

Effect of Low Dose Magnesium Sulphate on Succinylcholine Induced Fasciculations & Postoperative Myalgia

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Abstract

Objectives: To investigate the effect of Magnesium Sulphate on Succinylcholine induced fasciculations during General Anaesthesia & postoperative myalgia. **Methods:** Double blind randomised clinical trial on patients who were candidates for surgery under general anaesthesia. Patients were selected & divided into two equal groups of Study & controls using block randomisation. Study group received Magnesium Sulphate while Controls received Normal Saline. SPSS 18 was used for statistical analysis. **Results:** Out of the 100 subjects in the study 49 (49%) were men & 51 (51%) were women ($p < 0.072$). The mean age of the two groups were 37.5 ± 12.2 year & 37.7 ± 12 year ($p < 0.9$). There was significant difference between the two groups in terms of the degree of fasciculations & post operative myalgia ($p < 0.001$). **Conclusion:** Even low dose of magnesium sulphate can prevent & reduce the degree of succinylcholine induced fasciculation & postoperative myalgia.

Keywords: Magnesium sulphate; muscle fasciculation; succinylcholine; Postoperative Myalgia (POM).

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Introduction

Succinylcholine is a depolarising muscle relaxant used to facilitate endotracheal intubation. One of its adverse effect is fasciculation & post operative myalgia (POM) along with other minor adverse effect.

Mechanism of fasciculation is attributed to prejunctional depolarising action of Sch resulting in repetitive firing of motor nerve terminals and antidromic discharges that manifests as uncoordinated muscle contractions [18]. $MgSO_4$

reduces this by acting prejunctionally. Phenytoin & d-tubocurarine have same action.

Mechanism of Post Operative Myalgia (POM): Fasciculations involves vigorous contraction by muscle bundles with no shortening & without synchronous activity in adjacent bundles. This leads to fibre rupture or damage, release of phosphokinase, increased myoplasmic calcium, changes in membrane phospholipids, releasing free fatty acids & the involvement of free radicals [4,6] causing pain. Postoperative myalgia is attributed to muscle damage produced by the sheering forces associated with fasciculations at onset of phase-I block.

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There have been suggestions that fasciculations and muscle pains are related. Therefore, various methods & drugs have been suggested for the prevention of these complications. Magnesium sulphate is one of the drugs that has been recently investigated largely.

Magnesium acts as an adrenergic antagonist and inhibits the release of catecholamine & controls the undesirable effects of laryngoscopy for tracheal intubation such as tachycardia, hypertension, raised intraocular pressure, reduces the potassium concentration by reducing fasciculations. It is also very effective in reducing postoperative myalgia following Sch. It is wonderful drug to reduce undesirable effects of Sch but only few studies are there investigating this drug.

Therefore this study was planned to assess the effect of magnesium sulphate on muscle fasciculation & postoperative myalgia following succinylcholine administration.

Material & Methods

Double blind randomised clinical trial was conducted on patients undergoing elective surgery under general anaesthesia

ASA Grade I and II between the age group of 18 to 60 years.

Exclusion criteria - pregnancy, extremes of age, emergency surgery, history of muscular disease, malignant hyperthermia, patients on calcium channel blockers or beta blockers, hypotension, hypoparathyroid & hypocalcaemia, contraindication to suxamethonium.

Sample size was 100 with two equal group of Study & control. Written informed consent was taken from patients.

Study group received 20 mg/kg of magnesium sulphate in 100 ml of normal saline infused in 5 minutes, started 6.5 min before anaesthesia. The controls received 100 ml of normal saline without magnesium sulphate in 5 minutes, started 6.5 min before anaesthesia.

Fasciculation was observed & graded by scoring system.

		Score
Nil	No visible fasciculations	0
Mild	Very fine fingertip or facial muscle movements	1
Moderate	Minimal fasciculations on trunk or extremities	2
Severe	Vigorous faciculations on trunk or extremities	3

Postoperative myalgia was observed at the 1 hour, 12 hour, 24 hour & 48 hours after surgery & grading done.

Grading & scoring system of Postoperative Myalgia.

Grade		Score
Nil	No muscle pain or stiffness	0
Mild	Muscle stiffness or pain at one site but not causing disability or limitations of activity	1
Moderate	Muscle pain or stiffness noticed by patient spontaneously & requiring analgesic therapy	2
Severe	Generalised severe or incapacitating discomfort	3

Data were entered into SPSS 18 & was analysed using Mann-whitney U test and chi-square test.

Results

Mean age of the study & control groups were 37.5±12.2yr and 37.7±12yr (p<0.9). There were 49 (49%) men & 51 (51%) women in the study (p<0.072)

- Faciculations were nil among study group while 100% among the controls (p<0.001) with various grades.
- Postoperative myalgia was nil in study group while in control group patients had various degrees of myalgia.

Table 1:

Variables	Study Group	Control Group	P-Value
Male	20 (40%)	29 (58%)	0.072
Female	30 (60%)	21 (42%)	
ASA I	41 (82%)	37 (74%)	0.334
ASA II	9 (18%)	13 (26%)	
Fasciculations Grade			
0	50 (100%)	0 (0%)	<0.001 (Significant)
1	0 (0%)	10 (20%)	<0.001 (Significant)
2	0 (0%)	25 (50%)	<0.001 (Significant)
3	0 (0%)	15 (30%)	<0.001 (Significant)
Postoperative Myalgia			
0	48 (96%)	0 (0%)	<0.001 (Significant)
1	2 (04%)	10 (20%)	<0.001 (Significant)
2	0 (0%)	25 (50%)	<0.001 (Significant)
3	0 (0%)	15 (30%)	<0.001 (Significant)

Discussion

In this study both study group & control group have similar baseline characteristics. Therefore, the findings are the results of the interventions. Based on the results, magnesium sulphate can greatly reduce the muscle fasciculation & post operative myalgia caused by succinylcholine.

Various drugs & methods are used to reduce succinylcholine induced fasciculations but magnesium sulphate is excellent drug, cheap, easily available and can be effective in low doses without any side effects.

In our study no patients had fasciculations, while all patients in control group had mild to severe fasciculations which is statically significant.

Two patients in study group experienced mild postoperative myalgia and 48 (98%) patients had no postoperative myalgia. While in control group all pts experienced postoperative myalgia with mild to severe grades.

In a study done by Aldrete, et al [14] after Magnesium Sulphate and thiopentone, no patients had fasciculation.

In a study done by Kararmaza, et al. [12] on the effects of propofol on succinylcholine induced fasciculation reported that 20% of people in propofol group did not experience any type & fasciculations. In a meta analysis by Schreiberju, et al [7] fasciculations were observed in 95% in placebo group & 50% in the intervention group. Another study by Sakurabas, et al. [2] also showed that Magnesium sulphate is useful both for reducing fasciculations, blood pressure and heart rate changes during anaesthesia. In their study 33% of the magnesium sulphate group did not experience fasciculations at all.

In a study done by Kumar M, et al. [10] investigated the effect of magnesium sulphate on succinylcholine induced fasciculation & found very minimal degree of fasciculations in study group compared to control group.

In study by done by sakuraba, et al. [2] found reduced fasculations and attenuated pressor response to laryngoscopy & tracheal intubation.

Various studies done by Shin YH, et al. [9], MC Bin et al. [17], Tauzin-fin et al[18], showed intra operative & postoperative analgesic action of magnesium sulphate and reduced requirement of analgesics.

Most of the studies had used high doses of Magnesium Sulphate ranging 40 mg/kg to

60 mg/kg. Here we took efforts to use low dose of magnesium sulphate i.e. 20 mg/kg to get the desirable effects & reduce Magnesium Sulphate associated complications.

Conclusion

Magnesium sulphate is a wonderful drug even in low doses to reduce fasciculations & postoperative myalgia after succinylcholine. Even though a number of drugs have been used to reduce fasciculations but Magnesium Sulphate is economical, easily available, free of side effects. So we can use this method routinely in our day to day practice to make our patients comfortable with best outcome.

References

1. Parmar S, Vyas A, Sheik A. Usefulness of propofol to prevent succinylcholine induced fasciculations and myalgia, a comaparision with thiopentone sodium as an indication agent. *Int J Med Sci Public Health*. 2013;339-43.
2. Sakuraba S, Serita R, Kosugi S, Eriksson Li, Lindahl SG, Tadeka J. pretreatment with magnesi, m sulphate is associated with less succinylcholine-induced fasciculation and subsequent tracheal intubation-induced hemodynamic changes than precurrarrization with vecuronium during rapid sequence induction. *acta anaesthesiol Belg*.
3. James MFM. Clinical use of Magnesium infusion in anesthesia. *Anesth Anal.g* 1992;24;129-34.
4. Wong SF, Chung F. Succinylcholine-associated postoperative myalgia. *Anaesthesia*. 2000; 55: 144-52.
5. Yun MJ, Kim YH, Go YK, Shin JE, Ryu CG, Kim W, et al. Remifentanyl attenuates muscle fasciculations by succinylcholine. *Yonsei Med. J* 2010; 51: 585-9.
6. James MF, Cork RC, Dennett JE. Succinylcholine pretreatment with magnesium sulphate. *Anesth Anal*. 1986;65:373-6.
7. Schreiber JR, Lysakowski C, Fuchs-Buder T, Tramer MR. Prevention of succinylcholine-induced fasciculation and myalgia; a meta-analysis of randomized trials. *Anesthesiology*. 2005;103: 877-84.
8. Han JU. About uses of magnesium during perioperative period. *Korean J Anesthesio*. 2012;62: 509-11.
9. Shin YH, Choi SJ, Jeong HY, Kim MH. Evaluation of dose effects of magnesium sulphate on rocuronium injection pain and hemodynamic changes by laryngoscopy and endotracheal intubation. *Korean J Anesthesiol*. 2011;60:329-33.
10. Kumar M, Sethi A, Shukla U, Goyal R, Talwar N. Effect of magnesium sulphate with propofol

- induction of anaesthesia on succinylcholine-induced fasciculations and myalgia. *J Anaesthesiol Clin Pharmacol.* 2012;28:81-5.
11. Lysakowski C, Dumont L, Czarnatzki C, Tramer MR. Magnesium as adjuvant to postoperative analgesia; a systematic review of randomized trials. *Anesth Analg.* 2007;104:1532-9.
 12. Kararmaz A, Kaya S, Turhanoglu S, Ozyilmaz MA. Effects of high dose propofol on succinylcholine induced fasciculations and myalgia. *Acta Anaesthesiologica Scandinavica.* 2003;47:180-4.
 13. Shoroghi M, Zahedi H, Farahbaksh F, Sheikhvatan M, Abbasi A. The effect of thiopentone on severity and duration of succinylcholine induced fasciculation. *Clin Neuropharmacol.* 2009;32:94-6.
 14. Aldrete JA, Zahler A, Aikawa JK. Prevention of succinylcholine induced hyperkalaemia by magnesium sulphate. *Can Anaesth Soc J.* 1970;17:477-84.
 15. Imani F, Rokhtabnak F, Radmehr M, Taherifard P. Evaluation of analgesic effect of adding magnesium to lidocaine in patient controlled regional analgesia (PCRA) after foot surgery. *Anesthesiol Pain.* 2011; 1:48-56.
 16. Danladi KY, Sotunmbi PT, Eyelad OR. The effects of magnesium sulphate pretreatment on suxamethonium induced complications during induction of general endotracheal anaesthesia. *Afr J Med Med Sci.* 2007;36:43-7.
 17. McBain CJ, Mayer ML. N-methyl-D-aspartic acid receptor structure and function. *Physio rev.* 1994;74:723-60.
 18. Tazuin-Fin P, Sesay M, Delort-Laval S, Krol-Houdek MC, Maurette P. Intravenous magnesium sulphate decreases postoperative tramadol requirement after radical prostatectomy. *Eur J Anaesthesiol.* 2006;23:1055-9.
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