

# Suprascapular nerve block for the treatment of frozen shoulder in primary care: a randomized trial

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## SUMMARY

**Background.** Frozen shoulder is a common problem in general practice, but its treatment is difficult since none of the currently used therapies are proven to be effective.

**Aim.** To assess the effectiveness of suprascapular nerve block to relieve pain and improve range of movement, and its suitability for use in primary care. This small study by a single practitioner aims to justify a larger multicentred trial.

**Method.** A randomized trial of 30 patients to compare a single suprascapular nerve block with a course of intra-articular injections. Patients' pain levels and ranges of movement were assessed over a 12-week period.

**Results.** Suprascapular nerve block produced a faster and more complete resolution of pain and restoration of range of movement than a series of intra-articular injections. These differences were confirmed by statistical analysis using the Mann-Whitney U-test ( $P < 0.01$  for pain levels and  $P < 0.05$  for range of abduction and external rotation.)

**Conclusions.** This study suggests that suprascapular nerve block is a safe and effective treatment for frozen shoulder in primary care, and justifies a larger multicentred trial using independent blinded assessment. Such a study should include a third group treated by suprascapular nerve block without steroid; a more comprehensive assessment of patient debility.

**Keywords:** adhesive capsulitis; frozen shoulder; suprascapular nerve block; intra-articular steroids; randomized controlled trial.

## Introduction

FROZEN shoulder, or adhesive capsulitis, is a common problem in general practice presenting as pain that may be severe, and as a progressive loss of movement resulting in a loss of function. It is often considered to be self-limiting but the available evidence does not support this.<sup>1</sup>

Despite the increased understanding of the underlying pathology,<sup>2</sup> there is still confusion regarding which is the most effective treatment. Physiotherapy can help in the early stages, but in established shoulder pain of synovial origin it has been demonstrated to be of little benefit.<sup>3</sup> Other frequently used treatments are non-steroidal anti-inflammatory analgesics, intra-articular injections, and manipulation under anaesthetic. Oral anti-inflammatory drugs provide some analgesic benefits but seem to do little to resolve the condition. Intra-articular injections are usually a combination of local anaesthetic and steroid, and often have to

be repeated. While most physicians will repeat such injections (Cyriax suggested up to eight times<sup>4</sup>), others stress the risk of steroid arthropathy as well as that of iatrogenic infection. The lack of evidence to support the effectiveness of intra-articular steroids<sup>5</sup> can be used to justify the use of manipulation under anaesthetic; however, this also has associated risks.

It has been suggested that a suprascapular nerve block may be a more effective alternative treatment. This technique, which was first described in 1941,<sup>6</sup> aims to block the nerves to the glenohumeral joint as they branch from the suprascapular nerve near the scapular notch, and has been used to reduce shoulder pain caused by a range of pathologies. In the classical technique, the needle is aimed, perpendicular to the skin, into the region of the scapular notch. Reported complications, including pneumothorax and damage to the suprascapular nerve and vessels, have limited its use. The modified technique described by Dangoisse *et al*<sup>7</sup> eliminates these risks and makes it suitable for use in primary care.

To assess its effectiveness in general practice it was compared with intra-articular injections, as recommended by Cyriax,<sup>4</sup> in a randomized trial. A MEDLINE search of papers since 1966 has not produced any reference to similar previous comparisons.

The trial was approved by the ethical committee of Wrightington Hospital.

## Method

### Patient selection

Patients were recruited to the trial from three general practices within the South Ribblesdale Audit Group, with a combined list size of 32 000. Those recruited were all in the second or third stage of shoulder capsulitis as defined by van de Velde.<sup>8</sup> As such, they had a capsular loss of movement (most loss of external rotation, then abduction, and least loss of internal rotation), with pain that was either constant, radiated beyond the elbow, or disturbed sleep. All resisted movements were pain free. All suitable patients attending their general practitioner were referred to the study, where one doctor reassessed them and confirmed that they all met the above criteria. Serious pathology was excluded by measurement of ESR, random blood sugar, and rheumatoid factor. They were then randomly allocated to one of the two treatment groups using sealed envelopes. Written consent was obtained from all patients.

### Techniques

All injections were administered by the same doctor using one of two techniques:

- **Intra-articular injection.** A mixture of 20 mg Triamcinolone acetonide (0.5 ml Kenalog) and 4.5 ml 2% Lidocaine Hydrochloride (Xylocaine) was introduced into the glenohumeral joint using a 21G × 1.5" needle via a posterior approach. The injection was repeated up to a total of three doses as determined by improvement of signs and symptoms. This limit of three injections was in part owing to restrictions imposed by the ethical committee.

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- **Suprascapular nerve block.** A mixture of 20 mg Triamcinolone acetonide (0.5 ml Kenalog) and 9.5 ml 0.5% Bupivacaine Hydrochloride (Marcain) was injected using the technique described by Dangoisse *et al*<sup>7</sup> (Figure 1). A 21G × 1.5" needle was introduced through the skin 2 cm cephaloid to the midpoint of the spine of the scapula (Figure 1). The needle was advanced parallel to the blade of the scapula until bony contact was made in the floor of the suprascapular fossa. This technique has previously been demonstrated to be safe and to effectively block the articular branches of the suprascapular nerve. The injection was not repeated. The need to include a steroid in the injection has been debated;<sup>9</sup> we chose to include it to minimize the differences between the treatment groups.

Following each treatment, all patients were given verbal and written instructions regarding a home exercise programme of self-mobilization, joint-stretching, and static rotator cuff-strengthening. Patients were asked to take only paracetamol for pain relief.

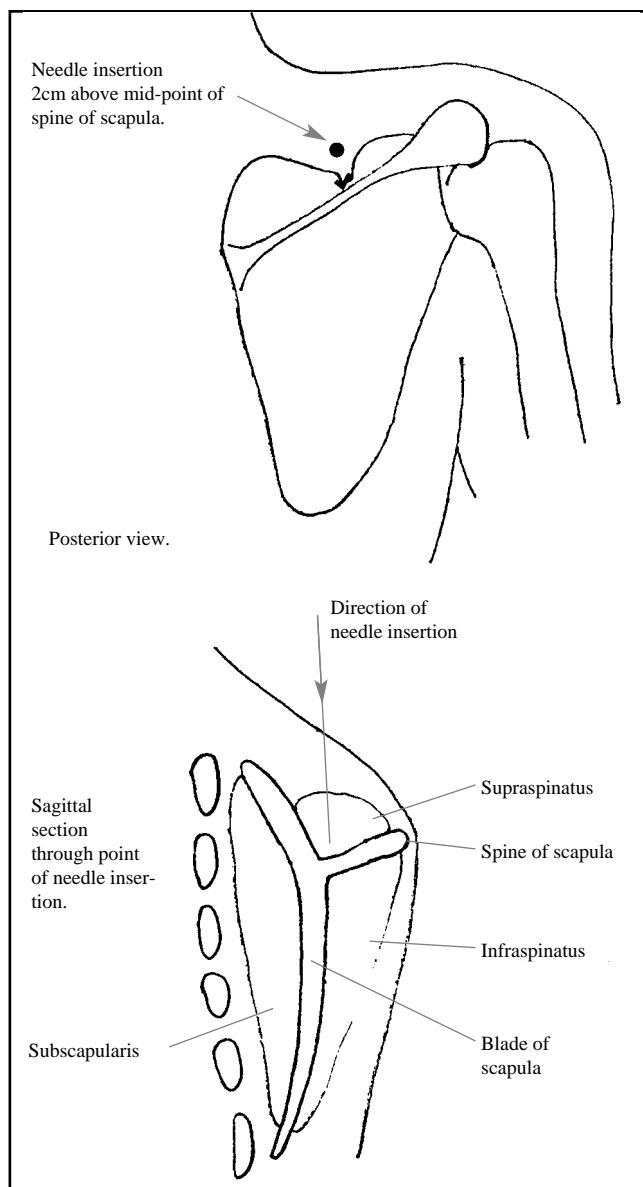


Figure 1. Suprascapular nerve block.

### Assessment

Pain levels and range of movement were recorded at initial attendance and after one week, three weeks, seven weeks, and 12 weeks. To avoid bias, patients graded their pain using the scale shown in Table 1. The sum of the three columns was recorded as the total pain score.

Range of movement was measured using a goniometer in three planes: abduction, internal, and external rotation. No attempt was made to isolate gleno-humeral movement, as total shoulder movement gave more reproducible results and is a better gauge of function.

### Results

Thirty patients were recruited over five months, from December 1996 to April 1997, and were randomly allocated into two equal groups. At initial assessment, the two groups were similar (Table 2). No patients were withdrawn from the trial or lost to follow-up.

The only adverse effect during the course of the trial was with one patient who experienced a vaso-vagal collapse following an intra-articular injection. She recovered quickly, and a further injection some weeks later was uneventful.

Four patients in the intra-articular group only required one injection, four required two injections, and seven had three injections. Some of the patients having three injections had still not responded fully, and some physicians may have proceeded with further injections. This would have increased the average number of injections from the observed 2.2.

Both treatment groups showed a marked improvement in pain and range of movement, but the nerve block patients appeared to respond more quickly and more completely (Table 3). One patient appeared to gain little or no benefit from suprascapular nerve block. The others all experienced a rapid improvement in pain and range of movement, their pain either resolving fully or reducing to mild and intermittent. This improvement was sustained in all but one patient. One patient failed to respond to intra-articular injections, and in six others the response was poor, such that, at one week, 11 patients experienced more than intermittent mild pain. This number remained unchanged at three weeks, then fell to eight patients at seven weeks and seven patients at 12 weeks. The changes in sleep disturbance, pain radiation, and range of movement followed similar patterns. In keeping with the expected capsular pattern, reduction in internal rotation was small in all patients and no significant changes were seen.

The two groups were compared using the Mann-Whitney U-test, as suggested by Matthews *et al*.<sup>10</sup> The results are summarized in Table 4. The area under the curves for the individual patients was not found to follow the normal distribution, and so a non-parametric test was used. The differences between the pain scores were highly significant ( $P < 0.01$ ), while those between the ranges of abduction and external rotation were significant ( $P < 0.05$ ). The test failed to demonstrate significant differences in sleep disturbance and pain radiation, as some patients registered zero at initial assessment and were removed from the dataset before analysis, so reducing the sample size.

### Discussion

While this study has limitations, it appears to demonstrate that suprascapular nerve block gives better results than more traditional methods. The sample size was small but the statistical methods used are well proven and give significant results. The main weakness of the study is that no attempt was made at independent or blinded assessment. Bias was reduced by using patients' assessment of pain scores. Records of joint range of

**Table 1.** Scale used to grade severity of pain.

| Score | Pain               | Radiation | Sleep disturbance |
|-------|--------------------|-----------|-------------------|
| 0     | None               | None      | None              |
| 1     | Mild, intermittent | To elbow  | Mild              |
| 2     | Mild, constant     | To wrist  | Moderate          |
| 3     | Moderate           | To hand   | Severe            |
| 4     | Severe             | –         | –                 |
| 5     | Very severe        | –         | –                 |

**Table 2.** Comparison of the two treatment groups at initial assessment. Figures are medians, with interquartile range in brackets.

|                           | Age     | Male/female | Simple pain score | Total pain score | Abduction | External rotation |
|---------------------------|---------|-------------|-------------------|------------------|-----------|-------------------|
| Intra-articular injection | 53 (10) | 7/8         | 3 (0)             | 5 (2.5)          | 90 (35)   | 20 (20)           |
| Suprascapular nerve block | 60 (16) | 8/7         | 3 (1.5)           | 7 (1.5)          | 100 (50)  | 30 (15)           |

**Table 3.** Pain scores and range of movement in suprascapular nerve block (SNB) and intra-articular groups (IA). Figures are medians, with interquartile range in brackets.

|         | Simple pain score |         | Total pain score |         | Abduction |          | External rotation |         |
|---------|-------------------|---------|------------------|---------|-----------|----------|-------------------|---------|
|         | SNB               | IA      | SNB              | IA      | SNB       | IA       | SNB               | IA      |
| Initial | 3 (1.5)           | 3 (0)   | 7 (2.5)          | 5 (2.5) | 100 (50)  | 90 (35)  | 30 (15)           | 20 (20) |
| Week 1  | 1 (1.5)           | 2 (1.5) | 2 (3.5)          | 4 (3.5) | 160 (35)  | 110 (45) | 70 (40)           | 40 (30) |
| Week 3  | 1 (1)             | 2 (1)   | 1 (1.5)          | 3 (2.5) | 170 (30)  | 140 (75) | 80 (20)           | 50 (35) |
| Week 7  | 1 (1)             | 2 (1)   | 1 (1)            | 2 (2)   | 180 (10)  | 140 (65) | 80 (20)           | 60 (45) |
| Week 12 | 1 (1)             | 2 (1)   | 1 (1)            | 2 (1)   | 170 (15)  | 170 (50) | 80 (25)           | 70 (35) |

**Table 4.** Summary of results of Mann–Whitney U-test.

| Indicator         | Median area scores |      | Significance level |
|-------------------|--------------------|------|--------------------|
|                   | SNB                | IA   |                    |
| Simple pain score | 12.5               | 23   | P = 0.0054         |
| Abduction         | 2050               | 1660 | P = 0.0326         |
| External rotation | 850                | 730  | P = 0.0152         |
| Sleep disturbance | 2.0                | 7.0  | P = 0.0877         |
| Pain radiation    | 0.5                | 2.5  | P = 0.1351         |

movement are notoriously inaccurate, but the differences between the two groups are greater than any expected errors.

It is not clear how the nerve block acts to produce a resolution of the symptoms. As the direct action of Bupivacaine cannot extend beyond a few hours or days there must be an effect on the underlying pathology, which is owing in part to the patient's ability to perform an adequate exercise programme. The Triamcinolone included in the injection may have a systemic anti-inflammatory effect, but this should be the same in both groups. A more definitive study could also have a third group of patients treated by nerve block without steroid.

Since the nerve block produces a faster resolution, its widespread use could produce a saving of medical time and further economic benefits if patients are able to return to work sooner. These factors should be more carefully measured in a future study.

## Conclusions

This study has shown that suprascapular nerve block can produce good results in primary care. The technique has been developed to afford maximum safety and has several potential benefits over the traditional intra-articular injection. Although this study demonstrates a faster, more complete resolution of symptoms, it

does have some weaknesses. There is certainly enough evidence to justify a larger multicentred trial with independent, blinded assessment and the addition of a group treated by nerve block without steroid.

## References

- Shaffer B, Tibone JE, Kerlan RK. Frozen shoulder: A long term follow up. *J Bone Joint Surg* 1992; **74A**: 738-746.
- Bunker TD. Frozen shoulder: unravelling the enigma. *Ann R Coll Surg Engl* 1997; **79**: 210-213.
- Winters JC, Sobel JS, Groenier KH, *et al.* Comparison of physiotherapy, manipulation, and corticosteroid injection for treating shoulder complaints in general practice: randomized single blind study. *BMJ* 1997; **314**: 1320-1325.
- Cyriax JH. *Textbook of Orthopaedic Medicine*. Vol II. 10th edn. London: Ballière Tindall, 1980.
- van der Heijden GJMG, van der Windt DAWM, Kleijnen J, *et al.* Steroid injections for shoulder disorders: a systemic review of randomized clinical trials. *Br J Gen Pract* 1996; **46**: 309-316.
- Wertheim HM, Rovenstine FA. Suprascapular nerve block. *Anesthesiology* 1941; **2**: 541-545.
- Dangoisse MJ, Wilson DJ, Glynn CJ. MRI and clinical study of an easy and safe technique of suprascapular nerve blockade. *Acta Anaesth Belg* 1994; **45**: 49-54.
- van de Velde T. The shoulder. In: *A System of Orthopaedic Medicine*. London: WB Saunders, 1995.
- Gado K, Emery P. Modified suprascapular nerve block with Bupivacaine alone effectively controls chronic shoulder pain in patients with rheumatoid arthritis. *Ann Rheum Dis* 1993; **52**: 215-218.
- Matthews JNS, Altman DG, Campbell MJ, Royston P. Analysis of serial measurements in medical research. *BMJ* 1990; **300**: 230-235.

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