Bol Med Hosp Infant Mex. 2016;**73(5)**:318–324

Boletín Médico del
Hospital Infantil de México

www.elsevier.es/bmhim

RESEARCH ARTICLE

Pulmonary complications associated with mechanical ventilation in neonates☆

Cristabel Torres-Castro[a], Jaime Valle-Leal[a,*], Alba J. Martínez-Limón[b], Zaira Lastra-Jiménez[c], Lesvia Carmina Delgado-Bojórquez[d]

[a] *Departamento de Pediatría, Hospital General Regional No.1, Instituto Mexicano del Seguro Social, Ciudad Obregón, Sonora, Mexico*
[b] *Departamento de Neonatología, Hospital General Regional No. 1, Instituto Mexicano del Seguro Social, Ciudad Obregón, Sonora, Mexico*
[c] *Departamento de Epidemiología, Hospital General Regional No. 1, Instituto Mexicano del Seguro Social, Ciudad Obregón, Sonora, Mexico*
[d] *Dirección del Hospital General Regional No. 1, Instituto Mexicano del Seguro Social, Ciudad Obregón, Sonora, Mexico*

Received 10 March 2016; accepted 8 August 2016
Available online 7 December 2017

KEYWORDS
Atelectasis;
Complications;
Pneumothorax;
Pneumonia;
Mechanical ventilation

Abstract
Background: To determine the incidence of pulmonary complications associated with mechanical ventilation in patients admitted to a second level hospital neonatal intensive care unit (NICU).
Methods: Retrospective analytical study records of newborns admitted to NICU who receiving mechanical ventilation in a secondary hospital health care. Demographic mechanical ventilation, intubation and complications data reported in the clinical record were collected and analyzed.
Results: In 53 patients selected, a total of 40 complications were found. The annual incidence of pulmonary complications associated with mechanical ventilation in the NICU, at a second level hospital at Sonora was 49.05% (95% CI 0.35 to 0.62). The most frequent pulmonary complications were atelectasis 35%, pneumonia 27.5%, pneumothorax 15%, bronchopulmonary dysplasia 15%, pneumomediastinum 15% and pulmonary hemorrhage 2.5%.
Conclusions: The presentation of pulmonary complications secondary to mechanical ventilation in neonatal patients is similar to that reported in developing countries. Atelectasis is the most common pulmonary complication in neonatal patients undergoing mechanical ventilation.

☆ Please cite this article as: Torres-Castro C, Valle-Leal J, Martínez-Limón AJ, Lastra-Jiménez Z, Delgado-Bojórquez LC. Complicaciones pulmonares asociadas a ventilación mecánica en el paciente neonatal. Bol Med Hosp Infant Mex. 2016;73:318–324.

* Corresponding author.
E-mail address: valle_jaime1@hotmail.com (J. Valle-Leal).

https://doi.org/10.1016/j.bmhime.2016.08.001

PALABRAS CLAVE
Atelectasia;
Complicaciones;
Neumotórax;
Neumonía;
Ventilación mecánica

Complicaciones pulmonares asociadas a ventilación mecánica en el paciente neonatal

Resumen
Introducción: Se buscó determinar la incidencia de complicaciones pulmonares asociadas a ventilación mecánica en pacientes ingresados a un servicio de cuidados intensivos neonatales (UCIN) en un hospital de 2° nivel.
Metodología: Estudio analítico retrospectivo en expedientes de recién nacidos ingresados a una sala de UCIN y que recibieron ventilación mecánica en un hospital de segundo nivel de atención médica. Se recabaron datos demográficos, de la ventilación mecánica, la intubación y complicaciones reportadas en el expediente clínico y se analizaron en el programa estadístico SPSS 20.
Resultados: De los 53 pacientes seleccionados se encontraron un total de 40 complicaciones. La incidencia anual de las complicaciones pulmonares asociadas a ventilación mecánica en el área de UCIN del servicio de Neonatología, en un hospital de segundo nivel en Sonora fue de 49.05% (IC 95% 0.35-0.62). Las complicaciones pulmonares más frecuentes fueron: atelectasia 35%, neumonía 27.5%, neumotórax 15%, displasia broncopulmonar 15%, neumomediastino 15% y hemorragia pulmonar 2.5%.
Conclusiones: La presentación de complicaciones pulmonares secundarias a ventilación mecánica en pacientes neonatales es similar a lo reportado en países en desarrollo. La atelectasia es la complicación pulmonar más frecuente en los pacientes neonatales sometidos a ventilación mecánica.

1. Introduction

Ventilatory assistance allows for the recovery and maintenance of the patient with cardiorespiratory failure. Thanks to this intervention, many neonatal patients' lives are saved in the neonatal intensive care units (NICUs). Nevertheless, the use of this supportive therapy induces lung injury, leads to irreversible structural damage and alters respiratory and hemodynamic function causing complications that impact the patients' evolution and prognosis[1–5].

Scientific advances have allowed relying on new and better devices for respiratory assistance, which have decreased neonatal mortality but not complications secondary to their use, given that many of them, especially premature neonates, depend on the level of pulmonary development of the patient[6].

Risk factors of the premature patient that make him more vulnerable to complications secondary to mechanical ventilation have been widely described. Factors that stand out include central neurologic maturity and respiratory muscle weakness, poor alveolar development of the lungs, deficient surfactant synthesis and increase of alveolar-capillary membrane thickness[7]. Also, some patient-related factors such as gestational age less than 29 weeks, birth weight less than 1500 g, neonatal sepsis, male gender and the presence of a persistent ductus arteriosus, as well as ventilator support, FiO2 concentration and the number of days on ventilator support[8–12].

Recent articles demonstrate the relationship between mechanical ventilation and lung injury in the preterm patient, which has been directly associated with surfactant deficiency and the inflammatory effect that results from secondary invasion by ventilator support. In the same way, the utility of prophylactic surfactant has been demonstrated, which reduces mortality compared to therapeutic administration, and decreases the risk of bronchopulmonary dysplasia, pneumothorax and pulmonary hemorrhage[13–15].

The frequency of complications associated with mechanical ventilation in pediatric patients has been reported between 40-150%, depending on the population, since one patient can present more than one complication[8,9,11]. At the national level, there is scarce information about this topic in the neonate. Lopez-Candiani et al., in 2007, reported a study conducted in Mexico City in neonates that were treated with mechanical ventilation. They found a frequency of complications of 81%, being the most common atelectasis, accidental extubation, hypoxia during intubation, hospital-acquired pneumonia and bronchopulmonary dysplasia[10]. Similar studies in our region are not documented.

The objective of the present study was to describe the presentation of pulmonary complications associated with mechanical ventilation in patients of a NICU in a secondary care hospital in Sonora, Mexico.

2. Methods

Using a transversal, analytic and retrospective design, medical records of patients admitted to the NICU, who required assisted mechanical ventilation for more than eight hours during the period of September 2014 to September 2015 were included. All the patients should have a complete medical record to fill the data sheet.