

# Magnesium interscalene nerve block for the management of painful shoulder disorders

### ABSTRACT

Shoulder pain is a common and distressing disorder. Systemic multimodal analgesia may be ineffective, but interscalene nerve block provides effective therapy. Magnesium may increase the efficacy and duration of systemic or regional analgesia. This case series examines the utility of magnesium interscalene nerve block for the management of painful shoulder disorders. Six elderly patients with shoulder pain and dysfunction received interscalene nerve block with injection of bupivacaine and magnesium. The patients subsequently reported significant improvement in sleep, shoulder pain, and physical function for 16 weeks. This report highlights that magnesium interscalene nerve block provides safe, effective, and prolonged shoulder analgesia.

**Key words:** Interscalene nerve block; magnesium; prolonged regional analgesia; shoulder pain

### Introduction

Chronic or acute painful shoulder disorders are common and may be difficult to treat. The pain may be secondary to arthritis, injury, or surgery.<sup>[1-4]</sup> Multimodal systemic analgesia and complementary therapy may be ineffective.<sup>[1,2]</sup> Interscalene brachial plexus nerve block usually provides safe, effective analgesia for shoulder pain and dysfunction.<sup>[4,5]</sup> Common agents used for interscalene nerve block include local anesthetic or steroid.<sup>[2,4,5]</sup> An alternative and suitable anti-nociceptive agent is magnesium. However, there is limited report of its use for the management of shoulder pain.<sup>[6]</sup> Magnesium is essential for human physiologic processes and is used in many medical therapies.<sup>[7-10]</sup> The systemic administration of magnesium is known to reduce acute pain.<sup>[7,9,10]</sup> The addition of magnesium to local anesthetic is known to increase the efficacy and duration of regional analgesia.<sup>[6,8,11]</sup> However, there is limited data on the

use of magnesium for interscalene or other peripheral nerve blocks. This case series examines the utility of magnesium interscalene nerve block for the management of shoulder pain.

### Case Report


The cases were approved and conducted at the Central Manchester University Hospital, Manchester, UK, from February 2011 to January 2013. Informed consent was obtained from the patients, for the interscalene block and case reporting. Six elderly patients with acute-on-chronic shoulder hyperalgesia, allodynia, stiffness, and dysfunction presented for pain management. The cohort included four men and two women. They had pain score of 7/10, depression, and insomnia. Their pain was persistent

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despite multimodal systemic analgesia, comprising regular paracetamol, diclofenac, and tramadol, at high doses.

The risks and benefits of interscalene block were discussed with the patients, and informed consent was obtained for the block. Interscalene block was performed with patients in the supine posture, with patients' head turned away from the side to be blocked. Patients were monitored with noninvasive blood pressure, electrocardiography, and pulse oximetry. Interscalene block was guided by ultrasonography. Under strict asepsis, ultrasonography was used to identify the carotid artery, the scalene muscles, and the brachial plexus sandwiched between the anterior and middle scalene muscles. A 22G nerve block needle was inserted in the posterolateral neck, lateral to the carotid artery and 3–4 cm cephalad to the clavicle. The needle was inserted in-plane to the ultrasound probe and in a lateral-to-medial direction. The block was achieved with injection of 15 ml of 0.1% bupivacaine and 1 g of magnesium. The blocks were uneventful, without complications, and patients were monitored for 45 min postinjection, before discharge home. All the patients achieved improved pain score of 0/10 before discharge home. They were followed up by telephone and clinic consultations. They all reported sustained significant improvement in sleep, shoulder pain, and function for 16 weeks. Their multimodal systemic analgesia requirements reduced significantly.

## Discussion

Interscalene brachial plexus nerve block is a safe procedure. All the patients in the current report had uneventful nerve block, without any complication, and this corroborates previous reliable reports.<sup>[4,5,12]</sup> Ultrasonography guidance was used in the current series, which may improve the safety or efficacy of interscalene block. However, a good knowledge of anatomy is the most essential requirement to perform the block successfully. Interscalene block is a reliable and effective mode of analgesia for shoulder disorders. The patients in the current report had excellent shoulder analgesia following interscalene block, and this confirms the outcome of previous clinical studies.<sup>[4,5,12]</sup>

In the current series, the bupivacaine component of the nerve block injection contributed some analgesia in the initial 6 h. This 6-h effect is due to the duration of action of bupivacaine, as shown in previous studies.<sup>[6,12]</sup> However, the prolonged 16-week analgesia in these patients was the effect of magnesium. Magnesium has been shown to provide good regional analgesia for 24 h.<sup>[8,11]</sup> However, the patients in the current series had satisfactory analgesia for 16 weeks,

and this is one of the rare reports to show such prolonged, effective local analgesic effect of magnesium. The patients in the current series also had improved sleep and physical function; secondary to the effective interscalene nerve block analgesia. This corroborates previous studies that showed improved emotional and physical functions in association with better analgesia.<sup>[2,4,6,10]</sup>

Magnesium acts as a physiologic antagonist of calcium, thereby producing neuromodulation and analgesia.<sup>[6-10]</sup> It also antagonizes the N-methyl-D-aspartate (NMDA) system that is involved in the pathophysiology and propagation of neuropathic pain.<sup>[6-10]</sup> The patients in this current report had neuropathic pain in the form of hyperalgesia and allodynia, but they benefited from magnesium antagonism of NMDA activity, following the interscalene block. A magnesium dose of 1.5 g was used for regional analgesia in a previous study.<sup>[11]</sup> However, a lower dose of 1 g was used for interscalene block in the current series, and this lower magnesium dose provided effective, reliable, safe, and prolonged analgesia.

## Conclusion

Magnesium interscalene nerve block provides safe, effective, and prolonged shoulder analgesia. The clinical practice and teaching of magnesium interscalene nerve block should be encouraged. This study highlights the ease, efficacy, and utility of magnesium interscalene nerve block for the treatment of painful shoulder disorders. Larger or randomized studies will be interesting.

## Consent

Written informed consent was obtained from all the patients.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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