

Magnesium sulfate for subarachnoid hemorrhage

Ram et al. suggested that [magnesium sulfate](#) has a role in the treatment of [subarachnoid hemorrhage](#)-induced [vasospasm](#) in humans ¹⁾.

Boet et al. established in 2000 administration [guidelines](#) for the use of MgSO₄ in aneurysmal SAH but appointed that a prospective double-blind placebo-controlled trial is required to establish the effectiveness of MgSO₄ for treating vasospasm in aneurysmal SAH ²⁾.

Brewer et al. studied the effect of magnesium as a cerebral vasodilator by measuring the cerebral blood flow velocity (CBFV) response to a 5g intravenous bolus of MgSO₄ compared with a saline placebo after subarachnoid hemorrhage (SAH). Transcranial Doppler ultrasonography of the middle cerebral artery (MCA) was measured after each infusion. Patients were studied up to three times after SAH at prescribed time intervals. Fourteen patients (11 women, 3 men; mean age 58 years) underwent 29 studies. All patients underwent hypertensive, hypervolemic therapy. Four patients developed cerebral vasospasm. Doubling serum magnesium levels did not affect MCA CBFV but slightly lowered mean arterial blood pressure and systemic vascular resistance. Intravenous magnesium bolus did not reduce elevated CBFV in the subset of SAH patients with clinical vasospasm. The role of magnesium sulfate as a cerebral vasodilator in patients with SAH requires further study ³⁾.

Administration of high-dose MgSO₄ following aneurysmal SAH is safe, and steady Mg⁺⁺ levels in the range of 4 to 5.5 mg/dl are easily maintained. This treatment does not interfere with neurological assessment, administration of anesthesia during surgery, or other aspects of clinical care. Veyna et al. observed a trend in which a higher percentage of patients obtained GOS scores of 4 or 5 in the group treated with MgSO₄, but the trend did not reach a statistically significant level ⁴⁾.

A [systematic review](#) was conducted to determine the evidence for the prophylactic use of magnesium sulfate in aneurysmal subarachnoid hemorrhage. [Medline](#), [Embase](#), [Cochrane](#) library, [clinicaltrials.gov](#), and [controlled-trials.com](#) were searched with a comprehensive search strategy. 2,035 records were identified in the initial search and 1,574 remained after removal of duplicates. Randomized, parallel group, controlled trials of magnesium sulfate in patients with aneurysmal subarachnoid hemorrhage were included. A total of ten studies were included. Review Manager and GRADE software were used to synthesize the results. The summary effect for Glasgow outcome scale and the modified Rankin scale is a risk ratio (RR) of 0.93 [95 % confidence interval (CI) 0.82-1.06]. The RR for mortality is 0.95 [95 % CI 0.76-1.17]. Delayed cerebral ischemia has a RR of 0.54 [95 % CI 0.38-0.75], which is the only outcome with a statistically significant summary effect measure favoring magnesium treatment. Delayed ischemic neurological deficit has a RR of 0.93 [95 % CI 0.62-1.39]. Transcranial doppler vasospasm has a RR of 0.72 [95 % CI 0.51-1.03]. Current evidence does not support the prophylactic use of magnesium sulfate in aneurysmal subarachnoid hemorrhage ⁵⁾.

Currently, the only treatment strategy to reduce the risk of delayed cerebral ischaemia remains nimodipine; there is no place for magnesium sulphate ^{6) 7)}.

Continuous cisternal irrigation with MgSO₄ solution starting on Day 4 and continuing to Day 14 significantly inhibited [cerebral vasospasm](#) CV in patients with [aneurysmal subarachnoid hemorrhage](#) (SAH) without severe cardiovascular complications. However, this improvement in CV neither reduced the incidence of [delayed cerebral ischemia](#) nor improved the functional outcomes in patients with SAH ⁸⁾.

Magnesium treatment did not reduce the risk of delayed cerebral ischemia in patients with aneurysmal subarachnoid hemorrhage, nor was there an interaction with glucose levels. It is therefore

unlikely that glucose levels explain the failure of magnesium to prevent delayed cerebral ischemia and poor outcome after aneurysmal subarachnoid hemorrhage⁹⁾.

Current evidence does not support the prophylactic use of magnesium sulfate in aneurysmal subarachnoid hemorrhage¹⁰⁾.

It is disappointing that recent randomized, controlled trials did not demonstrate that the vasodilator magnesium sulfate improve patient outcome¹¹⁾.

1)

Ram Z, Sadeh M, Shacked I, Sahar A, Hadani M. Magnesium sulfate reverses experimental delayed cerebral vasospasm after subarachnoid hemorrhage in rats. *Stroke*. 1991 Jul;22(7):922-7. PubMed PMID: 1853412.

2)

Boet R, Mee E. Magnesium sulfate in the management of patients with Fisher Grade 3 subarachnoid hemorrhage: a pilot study. *Neurosurgery*. 2000 Sep;47(3):602-6; discussion 606-7. PubMed PMID: 10981747.

3)

Brewer RP, Parra A, Lynch J, Chilukuri V, Borel CO. Cerebral blood flow velocity response to magnesium sulfate in patients after subarachnoid hemorrhage. *J Neurosurg Anesthesiol*. 2001 Jul;13(3):202-6. PubMed PMID: 11426093.

4)

Veyna RS, Seyfried D, Burke DG, Zimmerman C, Mlynarek M, Nichols V, Marrocco A, Thomas AJ, Mitsias PD, Malik GM. Magnesium sulfate therapy after aneurysmal subarachnoid hemorrhage. *J Neurosurg*. 2002 Mar;96(3):510-4. PubMed PMID: 11883835.

5)

Reddy D, Fallah A, Petropoulos JA, Farrokhyar F, Macdonald RL, Jichici D. Prophylactic magnesium sulfate for aneurysmal subarachnoid hemorrhage: a systematic review and meta-analysis. *Neurocrit Care*. 2014 Oct;21(2):356-64. doi: 10.1007/s12028-014-9964-0. Review. PubMed PMID: 24619389.

6)

Young AM, Karri SK, Helmy A, Budohoski KP, Kirollos RW, Bulters DO, Kirkpatrick PJ, Ogilvy CS, Trivedi RA. Pharmacologic Management of Subarachnoid Hemorrhage. *World Neurosurg*. 2015 Jul;84(1):28-35. doi: 10.1016/j.wneu.2015.02.004. Epub 2015 Feb 18. PubMed PMID: 25701766.

7)

Rinkel GJ. Management of patients with aneurysmal subarachnoid haemorrhage. *Curr Opin Neurol*. 2016 Feb;29(1):37-41. doi: 10.1097/WCO.0000000000000282. PubMed PMID: 26641816.

8)

Yamamoto T, Mori K, Esaki T, Nakao Y, Tokugawa J, Watanabe M. Preventive effect of continuous cisternal irrigation with magnesium sulfate solution on angiographic cerebral vasospasms associated with aneurysmal subarachnoid hemorrhages: a randomized controlled trial. *J Neurosurg*. 2016 Jan;124(1):18-26. doi: 10.3171/2015.1.JNS142757. Epub 2015 Jul 31. PubMed PMID: 26230471.

9)

Leijenaar JF, Dorhout Mees SM, Algra A, van den Bergh WM, Rinkel GJ; MASH-II Study Group. Effect of magnesium treatment and glucose levels on delayed cerebral ischemia in patients with subarachnoid hemorrhage: a substudy of the Magnesium in Aneurysmal Subarachnoid Haemorrhage trial (MASH-II). *Int J Stroke*. 2015 Oct;10 Suppl A100:108-12. doi: 10.1111/ijls.12621. PubMed PMID: 26502971.

10)

Reddy D, Fallah A, Petropoulos JA, Farrokhyar F, Macdonald RL, Jichici D. Prophylactic magnesium sulfate for aneurysmal subarachnoid hemorrhage: a systematic review and meta-analysis. *Neurocrit Care*. 2014 Oct;21(2):356-64. doi: 10.1007/s12028-014-9964-0. PubMed PMID: 24619389.

11)

Findlay JM, Nisar J, Darsaut T. Cerebral Vasospasm: A Review. *Can J Neurol Sci*. 2015 Sep 2;1-18.

[Epub ahead of print] PubMed PMID: 26332908.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

https://neurosurgerywiki.com/wiki/doku.php?id=magnesium_sulfate_for_subarachnoid_hemorrhage

Last update: **2024/06/07 02:59**

