

**Screening of the cervical spine in sub-acromial shoulder pain: a
systematic review**

Keywords:

shoulder; cervical; physiotherapy; review

Abstract:

Background: Sub-acromial shoulder pain (SASP) is a common clinical presentation with much diagnostic uncertainty. Some of this uncertainty relates to the involvement of the cervical spine as a source or contribution to SASP. Currently, there is no accepted method of screening of the cervical spine in the presence of SASP, which risks patients receiving misguided and/or ineffective interventions.

Objective : To evaluate approaches used to screen the cervical spine in patients with SASP.

Design: Systematic review of randomized controlled trials (RCTs).

Methods: Electronic searches of PEDro and MEDLINE to December 2016 were conducted. RCTs evaluating the effectiveness of interventions within the current scope of physiotherapy comprising of adult patients complaining of SASP were included. Data relating to the method of cervical spine screening was extracted and synthesized categorically.

Results: 102 studies were included. 26 (25.5%) were categorized as “No method of screening undertaken or reported”, 49 (48.0%) were categorized as “Localized cervical spine symptoms and/or radiculopathy/radicular pain”, 9 (8.8%) were categorized as “Cervical examination”, 2 (2.0%) were categorized as “Manual testing”, 2 (2.0%) were categorized as ‘History of cervical surgery’, and 14 (13.7%) were categorized as using “Combined approaches”

Conclusion: Examination of the cervical spine in patients with SASP is variable in RCTs. In many instances, no or minimal attempts to screen were made/reported. This has potential research and management implications and further research is indicated to facilitate development of this aspect of examination.

1. Introduction:

Shoulder pain is one of the most common musculoskeletal complaints with a prevalence estimated at between 7 to 26 %¹ and with sub-acromial shoulder pain (SASP) regarded as the most common sub-group of shoulder pain². SASP presents a significant healthcare and economic burden³⁻⁶ and so has been the subject of much research. Despite this, a number of key clinical questions remain unclear, spanning aspects of the condition from terminology, pathophysiology, diagnosis and treatment.

With regards to terminology, the CSAW trial⁷ has cast doubt on one of the most common diagnostic terms, subacromial impingement syndrome, but beyond this there remains much uncertainty. A range of terms continue to be used in clinical and research circles, including rotator cuff tendinopathy, rotator cuff-related shoulder pain and subacromial shoulder pain. Whilst there is some justification for these terms, there are also significant limitations. This is reflective of the growing recognition of the disconnect between structural pathology and patient report of pain and function⁸.

Both the pathoaetiology and pathophysiology of SASP are not fully understood. It is thought that the rotator cuff and subacromial bursa are the tissues local to the region

that are most commonly implicated in shoulder pain^{4,9,10}. However, SASP presents as something of a diagnostic dilemma. It is known there are significant limitations regarding the physical examination tests used to inform specific diagnoses¹⁰⁻¹². A further component of this dilemma is the role of the cervical spine as a possible source or contributory **consequence** in shoulder pain presentations. There are clinical situations (for example cervical radiculopathy) where it is clear that the cervical spine should be considered as a **potential** contributor to shoulder pain¹³⁻¹⁵. However, it is also **apparent** that a proportion of patients presenting with SASP still have a relevant cervical component without obvious radiculopathy (i.e. movements and positions of their neck influence shoulder pain and movement)¹⁶⁻¹⁸. It is widely recognized that the cervical spine should be examined and excluded prior to a more specific diagnosis implicating the shoulder¹⁹ but the optimal methods to do this remain unclear²⁰. Therefore, as a starting point to understanding examination practice, the aim of this systematic review was to examine how RCTs **attempt to screen for cervical disorders in patients presenting with** SASP.

2. Method:

Methods were pre-specified and recorded in an unpublished protocol.

2.1 Data sources and search strategy

The authors conducted searches of PEDro (tX & gX) and MEDLINE (tX) from 2000 to December 2016. These two databases were chosen as they were felt most likely to return the relevant trials.

Search terms are included in Tables 1 and 2 below;

Table 1: PEDro search strategy
Search terms
Body Part: Upper arm, shoulder or shoulder girdle
Method: Clinical Trial
Published since: 2000

Table 2: MEDLINE search strategy

Search terms

1: Shoulder pain OR shoulder joint OR shoulder impingement syndrome OR subacromial pain syndrome* OR rotator cuff* OR subacromial impingement syndrome* OR supraspinatus tend* OR shoulder burs* OR shoulder tend* OR painful arc*

2: Physiotherap* OR Physical Therap* OR Rehabilitat* OR Exercis* OR Mobili* OR Manip* OR Manual Therap* OR Electrotherap* OR Ultraso* OR Laser* OR Shockwave* OR Acupunctur* OR inject* OR tape OR taping OR conservative treatment

3: Randomized controlled* OR randomised controlled* OR controlled clinical trial OR randomized OR placebo OR randomly OR trial OR groups

4: 1 AND 2 AND 3

5: Limited to year 2000 and Adults

2.2 Study selection and inclusion criteria

For studies to be included, the following criteria had to be met:

Population – Adult (> 18 years) patients with SASP; commonly referred to as shoulder impingement syndrome, rotator cuff tendinopathy, sub-acromial pain syndrome. This focus was pre-specified to reflect that this is the most common shoulder pain presentation²¹ and a clinical area where significant diagnostic uncertainty is apparent, along with the greatest volume of published RCTs.

Intervention – Any interventions within the scope of physiotherapy including, but not restricted to; exercise, manual therapy, electrotherapy, acupuncture, steroid injection, taping, shockwave therapy.

Comparison – Not applicable

Outcomes – Not applicable

Study design – RCTs. RCTs were chosen as they comprise a reasonably homogenous body of research and represent a significant contribution to the evidence base used to treat SASP.

2.3 Data extraction

Data for the final review was extracted from the appropriate studies by all authors (XXXX). The data extracted included a PEDro score where possible, subject demographics, the method of diagnosis of shoulder pathology and the method of cervical spine screening. No clinical outcome data was collected as this was not relevant to the aim of the review.

2.4 Quality appraisal

The vast majority of studies were available from the PEDro database and hence had existing ratings. This consists of 11 criteria and are rated as either Yes (1 point) or No (0 points), with a maximum score of 10 (Note: the criteria relating to external validity is not included in the overall score). A PEDro score of ≥ 6 is regarded as high-quality²². Six studies required rating by cX & eX^{18,23–28}.

Additionally, a sensitivity analysis was applied to studies with a PEDro score ≥ 6 to examine the methods used by higher-quality studies when compared with the literature forming the review as a whole.

2.5 Data synthesis

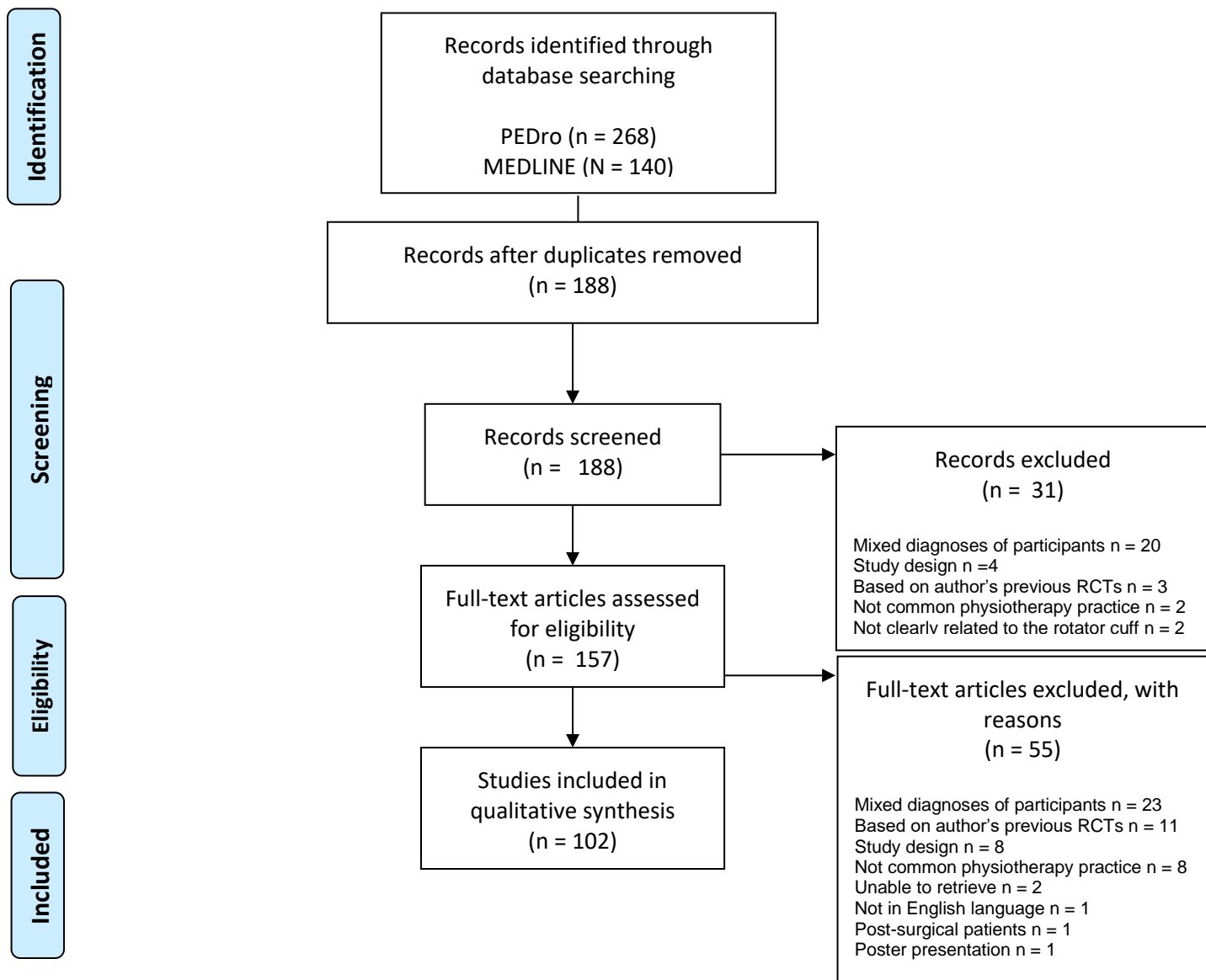
Following data extraction, two authors (tX & cX) reviewed the emergent data and generated six categories to capture and describe the clinical assessment methods used for cervical spine screening (see section 3.4). All included studies then were allocated to one of the categories by tX. This was confirmed by cX.

3. Results:

3.1 Search results

Figure 1 demonstrates the PRISMA flow diagram used;

Figure 1: Prisma flow diagram



3.2. Study characteristics

102 studies were included for review, following removal of 55 studies at full text during screening^{12,18,23–26,29–179}. The interventions within the studies reviewed included multimodal physiotherapy, exercise therapy, manual therapy, electrotherapy and others. For further participant details, please see Appendix 1.

3.3 Quality assessment

Of 102 studies included, median PEDro score was 6, with a range of 2-10.

68 studies had a PEDro score ≥ 6 and were included in the sensitivity analysis.

3.4 Data synthesis/Method of cervical spine screening

As detailed in section 2.5, 6 categories were generated;

1. No method of screening undertaken or reported. Within these studies, no method was reported in the full-text article.

2. Localized cervical spine symptoms and/or radiculopathy/radicular pain. Studies within this category typically cited cervical pain or upper limb radiculopathy/radicular pain as the screening method.

3. Cervical examination (split into 3 sub-groups);

3a. Unspecified. It was reported that a cervical spine examination had been performed but details of examination were not provided.

3b. Active Range of Movement (AROM) and/or Passive Range of Movement (PROM).

The method of cervical spine screening was either AROM or PROM.

3c. Neurological testing. This was described as assessment of muscle strength and stretch reflexes in one study²⁵.

4. Manual testing. This included a cervical compression test⁵² and manual assessment methods such as brachial plexus tension testing⁴⁷.

5. History of cervical surgery.

6. Combined approaches. This included variable combinations of categories 2-5.

Overall, 102 studies were included in the final review. Of these;

- 26 (25.5%) were categorized as “No method of screening undertaken or reported”
- 49 (48.0%) were categorized as “Localized cervical spine symptoms and/or radiculopathy/Localized cervical spine symptoms and/or radiculopathy/radicular pain”
- 9 (8.8%) were categorized as “Cervical examination” (Unspecified examination n = 4, AROM and/or PROM n = 4, Neurological testing n = 1)
- 2 (2.0%) were categorized as “Manual testing”
- 2 (2.0%) were categorized as ‘History of cervical surgery’

- 14 (13.7%) were categorized as using “Combined approaches”

Of the 68 studies that were included in the sensitivity analysis;

- 12 (17.8%) were categorized as “No method of screening undertaken or reported”
- 34 (50.0%) were categorized as “Localized cervical spine symptoms and/or radiculopathy
Localized cervical spine symptoms and/or radiculopathy/radicular pain”
- 8 (11.7%) were categorized as “Cervical examination” (Unspecified examination n = 3, AROM and/or PROM n = 4, Neurological testing n = 1)
- 2 (2.9%) were categorized as “Manual testing”
- 1 (1.5%) was categorized as ‘History of cervical surgery’
- 11 (16%) were categorized as using “Combined approaches”

4. Discussion:

This systematic review describes and evaluates the methods used to exclude the cervical spine in RCTs relating to physiotherapeutic treatment of shoulder pain. As previously discussed, much uncertainty surrounds this clinical area, and the findings of

this review further highlight this issue. The results demonstrate considerable variability in clinical assessment methods, spanning a range of approaches from no assessment to a combined approach including consideration of multiple signs and symptoms.

The wide variation in approaches suggests a lack of consensus on this matter. It is notable that 75 (73.5%) of the studies either did not report/undertake a method of screening, or relied on symptom location only. This raises potential concerns that such limited approaches could potentially contribute to unnecessarily heterogeneous samples within research, caused by the allocation of patients to groups based on an inaccurate diagnosis. For example, directing treatment at the shoulder of a patient with a cervical component to their shoulder pain presentation risks compromising treatment effect in research studies, and potentially in clinical practice.

A minority of studies (n = 14; 13.7%) used a combination of symptoms and examination techniques to assess the cervical spine. Such an approach would be in keeping with research suggesting that clusters of tests might be a more reliable basis for diagnostic decision making²⁰. This is also possibly reflected in the sensitivity analysis, with slight trends away from category one studies (“No method of screening undertaken or reported”) and towards category six studies (“Combined approaches”).

However, these trends remained relatively modest and the optimal methods for screening of the cervical spine remain unknown.

4.1 Implications for clinical practice

This study highlights the uncertainty and variability of practice with regards to screening the cervical spine in a significant proportion of the evidence base regarding management of SASP. This raises two main concerns. Firstly, it may lead to unintentionally heterogeneous samples within the research. This in turn may impact the efficacy of the proposed treatments. Secondly, if these methods are representative of clinical practice, there is a risk of offering misguided interventions and/or compromising clinical outcomes due to treatment based on an inaccurate diagnosis. However, it is not known how these findings relate to clinical practice, and this is an area for further research.

4.2 Strengths and weaknesses of the study

To our knowledge, this systematic review is the first to investigate methods to screen the cervical spine in the presence of SASP. The review was conducted according to a pre-specified protocol and according to published standards. The inclusion of more

than one author at each stage of the review process adds significant methodological rigor.

We acknowledge that several limitations exist within this study's methodology. Only two databases were searched, however, this decision was pragmatic as it was expected that there would be a large volume of RCTs on SASP. The databases selected were chosen to optimize the likelihood of retrieving studies relating to physiotherapy research. The search period was limited to 10 years. The rationale for this was to ensure that findings of this review reflected current research cervical screening practice. Language restrictions were in place as is often the case for systematic reviews of this type.

5. Conclusions:

This systematic review describes and evaluates the methods used in RCTs to screen the cervical spine in SASP. The results demonstrate considerable variability in the screening methods used. In many instances, no or minimal attempts to screen were made/reported and this has potential research and management implications. It is apparent that the role of the cervical spine in SASP, the most effective method of screening the cervical spine, and the implications for clinical practice all remain

unclear. These factors limit the inferences that can be drawn but clearly highlight the need for further research in this area.

Conflicts of interest:

None.

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