Ultrasound-guided suprascapular nerve block for orthopaedic patients with persistent shoulder pain and stiffness

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Abstract:

**Introduction:** Suprascapular nerve blocks have been used successfully in rheumatology and pain clinics to control chronic shoulder pain. This study aims to assess the efficacy of ultrasound-guided suprascapular nerve blocks in a group of orthopaedic patients with persistent shoulder pain and stiffness.

**Materials and Methods:** A prospective audit of twenty-two consecutive patients was performed. Suprascapular nerve blocks were performed by an experienced anesthetist using ultrasound guidance to infiltrate 10mLs of plain 0.5% bupivacaine around the nerve in the suprascapular notch. Numerical analogue pain scores, from 0 to 10, were collected prior to the block and 20 minutes, 2-3 days, 2-3 weeks and 8-10 weeks post block. In addition, Oxford shoulder scores were collected pre-block and at 8-10 weeks post-block.

**Results:** 90% of patients had lower pain scores and higher Oxford shoulder scores at 8-10 weeks post-block. The mean pre-block pain score was 8.2 ± 1.8 and, at all subsequent points; it was significantly lower (p < 0.001). There was a significant increase in Oxford shoulder score at 8-10 weeks post-block (10.8 ± 8.2, p < 0.001). The response in patients with persistent postoperative pain and stiffness was better than patients with primary frozen shoulders, although this was not statistically significant. No complications were recorded.

**Conclusions:** Ultrasound-guided suprascapular nerve block is a simple and safe technique that can be successfully employed to achieve rapid relief of shoulder symptoms for up to ten weeks. This may be used as an interim whilst surgical intervention is planned, and can help facilitate shoulder rehabilitation.
Key words: Shoulder, pain, frozen shoulder, nerve block, rehabilitation.

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Introduction:

The prevalence of shoulder pain in adults in the United Kingdom is believed to be 7% overall, rising to 26% in the elderly (1). Referrals for shoulder pain comprise a substantial portion of the orthopaedic outpatient workload. Management aims to reduce pain and improve function. The choice of operative versus non-operative management depends on the diagnosis and patient’s fitness and expectations. Rehabilitation plays an important role whether patients are treated operatively or not, and pain can significantly restrict rehabilitation leading to lengthier time for recovery and / or suboptimal outcomes (2-3). Besides the foreseeable impact this has on the health services, the socioeconomic implications are also pronounced as the majority of patients afflicted by shoulder pain are middle-aged and ill health in this group results in lost working hours (4).

The suprascapular nerve has been shown to supply sensory fibres to about 70% of the shoulder joint and capsule, including the acromioclavicular joint and subacromial bursa (5-7). Suprascapular nerve block has been described as early as 1941 (8-9). It can be performed using anatomical landmarks, fluoroscopy or ultrasound guidance (9-12). Ultrasound-guidance provides a safer and more reliable method to visualise and block the nerve whilst avoiding possible complications (11). Suprascapular nerve block has been used by rheumatologists for patients with chronic shoulder pain, and patients with primary frozen shoulders (7, 13-16). It has been also employed in peri-operative pain control in shoulder surgery (6, 17). At our unit, the senior author has used suprascapular nerve block for patients with primary frozen
shoulders, as well as patients with persistent postoperative pain and stiffness. The aim of this study was to audit the results of this treatment in this particular group of patients.
Materials and Methods:

A prospective audit of twenty-two consecutive patients undergoing the procedure was carried out over an eight-month period. The procedure was offered to patients with primary frozen shoulders, and patients with postoperative persistent shoulder pain and stiffness despite a minimum of 6 weeks of physiotherapy. This was at the discretion of the senior author. Patients were given an information leaflet detailing the technique, benefits, possible side-effects and post procedure advice.

Following an informed written consent, the block was administered by a single experienced consultant anaesthetist in the operating theatre anaesthetic room. Under aseptic technique and using a high resolution portable ultrasound machine, the suprascapular nerve was visualised in the suprascapular notch. A long needle was then used to infiltrate 10mLs of plain 0.5% bupivucaine around the nerve. No steroids were used.

Patients consented to follow up using telephone interviews. The audit was approved by the local research and development department and patient advice and liaison services. Oxford shoulder scores and numerical analogue pain scores were collected prior to the block. Oxford shoulder scores ranged from 0 for the poorest function to 48 for the best function (18). Numerical analogue pain scores ranged from 0 for no pain to 10 for the worst pain. Numerical analogue pain scores were collected 20 minutes after the block, then at 2-3 days, 2-3 weeks and 8-10 weeks using telephone
interviews. Oxford shoulder scores were also collected at 8-10 weeks post block. Patients were asked about any complications. All patients were referred back to physiotherapy following the block.

Data were collected on Microsoft Excel © 2007. Statistical analysis was performed using SPSS 16.0 (Chicago, Illinois). Means, standard deviations and 95% confidence intervals (95% CI) were calculated. Results were compared using Mann-Whitney U-test, with p < 0.05 considered to be statistically significant.
Results:

Of the original 22 patients, two were excluded. One underwent previously planned surgery within 3 weeks of the block; the block was used as an interim measure for pain control whilst awaiting surgery. One patient was lost to follow up.

Twenty patients were included; 10 (50%) were females, 12 (60%) had nerve blocks for the right shoulders and the remainder for the left. The mean age was 54.9 ± 11.2 (range 42-77). Ten patients had postoperative pain and stiffness and ten had primary frozen shoulders. Table 1 details the procedures carried out for patients with persistent postoperative pain and stiffness. The mean time between the surgical procedure and performing the block was 13.2 ± 4.7 weeks (range 6-18).

The mean Oxford shoulder score pre-block was 16.8 ± 7.3 (range 5-31), and increased to 27.6 ± 10.9 (range 11-46) 8-10 weeks after the block (figure 1). The mean difference was 10.8 ± 8.2 (7.6-16.7 95% CI, p < 0.001). Figure 2 shows the mean numerical analogue pain scores prior to the block and at 20 minutes, 2-3 days, 2-3 weeks and 8-10 weeks post-block with 95% confidence intervals. The mean difference between pre-block numerical analogue pain score and all post-block scores was statistically significant (p < 0.001). At 8-10 weeks post-block, 18 of 20 patients (90%) had higher Oxford shoulder scores and lower pain scores. Two patients had lower Oxford shoulder scores and equal pain scores; one had a
massive rotator cuff tear and the other had a primary frozen shoulder and went on to have arthroscopic arthrolysis.

The two main groups, the primary frozen shoulder group (n=10) and the postoperative pain and stiffness group (n=10), were compared. At 8-10 weeks, the mean reduction in pain scores was $3.9 \pm 2.3$ versus $4.2 \pm 3.0$, and the mean increase in Oxford shoulder score was $8.6 \pm 6.9$ versus $13.0 \pm 9.2$ respectively. This shows a better response in the postoperative pain and stiffness group; however, the difference was not statistically significant (figures 1, 2). Each group had one case where the block failed. No complications were reported in any of the patients.
Discussion:

Suprascapular nerve block has been successfully used in rheumatology and pain clinics to control chronic shoulder pain (7, 9, 13-14). It has also been described in the treatment of primary frozen shoulders, and compared to intra-articular steroid injections (14, 16, 19). In orthopaedics, this technique was described for peri-operative pain control (6, 17). However, to our knowledge this technique has not been described in patients with persistent postoperative shoulder pain and stiffness. This study has shown that ultrasound-guided suprascapular nerve block can be used effectively and safely to reduce shoulder pain and improve function in orthopaedic patients. This was true for patients with primary shoulder pain, as well as for patients with persistent postoperative pain and stiffness. Patients had significantly higher Oxford shoulder scores and lower pain scores at 8-10 weeks post-block, and the block was successful in 90% of cases.

Suprascapular nerve blocks could be administered using anatomical landmarks, fluoroscopy or ultrasound guidance. A recent study has shown that using ultrasound guidance to administer suprascapular nerve blocks increases the efficacy and reduces complications of the block (20). Although we did not aim to compare ultrasound-guided blocks to blindly performed blocks, this study used ultrasound-guided nerve blocks with no reported complications. The blocks were performed in the theatre anaesthetic room in this study due to logistical reasons; however, the block is essentially a simple injection under ultrasound guidance which could be easily performed under aseptic technique as an office procedure.
Although some studies described suprascapular nerve blocks using a mixture of a steroid and local anaesthetic, recent studies have shown that local anaesthetic alone is as effective with similar long-term pain control (7, 13, 16, 21). This is confirmed by this study, where plain 0.5% bupivacaine without steroids achieved rapid pain control lasting up to ten weeks post block. The exact mechanism through which long-term pain relief is achieved using plain local anaesthetic is unclear. However, a randomised controlled trial comparing the injection of local anaesthetic versus saline for suprascapular nerve block showed a significant difference between the two groups (16). This suggests that the effect of the block is not secondary to placebo effect or to neuropraxia of the nerve due to the large volume injected.

Limitations of this study include the small number of patients and the lack of a control group. The lack of control group was because this was an audit of practice rather than a clinical trial. However, the trend was clear with significant improvement immediately after the block that was sustained for up to ten weeks post-block. Furthermore, the effect of the block in the postoperative pain and stiffness group matched that in the primary frozen shoulder group, in which the block has been described widely in the literature.

This study did not quantify the effect the block had on the ability of the patients to carry out their rehabilitation exercises. However, the subjective feedback we received from patients and physiotherapists was positive. Furthermore, the improvement in shoulder function is clearly reflected in the significant increase of patients' Oxford shoulder scores.
We conclude that ultrasound-guided suprascapular nerve block is a simple and safe technique that can be successfully employed to achieve rapid relief of symptoms for up to ten weeks in orthopaedic patients with persistent shoulder pain and dysfunction. Although the block itself may not address the underlying cause of pain and dysfunction, it may allow pain-free rehabilitation and physiotherapy, and could serve as a temporizing measure whilst further intervention, e.g. surgery, is being contemplated.
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References:


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<th>Procedure</th>
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<td>6</td>
</tr>
<tr>
<td>Arthroscopic rotator cuff repair</td>
<td>3</td>
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<tr>
<td>Arthroscopic arthrolysis + subacromial decompression</td>
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**Table 1:** Surgical procedures of the postoperative pain and stiffness group
**Figure 1:** Oxford Shoulder Scores (OSS) pre-block and 8-10 weeks post-block for all patients, primary frozen shoulder group and postoperative pain and stiffness group (means with 95% confidence intervals)
Figure 2: Numerical analogue pain scores (NAPS) for all patients, the primary frozen shoulder group and the postoperative pain and stiffness group (means with 95% confidence intervals).