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ORIGINAL ARTICLE

Prenatal treatment with magnesium sulphate: Initial clinical outcomes in pre-term infants less than 29 weeks and correlation with neonatal magnesium levels☆

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KEYWORDS
Magnesium sulphate;
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Abstract
Introduction: Antenatal magnesium sulphate ($MgSO_4$) administration has shown to be effective in minimising cerebral palsy and severe motor dysfunction at the age of 2 years.

The aim of this study is to analyse the initial clinical outcome of preterm neonates less than 29 weeks who have received prenatal $MgSO_4$, as well as to determine the relationship between the magnesium dose delivered to the mother and the magnesium concentration in the neonates.
Material and methods: A prospective cohort study was conducted on neonates of less than 29 weeks gestation admitted to the Neonatal Intensive Care Unit (NICU) of Hospital Universitario de Vigo from December 2012 to July 2015. Comparative analysis was performed on the perinatal outcomes, neonatal morbidity, mortality, and magnesium levels between the groups of neonates exposed to magnesium sulphate and the control group.
Results: A total of 42 neonates were included in the study. The mothers of 28 of them had received $MgSO_4$ as a neuroprotective agent.

Statistical significance was obtained in the mortality variable. There were no significant differences in the rest of studied variables. There was a significant correlation between the full dose of $MgSO_4$ received by the mother and the levels of magnesium in the neonate in the first 24 h of life (r^2 0.436; $P < 0.001$).

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Conclusions: A lower mortality was observed in the group that had been exposed to $MgSO_4$. No significant side effects were found as a result of administering of $MgSO_4$. The $MgSO_4$ dose received by mother has a linear relationship with the magnesium levels obtained in neonates.

PALABRAS CLAVE
Sulfato de magnesio;
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Terapia prenatal con sulfato de magnesio: evolución clínica de los recién nacidos pretérmino menores de 29 semanas y correlación con la magnesemia neonatal

Resumen
Introducción: La administración prenatal de $MgSO_4$ ha mostrado su eficacia en reducir la parálisis cerebral y la disfunción motora severa a los 2 años de edad.

El objetivo de este trabajo es estudiar la evolución clínica inicial de los neonatos menores de 29 semanas, que han recibido prenatalmente $MgSO_4$ con indicación neuroprotectora y dilucidar la asociación entre la dosis de magnesio administrada a la madre y las concentraciones de magnesio en suero neonatal.

Material y métodos: Estudio prospectivo de cohortes en el que se incluyó a los neonatos menores de 29 semanas ingresados en la Unidad de Cuidados Intensivos Neonatales del Hospital Universitario de Vigo desde diciembre del 2012 hasta julio del 2015. Análisis comparativo de resultados perinatales, de morbimortalidad neonatal y magnesemia entre el grupo expuesto prenatalmente al sulfato de magnesio y un grupo control.

Resultados: Se incluyó a un total de 42 recién nacidos, en 28 de los cuales sus madres habían recibido $MgSO_4$.

Se encontró significación estadística en la variable mortalidad. No hubo diferencias significativas en el resto de las variables estudiadas. Se obtuvo una correlación significativa entre la dosis total de $MgSO_4$ recibida por la madre y los niveles de magnesio del recién nacido en las primeras 24 h de vida (r^2 0,436; $p < 0{,}001$).

Conclusiones: Se ha obtenido una menor mortalidad en el grupo expuesto a $MgSO_4$. No se han encontrado efectos secundarios significativos derivados de la administración de $MgSO_4$. La dosis de $MgSO_4$ recibida por las madres tiene una relación lineal con los niveles de magnesio obtenidos en los recién nacidos.

Introduction

Although the survival rates of preterm newborns have increased significantly in the past 20 years, the incidence of cerebral palsy (CP) in children has remained stable through time, probably due to the increased survival of extremely preterm NBs and the associated morbidity and neurosensory impairment.[1,2]

The main risk factor for CP in children is preterm birth, and 35% of cases occur in children born at less than 34 weeks' gestation.[3] Cerebral palsy is 70 times more frequent in children born at less than 28 weeks and 40 times more frequent in children born at 28–32 weeks compared to children born to term.[4–7] The risk is inversely proportional to gestational age.

A Cochrane systematic review[8] published in 2009 concluded that administration of magnesium sulphate ($MgSO_4$) to women at risk of preterm birth, regardless of its purpose or route of administration, significantly reduces the incidence of cerebral palsy and severe motor dysfunction at age 2 years in children born before 32 weeks' gestation.

Two metaanalyses[9,10] published in 2009 suggest that the number needed to treat to prevent one case of CP is 63 pregnant women.

However, few studies have assessed the initial outcomes of newborns exposed to $MgSO_4$ before birth or described their clinical course during admission in the neonatal period. Studies in the literature have reported an increased incidence of hypotonia, intubation in the delivery room, a higher need for mechanical ventilation and patent ductus arteriosus, among other respiratory, haemodynamic,[11] neurologic and gastrointestinal[7,12] adverse effects.

On the other hand, there is currently no consensus regarding the dose, standard regimen, therapeutic window and safety of the use of $MgSO_4$ for neuroprotection. The cumulative dose of magnesium received by the mother that