

## Safety of prolonged magnesium sulphate infusions during treatment for severe paediatric status asthmaticus

Status asthmaticus is a common cause of emergency department visits and admission to the paediatric intensive care unit. Patients who fail to respond to inhaled beta-2 agonists and/or anticholinergic therapy often require additional therapy. Intravenous methylxanthines (e.g. aminophylline) and beta-2 agonists (e.g. salbutamol, terbutaline) are the commonly used second line agents. Magnesium sulphate has become popular in status asthmaticus although mainly as intravenous boluses. Prolonged magnesium sulphate infusion is increasingly being used, but data exploring adverse effects of its prolonged use are limited. Some of the documented adverse effects from smaller studies include nausea and emesis, facial flushing, and hypotension. Extreme hypermagnesaemia (9 - 12 mg/dL) is associated with myopathy, hyporeflexia, sedation and respiratory depression. The optimum therapeutic level of serum magnesium for status epilepticus in children is unknown. Adult studies have defined a target level of 3 to 5 mg/dL as both efficacious and well tolerated.

This study sought to evaluate the frequency and types, of adverse effects associated with prolonged (>24hrs) use of magnesium sulphate infusions for status asthmaticus. A dose of 50 to 70 mg/kg (maximum 2 g) was administered over 20 minutes followed by an infusion initiated at 25 mg/kg/hr. The median duration of therapy was 53.4 hours (range 24 - 177.5 hours). In this study, the therapeutic target was set at 4 - 6 mg/dL. Of the 1 210 magnesium levels, 82.4%

were in the therapeutic range, while only 2.8% were supratherapeutic. Significant adverse events such as hypotonia, respiratory depression requiring escalation of respiratory support, and sedation were rare in this study. Hypotension was the commonest adverse effect and was almost always diastolic. Of the non-cardiovascular adverse events, nausea and/or emesis were most common and treated with ondansetron. Supratherapeutic magnesium levels (>6 mg/dL) were uncommon and were not associated with adverse effects. Levels greater than 9 mg/dL were not recorded, and this level is probably related to more serious adverse effects. It appears that prolonged magnesium sulphate infusion is a relatively safe alternative for status asthmaticus, however the effect of diastolic hypotension in children needs further investigation. Prospective studies would better define adverse effects as they occur.

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1. Graff DM, Stevenson MD, Berkenbosch JW. Safety of prolonged magnesium sulfate infusions during treatment for severe pediatric status asthmaticus. *Pediatr Pulmonol* 2019;54(12):1941-1947. <https://doi.org/doi/pdf/10.1002/ppul.24499>

## Predictors for plication performance following diaphragmatic paralysis in children

Diaphragmatic paralysis results in loss of ability to generate functional pressure. It can be unilateral or bilateral. The causes include surgery, trauma, tumor, infections, metabolic and inflammatory conditions. Post cardiac surgery is the most common cause of diaphragmatic paralysis in children and treatment modalities include prolonged intubation, tracheostomy, diaphragmatic pacing, and plication. Asymptomatic patients with unilateral paralysis may require no treatment at all. Diaphragmatic plication for diaphragmatic paralysis can improve the respiratory status and facilitate early weaning in ventilated children. Patient selection for plication is contentious. The objectives of this study were to describe the aetiologies of diaphragmatic paralysis in children and predictors for plication in children. Eighty-eight patients met the criteria for the study. Two-thirds (67%) of the subjects had cardiac surgery related paralysis. The most frequent cardiac procedures that led to diaphragmatic paralysis were atrial switch operation (20%), Blalock-Taussig shunt (12%), and Glenn procedure (10%). A congenital cause was the most common of all noncardiac surgery related aetiologies of diaphragmatic paralysis.

Other causes included Gram-negative sepsis, pulmonary embolism, dehydration and comprised 13.7% of all noncardiac aetiologies. Twenty-seven patients (30%) had diaphragmatic plication and the reasons included ventilator dependence ( $n=14$ ), oxygen dependence ( $n=9$ ) and non-invasive positive pressure ventilation (NIPPV) dependence. ( $n=3$ ). The presence of co-morbidities like multi-organ dysfunction and sepsis increase the likelihood of diaphragmatic paralysis and plication. In conclusion, respiratory support-dependent patients with diaphragmatic paralysis from various aetiologies, who are of young ages and have comorbidities should be considered for early diaphragmatic plication.

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1. Goldberg L, Krauthammer A, Ashkenazi M, et al. Predictors for plication performance following diaphragmatic paralysis in children. *Pediatr Pulmonol* 2019;1- 6. <https://doi.org/doi.org/10.1002/ppul.24539>