

## ORIGINAL ARTICLES

**Manipulation Under Anaesthesia and Early Physiotherapy Facilitate Recovery of Patients with Frozen Shoulder Syndrome**CY Ng<sup>1</sup>, AK Amin<sup>1</sup>, S Narborough<sup>2</sup>, L McMullan<sup>2</sup>, R Cook<sup>3</sup>, IJ Brenkel<sup>3</sup><sup>1</sup>Specialist Registrar in Orthopaedics, Department of Orthopaedics, Queen Margaret Hospital, Dunfermline KY12 0SU<sup>2</sup>Senior Physiotherapist, Department of Orthopaedics, Queen Margaret Hospital, Dunfermline KY12 0SU<sup>3</sup>Consultant Orthopaedic Surgeon, Department of Orthopaedics, Queen Margaret Hospital, Dunfermline KY12 0SU**Correspondence to**Chye Yew Ng, Specialist Registrar in Orthopaedics, Department of Orthopaedics, Queen Margaret Hospital, Dunfermline KY12 0SU  
Telephone & Fax: +44 1383627089 E-mail: chyeng@gmail.com**Abstract****Aim**

The aim of this study was to examine the efficacy of manipulation under anaesthesia (MUA) followed by early physiotherapy in treating frozen shoulder syndrome.

**Methods**

In a prospective trial conducted between 26th August 2002 and 25th June 2004 in 86 patients with frozen shoulder syndrome, MUA was performed as a day procedure. Main outcomes were Disabilities of the Arm, Shoulder and Hand (DASH) score, a visual analogue score (VAS) for pain and range of movement, which were measured preoperatively and at six weeks post-procedure.

**Results**

Fifty (58.1%) patients had complete data. The average age was 54.5 years. The mean duration of symptoms until MUA was 13 months. The mean DASH score decreased from 48.07 to 15.84 ( $p < 0.0005$ ). The mean VAS reduced from 6.07 to 1.88 ( $p < 0.0005$ ). Flexion improved from 104.18 to 157.56 ( $p < 0.0005$ ); abduction from 70.48 to 150.00 ( $p < 0.0005$ ); and external rotation from 13.88 to 45.62 ( $p < 0.0005$ ).

**Conclusion**

MUA combined with early physiotherapy alleviates pain and facilitates recovery of function in patients with frozen shoulder syndrome.

**Key Words**

Frozen shoulder syndrome, adhesive capsulitis, manipulation under anaesthesia.

**Introduction**

Frozen shoulder syndrome has been defined by the American Shoulder and Elbow Surgeons Society as a condition of uncertain aetiology characterised by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder. Lundberg divided the patients into the primary and secondary groups.<sup>1</sup> The former group have no significant findings in the history, clinical examination or radiographic evaluation to account for their shoulder complaints. In contrast, the latter group describe a clear precipitant to the onset of their symptoms such as trauma or surgery to the affected upper limb.

The condition, if left untreated, may resolve in one to three years<sup>1</sup> but the protracted period of pain and disability causes significant morbidity and functional impairment. An array of treatment options have thus been described, including non-steroidal anti-inflammatory drugs, physiotherapy, manipulation under anaesthesia (MUA), intra-articular injections, and surgical or arthroscopic release. However a recent systematic review has found little evidence to support or refute the efficacy of the common interventions.<sup>2</sup>

In this prospective study, we report the early outcomes of patients with frozen shoulder syndrome who had undergone manipulation of the joint under anaesthesia followed by early rehabilitative treatment at our institution.

**Materials and Methods**

Between 26th August 2002 and 25th June 2004, 86 MUA's of the shoulder were performed by the senior authors (RC, IJB). The diagnosis of frozen shoulder syndrome was based on an appropriate history of pain and findings of restricted active and passive glenohumeral joint movement. Underlying shoulder pathology was excluded by conventional radiographs. Preoperatively every patient was given a Disabilities of the Arm, Shoulder and Hand (DASH)<sup>3</sup> questionnaire, information regarding the physiotherapy regime following manipulation and the use of ice after the exercise.

On the day of admission to the day surgery unit, the patient was re-assessed by a physiotherapist. The range of movement (ROM) of the affected shoulder and a pain visual analogue score (VAS) were documented.

All patients had shoulder manipulation under general anaesthesia with muscle paralysis. In theatre, the surgeon documented the force required to manipulate the shoulder on

a scale of 0 (no force) to 3 (maximum force).

Immediately after return from theatre, Cryocuff therapy was applied and the physiotherapist commenced passive and active assisted exercises and capsular stretches of the shoulder. Prior to discharge from the day unit, the patient was shown the exercise programme to be performed regularly until the first outpatient physiotherapy review, usually within three days of the manipulation. The intensity of further physiotherapy follow-up was dictated by individual patient's progress.

At six weeks post-manipulation, further DASH, VAS and ROM assessments were performed by the outpatient physiotherapist.

### Statistical analysis

Statistical analysis was performed using SPSS v10.0 software (SPSS Inc., Chicago, IL, USA). Paired Student's t-tests were used to compare pre-and post-procedure observations reported for the study sample. The level of significance was set at  $p < 0.05$ .

### Results

A complete, paired set of pre- and post-procedure data for all three measured parameters - VAS for pain, ROM and DASH score - were not available in 41.9% of the patients who were excluded from the analysis. Complete data were available for 50 (58.1%) patients who form the basis of the study.

The average age of the subjects was 54.5 years (range 37-71). Twelve (24%) were diabetic. In 13 (26%) the shoulder complaint followed trauma. Apart from two patients in whom the duration of symptoms was not documented, the mean duration of symptoms prior to MUA was 13 months (range 5-36).

The DASH score improved significantly following MUA. Apart from a patient whose pain worsened by 0.5 point on the VAS and three patients whose pain levels remained the same, all the other 46 patients achieved some alleviation of their pain by six weeks after the manipulation. (Table I)

**Table I: Differences in DASH and VAS Scores Before and After MUA**

	Pre-op	Post-op	p value
DASH (SD)	48.07 (16.40)	15.84 (16.69)	<0.0005
VAS for pain (SD)	6.07 (2.40)	1.88 (2.08)	<0.0005

DASH - Disabilities of the Arm, Shoulder and Hand

VAS - Visual Analogue Score

SD - Standard Deviation

There were significant improvements in all ROM's following the manipulation (Table II).

Seventeen (34%) of the 50 patients required maximal force three to mobilise the glenohumeral joint under general anaesthesia; 13 (26%) required force two; and 13 (26%) required force one. Seven (14%) of them did not require any force to mobilise the joint. These seven patients had presented with shoulder pain for an average of 13.6 months (range 5-24).

There were no intra-operative complications encountered during the MUA. In particular, there were no glenohumeral dislocations or fractures.

**Table II: Range of Movements of the Shoulder Pre and Post Manipulation**

	Pre-op (SD, range)	Post-op (SD, range)	p value
Flexion	104.18 (24.93, 55-170)	157.56 (22.82, 90-180)	$p < 0.0005$
Abduction	70.48 (26.57, 30-150)	150.00 (27.94, 70-180)	$p < 0.0005$
External rotation	13.88 (13.70, 0-50)	45.62 (14.87, 0-70)	$p < 0.0005$

SD - Standard Deviation

### Discussion

The natural history of frozen shoulder syndrome is commonly considered benign and self-resolving.<sup>1,4,5</sup> However in a longitudinal study of 68 frozen shoulders treated non-operatively, 50% of the patients still experienced some pain and/or stiffness of the shoulders at an average follow-up of seven years.<sup>6</sup> Overall our results support MUA as an effective and safe treatment of the frozen shoulder. MUA for frozen shoulder has been reported to improve mobility and to decrease shoulder pain.<sup>7,8</sup> The improvement was also found to be sustainable with high patient satisfaction rate.<sup>9,10</sup> A long-term review has demonstrated sustained improvement in shoulder motion and function at a mean of 15 years after the procedure.<sup>10</sup>

In our study population, a prompt increase in shoulder mobility following the procedure was observed. Such dramatic improvement would be unlikely in the absence of any intervention. It is however crucial to initiate physiotherapy as soon as possible to maintain the mobility achieved immediately post-manipulation. Neviasser and Neviasser stressed the importance of passive exercises to supplement manipulation in order to obtain good results.<sup>11</sup> Andersen et al in their study of arthroscopy and MUA employed continuous passive exercise administered by physiotherapists immediately after the surgery.<sup>12</sup> This was supplemented by an infusion of bupivacaine into the subacromial space and a continuous passive motion machine. Seventy-five percent of their patients achieved satisfactory results after a follow-up of 12 months. However their patients had an average hospital stay of six days. In another study, Castellarin et al described an intensive functional recovery programme for their patients following MUA and arthroscopy.<sup>13</sup> Significant improvement in shoulder mobility was reported at an average follow-up of 42 months. Physiotherapy forms an integral part of our treatment protocol. Patients' motivation and involvement in the exercise regime are vital to a good result. Our approach was flexible and individualised.

The lack of an untreated control group, a short period of follow-up and a significant number of patients who defaulted from follow-up represent limitations of our study. We made attempts to contact patients by phone when they failed to attend the six week review. Most of them reported alleviation of their shoulder symptoms such that they thought further review was unnecessary. This study is a pilot study to examine the efficacy of MUA and we have focussed on the early outcomes. Currently we are recruiting patients into a prospective, randomised trial comparing MUA and capsular distension as treatment for frozen shoulder syndrome.

A small group of patients in our series appeared to have a 'non-frozen' shoulder when examined under anaesthesia, as no additional force was required to mobilise the joint. The restriction of shoulder movements in these patients was thought to be secondary to pain. This highlights the difficulty in diagnosing frozen shoulder syndrome accurately in clinical settings.

Codman's observation in 1934 of frozen shoulder being a condition "difficult to define, difficult to treat and difficult to explain from the point of view of pathology" remains relevant today.<sup>14</sup>

In conclusion, manipulation under anaesthesia combined with early physiotherapy alleviates shoulder pain and facilitates recovery of shoulder function in patients with frozen shoulder syndrome.

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