

THE USE OF INJECTION THERAPY, PHYSIOTHERAPY OR COMBINATION OF BOTH IN THE MANAGEMENT OF ADHESIVE CAPSULITIS OF THE SHOULDER: A REVIEW OF EVIDENCE

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ABSTRACT

Background: The objective of this study was to review the evidence that support the use of injection therapy alone, Physiotherapy alone or a combination of both in the management of adhesive capsulitis.

Method: Relevant data were extracted from AMED, CINAHL, MEDLINE, SCOPUS and Web of Science from 2010-2015. Search limits included English language, literature from academic journals and full text availability at the university of Southampton.

Results: Five studies were included in this review. Three systematic reviews and 2 randomised controlled trials that had a diagnosis of adhesive capsulitis. Pain and disability were assessed using reliable outcome measures such as active passive ROM and Shoulder Pain Disability Index . Critical Appraisal Skills Program tool for systematic review and randomised control trials were used to analyse the articles.

Conclusion: The findings of this review suggests that corticosteroid injections are more beneficial than physiotherapeutic interventions in the treatment of adhesive capsulitis in the short-term, and to a lesser extent in the long-term, in terms of improving shoulder disability, pain and range of movement. The evidence from this review also suggests that injection therapy alone or physiotherapy alone is more beneficial than the wait-and-see approach.

KEYWORDS: Adhesive capsulitis, frozen shoulder, injection therapy, physiotherapy, corticosteroid, hyaluronic acid.

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INTRODUCTION

Adhesive capsulitis (AC) is a common cause of shoulder pain which is estimated to affect between 2% and 5% of the population [1]. AC also known as frozen shoulder is a self-limiting condition which can take up to two to three years for symptoms to resolve and some patients may never fully regain full motion [2]. The condition is characterised by painful and limited active and passive glenohumeral range of motion in at least two directions most notably shoulder

abduction and external rotation [2]. It is associated with synovitis and capsular contracture of the shoulder joint and can be classified as either primary or secondary [3]. It is particularly difficult to differentiate AC from other shoulder pathologies in clinical practice [2]. AC is considered primary if the onset is idiopathic and secondary if it results from a known cause or surgical event [4]. Secondary AC can be subcategorized according to its hypothesized cause (diabetes mellitus and/or

other metabolic conditions), extrinsic (cardiopulmonary disease, cervical disc, CVA, humerus fractures, Parkinson's disease), and intrinsic (rotator cuff pathologies, biceps tendonitis, calcific tendonitis, acromio-clavicular joint arthritis) [3].

There is however continued disagreement about whether the underlying pathology is an inflammatory condition, fibrosing condition, or an algoneurodystrophic process [5]. Histopathological evidence suggests that there is synovial inflammation followed by capsular fibrosis, in which type I and III collagen is laid down with subsequent tissue contraction [5]. The condition has been described by three phases[5]. A painful phase, lasting between 3-8 months is followed by a phase of progressive stiffness or an 'adhesive phase', typically lasting 4-6 months [6]. The final resolution phase of gradual return of motion is said to usually last between 5-24 months [7].

AC is usually managed in primary care with a combination of analgesics, corticosteroid injections, and physiotherapy [2]. Physiotherapy management includes patient education, electrotherapy modalities, stretching exercises and joint mobilisations [1,3]. Analgesics used include paracetamol with or without codeine, or an oral non-steroidal anti-inflammatory drug (NSAID, e.g. ibuprofen) [2]. Corticosteroids such as methyl-prednisolone and triamcinolone [8] are used in combination with local anaesthesia (e.g. lidocaine) for intra-articular injections [9]. More complex conditions are managed using capsular distension and surgical management which include manipulation under anaesthesia, translation mobilisation under anaesthesia or arthroscopic capsular release [10].

The definitive treatment for AC remains unclear even though multiple interventions have been studied. Various care pathways have been developed for it's management. These pathways consider all treatment modalities but do not state explicitly the most preferred treatment option.

This review therefore aims to provide evidence supporting the use of physiotherapy alone, injection therapy alone or a combination of both in the management of AC.

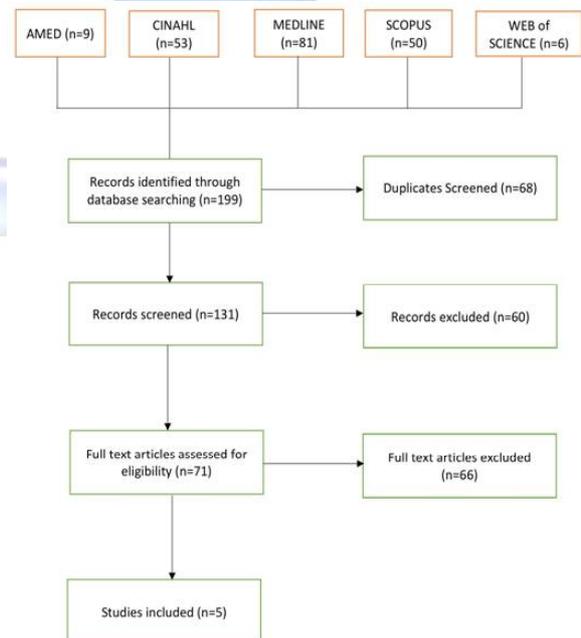
METHODS

A systematic search strategy was used to identify literature relevant to the topic. The focus of the study was clearly stated to ensure only information relevant to the research was obtained from the literature search. This was achieved by noting key terms and their synonyms as well as planning how to connect the terms to achieve optimal results. Table 1 outlines the search terms used. Data were extracted from online data bases including AMED, CINAHL, MEDLINE, SCOPUS and Web of Science.

Table 1: Search Terms

Key term	Boolean Operator	Synonyms
Frozen Shoulder	AND	Adhesive capsulitis Shoulder pain Contracted shoulder
Physiotherapy	AND	Physical therapy Exercise therapy Rehabilitation
Injection therapy	AND	Corticosteroid injection Hyaluronate injection Intra-articular injection

Fig. 1: Flow chart of search strategy



Inclusion criteria:

- Primary research directly related to the topic
- English language only
- Literature from Academic Journals
- Dates from 2000 to 2015 (Date of literature was fixed at 2000 to ensure that articles were still relevant to the current issues)

Exclusion criteria:

- Primary research not directly related to the topic area.
- Not English language
- Unpublished Research/Grey literature as these are difficult to obtain.

The articles identified were managed using endnote X7 and endnote web. The flow chart of search strategy is outlined in figure 1 and table 2 summarises the articles found.

Table 2: Summary of articles identified

Authors	Date	Published Journal	Title of Article	Methodology
Lin-Fen Hsieh, Wei-Chun Hsu, Yi-Jia Lin, Hsiao-Lan Chang, Chiao-Chien Chen, Vincent Huang.	2012	Archives of Physical Medicine and Rehabilitation	Addition of Intra-articular Hyaluronate Injection to Physical Therapy Program Produces No Extra Benefits in Patients With Adhesive Capsulitis of the Shoulder: A Randomised Controlled Trial	Randomised Controlled Trial
Mobini Maryam, Kashi Zahra, Bahar Adeleh, Yaghoobi Morteza.	2012	Pakistan Journal of Medical Sciences	Comparison of corticosteroid injections, physiotherapy, and combination therapy in treatment of frozen shoulder	Randomised Controlled Trial
Favejee M. M, Huisstede B. M, Koes B. W.	2011	British Journal of Sports Medicine	Frozen shoulder: the effectiveness of conservative and surgical interventions - systematic review	Systematic Review
Victoria Blanchard, Steven Barr, Frances L. Cerisola.	2010	Physiotherapy	The effectiveness of corticosteroid injections compared with physiotherapeutic interventions for adhesive capsulitis	Systematic Review
Rookmoneea M, Dennis L, Brealey S, Rangan A, White B, McDaid C, Harden M.	2010	Journal of Bone and Joint Surgery - Series B	The effectiveness of interventions in the management of patients with primary frozen shoulder	Systematic review

RESULTS

Characteristics of included studies:

The literature search resulted in 5 studies meeting all the inclusion criteria and being included in this review. Duplicate studies were deleted accordingly. Two RCTs and 3 systematic reviews were included in this review.

Methodological quality assessment

The quality of each article to be included in this study was assessed using the Critical Appraisal Skill Program (CASP) [11] tool for systematic reviews and RCTs. This tool provides the bases

for judging the quality of articles. Data were synthesised narratively with emphasis placed on the effects of the various interventions.

Systematic reviews

Conservative and surgical interventions: Favejee et al.[12] conducted a systematic review to provide an evidence based overview on the effectiveness of conservative and surgical interventions in managing AC. They searched the Cochrane Library, PubMed, EMBASE, CINAHL and PEDro for relevant systematic reviews and RCTs up to April 2008. Two reviewers independently selected relevant studies and a best-evidence synthesis was used to summarise the results. Five Cochrane reviews and 18 RCTs we included studying the effectiveness of oral medication, injection therapy, physiotherapy, acupuncture, arthrographic distension and suprascapular nerve block. There was strong evidence for the effectiveness of steroid injections and laser therapy in the short-term and moderate evidence for steroid injection in mid-term follow-up. There was moderate evidence for mobilisation techniques in the short-term and long-term.

Conservative management only: Rookmoneea et al.[13] conducted a review on the effectiveness of interventions used in the management of AC. Data were extracted from Cochrane database of systematic reviews, the database of abstracts of reviews of effects, PEDro, MEDLINE and EMBASE up to April 2009. Two independent reviewers applied selection criteria and assessed quality using the Assessment of Multiple Systematic Reviews (AMSTAR) tool. Eleven systematic reviews were included in the study but there was insufficient evidence to draw a firm conclusion on the effectiveness of various interventions in treating AC. They however found no reviews evaluating surgical interventions.

Corticosteroid injections and Physiotherapy: Blanchard et al.[8] compared the effectiveness of corticosteroid injections to physiotherapeutic interventions for the treatment of AC. Electronic databases including MEDLINE, EMBASE, CINAHL and AMED were searched up to week 23 2009. They also searched the Cochrane Register of Controlled Clinical Trials, the Physiotherapy Evidence Database (PEDro), the National Research Register and the National Recognition

Information Centre. Six studies were included in the final review. They concluded that corticosteroid injections have greater effects in the short-term than physiotherapeutic interventions. There was however not much difference in the long-term.

Randomised Controlled Trials

Hyaluronate injection compared to physical therapy: Hsieh et al. [14] conducted a prospective, randomised, and single-blind study to compare the efficacy of intra-articular hyaluronic acid (HA) injections plus physical therapy (PT) to that of physical therapy alone for the treatment of AC. A total of 70 patients were randomised into two groups of HA+PT (Group 1) or PT alone (Group 2). Patients in group 1 received 20mg HA injections once per week for 3 consecutive weeks and also participated in PT program for 3 months. Patients in group 2 received PT alone. Outcome measure of active passive Range of Motion (ROM), Shoulder Pain Disability Index (SPADI) and Quality of life assessment (SF-36) were measured. They concluded that intra-articular HA injections did not produce added benefit for patients with AC who were already receiving PT.

Corticosteroid injection compared to physical therapy: Maryam et al. [15] conducted a randomised controlled trial to compare the effect of corticosteroid injection, physiotherapy, and combination therapy (Corticosteroid injection and physiotherapy) in the treatment of AC. They included 87 patients who were randomised into one of 3 groups. Corticosteroid injection group, physiotherapy group or combination therapy group. Outcome measure of active and passive ROM and SPADI were recorded at baseline and after 6 weeks. They concluded that combination therapy was more effective than physiotherapy alone or corticosteroid injection alone.

Analysis: The results of all studies included in Blanchard et al. [8] were similar, with the exception of one [16] which found physiotherapy intervention of standardised interferential modality and active exercise therapy to be more beneficial than injection therapy of 20 mg triamcinolone without imaging guidance, in improving range of motion after 6 weeks of

treatment. There is however doubt as to the clinical relevance of an intervention after only 6 weeks if the intervention is not continued. Inter-rater agreement among the various studies was found to be high (Cohen's kappa=0.943) in Rookmoneea et al. [13]. The assessment of multiple systematic reviews (AMSTAR) tool was used to assess the quality of systematic reviews. Overlap of studies could be identified in all the systematic reviews but publication bias and potential conflict of interest are omitted from the reviews.

The results of all studies are clearly outlined and labelled. It was possible to combine data from three studies [16,17,18] included in Blanchard et al. [8] to calculate effect estimates for the outcome of pain, passive external rotation and shoulder disability at various stages of follow-up. It was not possible to include three studies [19,20,21] within the data analysis in Blanchard et al. [8] due to reduced methodological quality and the differences in the assessment and recording of outcomes.

A limitation that was apparent in all of the RCTs, other than the study by Carette et al. [18] was the failure to control the effect of additional interventions and to account for participants who did not complete the trial. This led to contamination of the data collected, which in turn affects the validity of the results and therefore the conclusions. Both Carette et al. [18] and der van Windt et al. [19] included an intention-to-treat analysis in an attempt to minimise the extent to which the results would have been flawed. Follow-up on patients was adequate in all studies with the exception of Arslan et al. [21] whereby comparison was only of the short-term benefit of physiotherapeutic intervention and corticosteroid injection. Confounding variables such as oral analgesics and other complementary therapies, which could potentially affect the results of the study, were not accounted for. Maryam et al. [15] allowed patients to take acetaminophen which could reduce pain and thereby affecting the outcome of the results.

Shoulder Pain and Disability Index (SPADI) was the primary outcome measure for three of the studies [8,14,15]. SPADI has been shown to have good reliability and validity and proven to be

good for clinical use [22]. All articles used passive and active ROM as secondary outcome measure. The ROM was measured before and after intervention to determine the progress of the patient. ROM is a widely used clinical assessment tool [23,24] and it is very prominent among physiotherapist. Other outcome measures used included the Shoulder Disability Questionnaire (SDQ) and the Short-Form 36 (SF-36) for measuring Quality of life. These outcome measures are highly reliable and also widely used in clinical practice [25]. The SF-36 contains relevant psychosocial assessment which are not routinely reported in clinical practice but very critical in the management of pain [25].

DISCUSSION

Although studies by both Blanchard et al. [8] and Maryam et al. [15] reviewed the evidence comparing the effectiveness of corticosteroid injections to physiotherapeutic interventions, Hsieh et al. [14] compared its effectiveness to Intra-articular hyaluronate injection which has similar effects to that of corticosteroid injections such as methyl-prednisolone and triamcinolone. This is relevant because of the difference in efficacy of both corticosteroid injections and hyaluronate injection. Due to the variation in the diagnosis of AC, all the studies presented with different diagnostic criteria and assessment methods. Accurate diagnosis of AC is very important to its management because other shoulder conditions such as rheumatoid arthritis, impingement syndrome etc. may be present and that can affect the effectiveness of the intervention. Maryam et al. [15] acknowledged the presence of subacromial bursitis and incorporated injection into the subacromial bursa in their study.

There is relevant coverage of patients at different age ranges (above 18 years) in all studies. This is particularly important to clinical practice because most patients who present with AC are between the ages of 40 to 60 years [2,5]. Occasionally patients above the age of 60 are encountered. No study however covered patients with AC secondary to cerebrovascular accident which is an extrinsic factor leading to the development of AC and particular common in patient population [3].

When analysing the effectiveness of injection therapy, it is important to clarify who is giving the injection and whether it is performed with/without guidance. Extended scope/ advanced practice physiotherapists are able to successfully perform injections just as qualified orthopaedic specialists [26]. Only Hsieh et al. [14] specified who was performing the injections and the appropriate training of the professional. No specific guidelines relating to the site of entry was acknowledged in the articles. All the articles used different approaches and this could affect the results since injection under ultrasound guidance has higher accuracy as compared to blinded injections, and therefore, has better treatment outcome [27]. Selection bias was eliminated from the systematic reviews [12,13] by the inclusion of two independent reviewers. A third reviewer was used if no consensus was reached. Blanchard et al. [8] also used a consensus approach to data inclusion but however used three reviewers which improve elimination of selection bias.

There is sufficient evidence from the findings of these studies [8,12,13,14,15] which indicates that the treatment of adhesive capsulitis with corticosteroid injection is more effective than physiotherapeutic intervention in the short-term, and to a lesser extent in the long-term. The population including age and demographics are similar to patients that are encountered in practice and therefore improves the generalisability of these articles. One of the identified differences between clinical practice and this review is the number of physiotherapy interventions provided and the length of treatment modalities. In the local and clinical settings, patients do not receive all these treatment modalities and therefore variation may result. Hsieh et al. [14] reported no significance difference in the combination of hyaluronate injection and physiotherapy but this is not supported by other studies [27,28]. Evidence from these studies indicated that the clinical outcomes of hyaluronate injections were superior to those of the control treatment and equivalent to those of intra-articular corticosteroid injections.

The disability score and SPADI score were better in combination therapy than other groups at

week 6, but pain scores and range of motion did not have any difference. The outcome measures utilised in these articles are very common in clinical practice and physiotherapists are particularly familiar with the measurement of passive and active ROM. The use of SF-36 also will help in identifying the patients overall Quality of life. Statistical significance were reported with p values <0.005 but caution should be taken in reporting clinical significance. Cost benefit analysis should be done to ascertain clinical significance, most especially in low economic populations.

LIMITATIONS

This review was limited to the number of articles published in English language. This could potentially exclude other articles that are relevant to the topic but not in English language. Also articles with full text available to the University of Southampton only were included. This was because the author could only get access to full text from this institution thereby limiting other relevant articles not available to the author.

CONCLUSION

The findings of this review suggests that corticosteroid injections are more beneficial than physiotherapeutic interventions in the treatment of adhesive capsulitis in the short-term, and to a lesser extent in the long-term, in terms of improving shoulder disability, pain and range of movement. This review also showed that both physiotherapeutic interventions and corticosteroid injections alone were more effective than the control groups (no intervention), which indicates that a 'wait-and-see policy' is not the best treatment option for patients. Many physiotherapists who use injection therapy as part of their practice are faced with the dilemma of whether to inject patients, carry out traditional physiotherapy or both. The findings of this review suggest that clinicians should advise patients with adhesive capsulitis, where appropriate, to have an injection as the first line of treatment in an attempt to settle symptoms quickly. Physiotherapists are in a position to offer alternatives, should the patient decline an injection or have a medical history such as

infection, coagulopathy or uncontrolled diabetes that contraindicates the use of corticosteroids. The cost effectiveness of injection therapy combined with physiotherapy should be analysed before undertaking a particular treatment pathway. In the clinical settings, patients should be given the option and choice. The review therefore indicates, that both physiotherapists and medical practitioners should consider offering corticosteroid injection as an initial treatment for this condition, but should not discount more traditional physiotherapeutic interventions.

ABBREVIATION

AC- Adhesive Capsulitis

ROM- Range of Motion

SPADI- Shoulder Pain Disability Index

CASP- Critical Skills Appraisal Program

RCT- Randomised Controlled Trial

Conflicts of Interests: None

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