



Adhesive shoulder capsulitis : Does the timing of manipulation influence outcome ?

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The purpose of this study was to assess the influence of timing of manipulation under anaesthesia for adhesive capsulitis of the shoulder on the long term outcome. One hundred and eighty consecutive patients with a diagnosis of adhesive capsulitis according to Codman's criteria were selected from a shoulder surgery database ; 145 were available for follow-up after a mean period of 62 months (range : 12 to 125). All patients underwent manipulation under anaesthesia (MUA) with intra-articular steroid injection.

A statistically significant improvement in range of movement, function (Oxford Shoulder Score) (OSS) and Visual Analogue pain intensity Score (VAS) was obtained following manipulation. Ninety percent of the 145 patients who successfully completed the study were satisfied with the procedure. Eighty-nine percent indicated that they would choose the same procedure again, if the same problem arose in the opposite shoulder.

Eighty-three percent of the patients had manipulation performed less than 9 months from onset of symptoms (early MUA). The remainder had manipulation performed after 9-40 months (late MUA). Patients who had early intervention had a significantly better Oxford Shoulder Score at final follow up ; mobility and pain (VAS) were also better than in the late group, but not significantly.

Keywords : shoulder capsulitis ; manipulation ; timing.

INTRODUCTION

Adhesive capsulitis is a common cause of pain and disability of the shoulder. It most commonly

occurs in the 40 to 60-year-old age group (26) and affects 2 to 5% of the general population. Duplay (9) in 1872 was the first to describe a painful, stiffening condition of the shoulder, which he termed "périarthrite scapulo-humérale" ; he suggested manipulation under anaesthesia as its treatment. Codman (5) in 1934 named the condition "frozen shoulder", stating that it was characterised by slow onset, pain near the insertion of the deltoid, inability to sleep on the affected side, painful and restricted elevation and external rotation, but normal radiological appearance. The term "adhesive capsulitis" was introduced by Neviaser (16) in 1945, based upon his findings of synovial changes in the glenohumeral joint.

Adhesive capsulitis is thought to resolve spontaneously after two years. However, Shaffer *et al* (24) showed that 50% of patients treated conservatively experienced either mild pain or stiffness, or both, after an average of 7 years. There continues to be

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controversy regarding the aetiology and treatment of adhesive capsulitis. Various different treatments have been recommended and a large number of studies have demonstrated successful results. Types of treatment include supervised neglect (7, 15), oral steroids (2, 21), intra-articular injections (3, 22), physiotherapy programmes (11, 14, 25), MUA (8, 10, 13, 18, 20), arthroscopic capsular release (1, 4, 23) and open surgical release (17, 19). Farrell *et al* (10) showed a significant and sustained improvement, after an average follow-up of 15 years, in flexion and in external rotation, following manipulation, while the mean Simple Shoulder Test Score was finally 9.5 out of 12 (12 being excellent). The time from onset of symptoms to manipulation under anaesthesia ranged from 2 months to 3 years.

The aim of the current study was to assess the outcome following MUA and intra-articular steroid injection, and to determine whether timing of manipulation influenced the long term outcome.

METHODS

One hundred and eighty consecutive patients with a diagnosis of adhesive capsulitis according to Codman's criteria and having symptoms longer than 3 months were selected from the shoulder surgery database. Patients with diabetes mellitus, bilateral frozen shoulder, previous shoulder surgery or glenohumeral arthritis were excluded. Patients who had a previous steroid injection were also excluded. All patients had a trial of conservative treatment including physiotherapy. Selected patients were reviewed preoperatively : time from onset of symptoms, range of motion, patient-based Oxford Shoulder Score (OSS) (6), and Visual Analogue pain intensity Score (VAS) were recorded. The OSS is a 12-item questionnaire about the experience of pain with activities of daily life ; a score of 12 reflects the ideal situation, while a score of 60 describes the worst possible situation.

All patients underwent manipulation under anaesthesia and received an intra-articular steroid injection by the senior author. The method of manipulation was standard. The scapula was stabilised by the operator's left hand to isolate glenohumeral motion. The inner aspect of the patient's proximal humerus was held by the operator's right hand in a fashion to minimise the lever arm of the manipulating force and to reduce the risk of fracture. The passive range of motion in all directions was

first recorded. Next using gentle pressure the arm was brought into forward flexion until the adhesions were felt to give way. The arm was now brought into external rotation to tear the anterior capsule. This was followed by cross-adduction and finally internal rotation. Physiotherapy was immediately started. The patients were discharged with a home exercise program.

Follow-up was arranged for 2 weeks post discharge ; subsequent controls depended on the complaints. At final review, after an average follow-up of 62 months (range : 12 to 125), range of motion, Oxford Shoulder Score, and Visual Analogue pain intensity Score (VAS) were determined ; the latter was used as it is a reliable measure of pain (26). Patients were also asked about overall satisfaction, and whether they would receive the procedure again, should the same problem arise in the opposite shoulder.

A Mann-Whitney U test was used to compare non-parametric data ; an unpaired samples student's t test for parametric data.

RESULTS

A total of 145 patients successfully completed the study. The female : male ratio was 2:1 and the average age was 60 years (range : 36 to 91). The mean duration of symptoms was 6.5 months, with 17% having their symptoms for more than nine months. The average follow-up period was 62 months (range : 12 to 125).

There was a significant improvement ($p < 0.0001$) in all ranges of movement (table I). There was also a significant improvement in mean Oxford Shoulder Score ($p < 0.0001$) and Visual Analogue pain intensity Score ($p < 0.0001$) after manipulation (table II). A total of 90% of patients stated that their symptoms were better, 7% said that their symptoms were unchanged, and 3% claimed that their symptoms were worse post manipulation. Eighty-nine percent indicated that they would choose the same procedure again, if the same problem arose in the opposite shoulder ; 4% said they would not and 7% were unsure.

Seventeen percent of the patients had their symptoms for at least 9 months prior to manipulation. The remainder 83% had earlier intervention which resulted in a better range of motion in all

Table I. – Pre and post manipulation range of motion

Range of Motion	Preoperative Mean +/- SD	Postoperative Mean +/- SD	<i>p</i> value
External Rotation	28.7° +/- 13.4	75.8° +/- 15.2	< 0.0001
Internal Rotation	36.7° +/- 19.3	72.7° +/- 19.1	< 0.0001
Abduction	54.2° +/- 26.9	154.5° +/- 34.3	< 0.0001
Flexion	69.3° +/- 39.2	158.8° +/- 29.7	< 0.0001

Un-paired samples Student's t-test, $p < 0.05$.

Table II. – Oxford Shoulder Score (12-60) and Visual Analogue pain intensity Score (0-10)

	Preoperative Median (Range)	Postoperative Median (Range)	<i>p</i> value
Oxford Shoulder Score	39.6 (27.6, 60)	12 (12, 48)	< 0.0001
Visual Analogue pain intensity Score	8 (2, 10)	1 (0, 9)	< 0.0001

Mann-Whitney U, $p < 0.05$.

Table III. – Range of motion for early and late manipulation

Range of Motion	Early MUA Mean +/- SD	Late MUA Mean +/- SD	<i>p</i> value
External Rotation	76.9° +/- 7.0	71.8° +/- 3.2	0.049
Internal Rotation	73.6° +/- 19.5	69.0° +/- 18.0	0.44
Abduction	157.6° +/- 35.7	142.9° +/- 26.2	0.097
Flexion	161.0° +/- 31.2	151.1° +/- 22.6	0.195

Un-paired samples Student's t-test, $p < 0.05$.

directions, with a significant difference only in external rotation ($p = 0.049$) (table III). There was a significant difference in the Oxford Shoulder Score between early and late manipulation: patients treated early had better results ($p = 0.0042$); there was no significant difference in the Visual Analogue pain intensity Scores (table IV).

Complications of MUA, including glenohumeral dislocation, humeral fracture, rotator cuff tear and nerve palsy, have been reported. However, none of these complications were observed in this study.

DISCUSSION

Manipulation under anaesthesia has been shown to improve the symptoms of adhesive capsulitis (8,

10, 13, 18, 20). Reichmister and Friedman (20) manipulated 38 shoulders which were followed-up for an average of 58 months. In their study 97% of patients had pain relief and almost full range of motion. Hill and Bogumill (13) reported on 17 shoulders manipulated, where 70% of the patients were able to return to work within 3 months. Farrell *et al* (10) found a significant and sustained improvement, after on average follow-up of 15 years. They demonstrated a long-term improvement of 70° in flexion and 53° in external rotation following manipulation, and a final mean Simple Shoulder Test score of 9.5 out of 12 (12 being excellent).

Patients who are treated conservatively often have residual restricted motion. Shaffer (24) showed that 60% of the patients in their long term study

Table IV. – Oxford Shoulder Score (12-60) and Visual Analogue pain intensity Score (0-10)

	Early MUA Median (Range)	Late MUA Median (Range)	<i>p</i> value
Oxford Shoulder Score	13.3 (12.0, 28.8)	16.1 (12.0-48.0)	0.0024
Visual Analogue pain intensity Score	1 (0, 9)	0 (0, 6)	0.39

Mann-Whitney U, $p < 0.05$.

had some restriction of motion when compared with the study control. Hamdan and Al-Essa (12) found they had to proceed to MUA in 98 out of 110 shoulders studied, after failure of conservative treatment.

The results of this study not only support manipulation under anaesthesia as a satisfactory treatment for adhesive capsulitis but also support early intervention. Seventeen percent of the patients had their symptoms for at least 9 months prior to manipulation. Those patients (83%) who had earlier intervention gained a better range of motion in all directions, but only the gain of external rotation was significantly better. The mean Oxford Shoulder Score was 13.3 for those patients who had early manipulation and 16.1 for those with late manipulation. Although this difference was small it was statistically significant ($p = 0.0042$). The Visual Analogue pain intensity Scale (VAS) was slightly better in the early group, but the difference was not significant.

In general, the longer the stiffness stage, the longer the recovery stage. Those patients with symptoms of pain and reduced range of motion for a longer period of time, being slower to enter the thawing phase, resulted in a poorer prognosis.

In conclusion, early, i.e. before 9 months, closed manipulation of the shoulder under anaesthesia and intra-articular injection of steroids is the recommended treatment of adhesive capsulitis.

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