SCIENTIFIC LETTER

Use and abuse of magnesium sulfate in asthmatic exacerbations

Uso y abuso del sulfato de magnesio en las crisis asmáticas

Dear Editor:

Different clinical practice guidelines recommend the use of intravenous (IV) magnesium sulphate (MgSO₄) for management of asthma exacerbations that do not respond to first-line treatment with bronchodilators (BDs) and steroid therapy.¹

One systematic review supports its use on the basis that it can achieve a reduction in hospital admission of 68% (odds ratio [OR], 0.32; 95% confidence interval [CI], 0.14–0.74), although it analysed a small number of studies and patients.² It should be used early in patients older than 5 years that do not respond to treatment.

In contrast, there is only one clinical trial analysing the effect in infants or pre-school children, with no efficacy observed in this age group.³

There is great variability in the use of MgSO₄ in paediatric emergency departments in other countries,⁴ and the frequency and conditions of use in hospitals in our country have not been reported previously.

The primary objective of our study was to assess the effectiveness of MgSO₄ in preventing hospital admission and the secondary objective to assess the factors associated with successful treatment with MgSO₄.

A descriptive, retrospective, observational, retrospective study was conducted, including patients aged 0-16 years with wheezing or asthmatic crisis who received treatment with MgSO₄ iv in the PEDs of two hospitals between January 2010 and December 2019.

The primary endpoint was the success of treatment, defined as prevention of hospital admission. We also analysed other variables related to the use of MgSO₄: patient age, patient sex, adequate previous intensive treatment at the PED (3 nebulisations in 1 h of salbutamol and ipratropium bromide and steroids), time elapsed to administration to MgSO₄, classification of asthma exacerbation based on GINA criteria in both hospitals, presence of respiratory infection and consolidation in the Chest X-ray. The drug was considered to be correctly used in patients over 5 years of age in whom it was administered within 2 h of arrival at the ED after receiving BD (3 doses) and corticosteroids.

The statistical analysis was performed with the SPSS® statistical software. MgSO₄ was administered 208 times in the EDs of the 2 hospitals, hospital A 163 (mean 30,000 EDs/year) and hospital B 45 cases (18,000 EDs/year). Table 1 summarises the characteristics of the patients.

Magnesium sulphate was used more frequently in male patients with severe exacerbations, and the median age was 56 months; 98 of the 208 patients were aged less than 5 years.

In 133 of the patients, the exacerbation was associated with infection. A chest radiograph was performed in 177 patients, detecting consolidation in 56.

In 188 patients, MgSO₄ was administered after absence of improvement with conventional treatment in the PED, usually late, with administration after 2 h of arrival to the PED in 161 of the patients.

The 45 patients managed in hospital B were admitted. On the other hand, 11 of the 163 patients managed in hospital A did not require admission.

In the univariate logistic regression analysis, we found an association between correct administration of the drug (meeting the 3 aforementioned criteria) and the probability of not being admitted (OR, 0.15; 95% CI, 0.02–0.90; P = .03). This association was not confirmed in the multiple regression model, in which only the severity of the exacerbation was associated with a higher probability of admission (Table 2).

As did previous authors, we found substantial variability in the use of MgSO₄ in our area. The drug was used under circumstances that was not always consistent with the available evidence. This was particularly the case of the age of administration, as a large percentage of the patients treated with it were infants and children under 5 years. This, combined with its late administration (more than 4 h after arrival to the PED in 92% of cases) could have contributed to the poor outcomes. Another salient finding was the low proportion of patients that were not hospitalised compared to previous studies. A possible partial

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The explanation is that the administration of MgSO₄ may influence the decision to admit children with asthma exacerbations, as evinced in one of the studied hospitals. It could also be due to its use being reserved for the most severe and refractory exacerbations with the aim of avoiding admission to the paediatric intensive care unit rather than admission to the hospital, which could explain its infrequent use.

In conclusion, although the literature supports the use of iv MgSO₄ off-label in paediatrics to prevent the admission of children with asthmatic crisis, its administration in our area did not adhere to recommendations or achieve the desired effects. It would be necessary to establish correct protocols for its use and to investigate the characteristics of the responding patients in order to implement an appropriate use of the drug.
The main limitations of the study are its retrospective design and the lack of objective criteria for hospital admission.

References


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