Search strategy

The Cochrane Library, PubMed, Embase, PEDro, and CINAHL were searched up to March 2009. Keywords related to SIS and interventions were included. The complete search strategy is available on request.

### Inclusion criteria

Systematic reviews and randomized clinical trials (RCTs) were included if they fulfilled all of the following criteria: (a) acute or chronic SIS (grades I−IV), not caused by an acute trauma or any systemic disease as described in the definition of CANS, was studied; (b) an intervention for treating SIS was evaluated; (c) results on pain, function, or recovery were reported; and (d) a follow-up period of ≥2 weeks was reported. There were no language restrictions.

After the full-text articles were included, we divided the included studies into different treatment groups for which separate reviews could be conducted. One of these groups is pharmaceutical intervention. For this review, only those studies were included in which pharmaceutical therapy (oral, injected, or patched) was compared with placebo, no treatment, or another nonsurgical treatment.

### Study selection

Two reviewers (B.M.H., L.G.) independently applied the inclusion criteria to select potential relevant studies from the title, abstracts, and full-text articles, respectively. A consensus method was used to solve any disagreements concerning inclusion of studies, and a third reviewer (B.W.K.) was consulted if disagreement persisted.

### Categorization of the relevant literature

Relevant articles are categorized under 3 headers: *Systematic reviews* describes all (Cochrane) reviews; *Recent RCTs* contains all RCTs published after the search date of the systematic review on the same intervention; *Additional RCTs* describes all RCTs concerning an intervention that has not yet been described in a systematic review.

### Data extraction

Three authors (L.G., R.S., B.M.H.) independently extracted data from the included articles. Information was collected on the study population, interventions, and outcome measures. A consensus procedure was used to solve any disagreement between the authors. Results were reported in short-term (≤3mo), midterm (4−6mo), and long-term (>6mo).

*List of abbreviations:*

| | |
|---|---|
| CANS | Complaints of the Arm, Neck, and/or Shoulder |
| CI | confidence interval |
| EDTA | ethylene diamine tetraacetic acid |
| GTN | glyceryltrinitrate |
| NSAIDs | nonsteroidal anti-inflammatory drugs |
| RCT | randomized clinical trial |
| ROM | range of motion |
| SIS | subacromial impingement syndrome |

### Methodologic quality assessment

Two reviewers (L.G., M.S.R.) independently assessed the methodologic quality of each RCT using Furlan's 12 criteria (table 1).[13] Each item was scored as "yes," "no," or "unclear." "High-quality" was defined as a "yes" score of ≥50%. A consensus procedure was used to solve disagreement between the reviewers.

In a (Cochrane) review, the use of a methodologic quality assessment is a standard procedure. We describe the methodologic quality scale/criteria that were used in the review, and used the authors' definitions of high and low quality for the included studies.

### Data synthesis

A quantitative analysis of the studies was not possible due to heterogeneity of the outcome measures. Therefore, we summarized the results using a best-evidence synthesis.[14] The article was included in the best-evidence synthesis only if a comparison was made between the groups and the level of significance was reported. The results of the study were labeled "significant" if 1 of the 3 outcome measures on pain, function, or recovery reported significant results. The levels of evidence for effectiveness are given in table 2.

## Results

### Characteristics of the included studies

The initial search resulted in 5 reviews from the Cochrane library. Via PubMed 5 reviews and 215 RCTs, via Embase 21 reviews and 193 RCTs, via CINAHL 141 reviews/RCTs, and via PEDro 0 reviews and 13 RCTs were identified. Finally, 3 reviews and 5 RCTs reported on the effectiveness of pharmaceutical interventions and were included.

The review of Green et al[15] that studied the effectiveness of physiotherapy for shoulder pain included 26 trials; 11 trials reported on SIS and were included in the present review. Another review of Green et al[16] studied the effectiveness of acupuncture for shoulder pain and included 9 trials; 2 trials reported on SIS and were included in the present review.

The review of Buchbinder et al[17] studied the effectiveness of corticosteroid injections for shoulder pain. Seven of the 26 trials included in this review met our inclusion criteria and were included in the present review. The characteristics of the included studies are listed in appendices 1, 2, and 3.

### Methodologic quality assessment

The results of the methodologic quality assessment are presented in table 3.

Four (of the 5 included) RCTs were of high quality. Most prevalent methodologic flaws were (1) care provider not blinded and (2) unclear whether allocation was concealed.

The 3 reviews used a methodologic scoring list of 11 items[16] or 5 items[17]: 18 of the 20 RCTs in these reviews scored ≥50% on the