

## Magnesium as an Adjunct to Local Anaesthetic Prolongs Postoperative Analgesia and Decreases Laryngospasm in Tonsillectomy

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Submitted: 23 Sep 2016; Accepted: 01 Oct 2016; Published: 06 Oct 2016

A trend in anaesthesia has been the addition of adjunct agents to infiltrated local anaesthetics to prolong the duration of analgesia [1-5]. One such agent is magnesium. A review of several databases including Pubmed, Medline, Web of Science and Cochrane Clinical Trials Registry identified four high quality level one RCTs studying the effect of adding magnesium to local anaesthetic infiltration in tonsillectomy [1,6-8].

On review of these the four studies, it was found that magnesium significantly reduced pain scores at one to 24 hours post-tonsillectomy. Two studies identified significant increases in time to first analgesia, by five to six hours [1,6]. Three studies also identified significant reductions in total postoperative analgesia requirements [1,6,8]. However, the most interesting and potentially most significant finding was a reduction in the incidence of laryngospasm. This reduction in post-operative laryngospasm with the use of magnesium was noted in all four studies when compared to placebo. In fact, there were zero incidents of laryngospasm across all four trials in patients treated with magnesium in addition to the local anaesthetic. The control groups however, consistently experienced an incidence of laryngospasm in 10-15% of patients.

The exact mechanism by which magnesium relaxes muscle is not known, however there are several plausible hypotheses [9]. It is suggested that magnesium has a beneficial role in most physiological systems; with the most widely accepted mechanism in prevention of muscular spasm involving neural and myocyte calcium channel modulation [10]. Magnesium has been shown to inhibit calcium channels in presynaptic neurons, thus reducing the amount of acetylcholine released into the neuromuscular junction [10]. Magnesium also inhibits calcium channels at the level of the smooth muscle cell, therefore reducing myoplasmic calcium. The decreased level of intracellular calcium prevents myosin light chain phosphorylation, resulting reduced myocyte contractility [11,10]. The complex interaction of magnesium with both presynaptic neurons and laryngeal myocytes

thus allows for smooth, non-spasmodic coordinated muscle contraction and reduces the incidence of spasm [11,12].

A 2008 meta-analysis identified infiltrated local anesthetic as the most effective mode of pain control in tonsillectomy [13]. The benefit of magnesium as an adjunct to local anaesthetic in further reducing post tonsillectomy pain and analgesic requirements is significant. The procedure is associated with significant post-operative pain which is an issue for a large proportion of patients that have obstructive sleep apnoea (OSA) [14,15]. The use of opiate analgesia is a well-known cause of severe respiratory depression in patients with OSA [14,15]. Therefore, the uses of alternative analgesic strategies are of even more importance.

In addition to a potentially reduced incidence of post-operative respiratory depression, the analgesic benefit of magnesium with local anesthetic infiltration has important implications for postoperative oral intake and hydration [15]. These benefits combined with a low risk of adverse drug reactions make it an ideal adjunct to local anesthetic infiltration.

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