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ORIGINAL ARTICLE

Surfactant replacement therapy with a minimally invasive technique: Experience in a tertiary hospital☆

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Abstract
Introduction: The minimally invasive technique known as MIST (Minimally Invasive Surfactant Therapy), is a method which allows surfactant to be administered to a patient connected to non-invasive respiratory support. Use of this therapy is growing in Neonatal Units, as it reduces the intubation rate and the pathology associated with intubation and allows surfactant to be administered to patients in need.
Patients and methods: In 2013 and 2014 in the Hospital General Universitario de Elche surfactant was delivered using this method to 19 patients, 5 of whom had a gestational age of 28 or less weeks. Data were compared with a historical cohort consisting of 28 patients with Respiratory Distress Syndrome treated initially with non-invasive respiratory support.
Results: No incidents were recorded that caused interruption of administration. A reduction in the fraction of inspired oxygen was observed in all cases after surfactant administration. Fewer intubations in the first 72 h of life were found in the treatment group compared to the control group (42% vs. 54%).
Discussion: The experience in the Hospital General Universitario de Elche shows that administration of surfactant using the MIST technique is a reproducible method of treatment, which allows surfactant distribution during spontaneous breathing with non-invasive respiratory support.

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Terapia con surfactante con técnica mínimamente invasiva: experiencia en un hospital terciario

Resumen
Introducción: La administración de surfactante mediante técnica mínimamente invasiva, conocida como MIST por sus siglas en inglés (Minimal Invasive Surfactant Therapy), es un procedimiento que permite administrar el surfactante estando el paciente conectado a ventilación no invasiva. Cada vez más utilizada en las unidades neonatales, permite reducir el número de intubaciones y la patología asociada a la misma, a la vez que no se priva de la administración de surfactante a los pacientes que lo necesitan.
Pacientes y métodos: En los años 2013 y 2014 en el Hospital General Universitario de Elche se administró surfactante mediante técnica mínimamente invasiva en 19 pacientes, 5 de ellos con una edad gestacional igual o menor de 28 semanas al nacimiento. Se realiza comparación con una cohorte histórica de 28 pacientes con distrés respiratorio neonatal que fueron inicialmente tratados con soporte respiratorio no invasivo.
Resultados: No se registraron complicaciones que obligaran a detener la técnica. Se observó en todos los casos una disminución de las necesidades de la fracción inspirada de oxígeno. El número de intubaciones fue menor en el grupo MIST respecto al grupo control (42% vs. 54%).
Discusión: La experiencia recopilada en el presente estudio muestra que la administración de surfactante con técnica MIST es un procedimiento reproducible que permite una buena distribución del surfactante en ventilación no invasiva.

Introduction

The addition of exogenous surfactant to treat hyaline membrane disease (HMD) has unquestionably been revolutionary. There are numerous studies showing how administration reduces mortality and morbidity among patients,[1] while mechanical ventilation has been associated with an increase in morbidity.[2]

Studies in animal models show that distribution of exogenous surfactant and incorporation into the endogenous metabolism is improved when surfactant is administered during spontaneous breathing with nasal continuous positive airway pressure instead of during conventional mechanical ventilation (MV).[3]

One alternative to administering surfactant and avoiding MV is the intubation–surfactant–extubation (INSURE) method. With this method, surfactant is administered after intubation immediately followed by extubation and non-invasive ventilation (NIV). Some studies have shown that this method reduces incidence of morbidity, air-leak syndrome, and the need for MV.[4,5] Despite these advantages, it should not be forgotten that the INSURE method requires the patient to be intubated, with the risks inherent to this procedure, and distribution of surfactant under intermittent positive pressure delivery is less effective than under spontaneous breathing. Added to this are the difficulties involved in extubation due to the need to sedate the infant once surfactant has been administered.[6]

MIST was developed to facilitate administration of exogenous surfactant without the need for MV. MIST techniques include nasopharyngeal instillation,[7] administration through a laryngeal mask,[8] aereosolisation[9] and techniques requiring tracheal catheterisation. Of these, the most widely used today is tracheal catheterisation, due to its ease of use, the possibility of administering surfactant quickly, and its effective distribution. Various methods have been developed using the tracheal catheterisation procedure.

Kribs et al. suggested the administration of surfactant using a technique known as the Cologne method, which consists of introducing a 4–5 FG nasogastric tube (NGT) in the trachea with the aid of Magill forceps. After cannulating the trachea, the laryngoscope is removed, surfactant is administered, and then the NGT is removed, maintaining the patient on NIV at all times. This technique can be challenging for professionals unaccusomed to using forceps.[10–12] A variant of the Cologne method is known as Take Care, which also uses an FG NGT but does not require the use of Magill forceps.

The Hobart method was devised with the aim simplifying the technique; it was developed by Dargaville and does not use Magill forceps. This is achieved by using a 16 G angiocatheter, more rigid than an NGT, which allows greater control of the direction of the catheter, introducing it directly through the vocal cords, and administering the surfactant while maintaining NIV.[13]

Studies comparing surfactant administration by means of the INSURE method with MIST techniques have shown that MIST reduces cases of bronchiopulmonary dysplasia, measured as an NNT of 10 in the clinical trial published by Kanmaz et al.[6]