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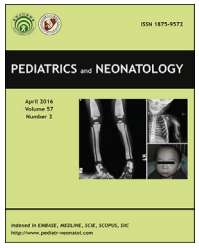

ORIGINAL ARTICLE

Comparison of Three Different Administration Positions for Intratracheal Beractant in Preterm Newborns with Respiratory Distress Syndrome

Ahmet Karadag [a], Ramazan Ozdemir [a,*], Halil Degirmencioglu [b], Nurdan Uras [b], Ugur Dilmen [b], Gokmen Bilgili [c], Omer Erdeve [d], Ufuk Cakir [d], Begum Atasay [d]

[a] *Department of Pediatrics, Division of Neonatology, School of Medicine, Inonu University, Malatya, Turkey*
[b] *Neonatal Intensive Care Unit, Zekai Tahir Burak Maternity and Teaching Hospital, Ankara, Turkey*
[c] *Department of Pediatrics, Division of Neonatology, School of Medicine, Celal Bayar University, Manisa, Turkey*
[d] *Department of Pediatrics, Division of Neonatology, School of Medicine, Ankara University, Ankara, Turkey*

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Key Words
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Background: The aim of this study was to compare the efficacy and adverse effects of various intratracheal beractant administration positions in preterm newborns with respiratory distress syndrome.
Methods: This study was performed on preterm newborns with respiratory distress syndrome. The inclusion criteria were being between 26 weeks and 32 weeks of gestational age, having a birth weight between 600 g and 1500 g, having received clinical and radiological confirmation for the diagnosis of respiratory distress syndrome (RDS) within 3 hours of life, having been born in one of the centers where the study was carried out, and having fractions of inspired oxygen (FiO_2) $\geq$ 0.40 to maintain oxygen saturation by pulse oximeter at 88—96%. Beractant was administered in four positions to Group I newborns, in two positions to Group II, and in neutral position to Group III.
Results: Groups I and II consisted of 42 preterm infants in each whereas Group III included 41 preterm infants. No significant differences were detected among the groups with regards to maternal and neonatal risk factors. Groups were also similar in terms of the following complications: patent ductus arteriosus (PDA), pneumothorax, intraventricular hemorrhage (IVH),

* Corresponding author. Department of Pediatrics, Division of Neonatology, School of Medicine, Inonu University, Turgut Ozal Medical Center, 44280 Malatya, Turkey.
E-mail address: ramazanoz@yahoo.com.tr (R. Ozdemir).

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chronic lung disease (CLD), retinopathy of prematurity (ROP), necrotising enterocolitis (NEC), death within the first 3 days of life, death within the first 28 days of life, and rehospitalization within 1 month after discharge. Neither any statistically significant differences among the parameters related with surfactant administration, nor any significant statistical differences among the FiO_2 levels and the saturation levels before and after the first surfactant administration among the groups were determined.

Conclusion: In terms of efficacy and side effects, no important difference was observed between the recommended four position beractant application, the two position administration, and the neutral position.

1. Introduction

Respiratory distress syndrome (RDS) remains the most frequent cause of mortality and morbidity in preterm newborns. However, it is known that administration of exogenous surfactants improves alveolar oxygenation and reduces mortality and morbidity rates among preterm newborns with RDS.[1–4] Several types of surfactant preparations, including synthetic preparations, which are protein-free, and natural preparations, from bovine or porcine origin, have been used in the treatment of RDS.[5–9]

Beractant is a bovine-derived natural surfactant used in preventing and treating RDS in premature newborns. Survanta (AbbVie Inc., North Chicago, IL, USA) is the only beractant preparation administered worldwide. The Food and Drug Administration (FDA) has approved the administration of Survanta for prevention and treatment of RDS in newborns since 1991.[10] The manufacturing company acquired FDA approval for the product by defining the administration of the beractant preparation as follows: for a homogenous distribution of Survanta throughout the lungs, each total dose is divided into four quarter-doses, also known as aliquots (4 aliquots = 1 total dose). However, there are some difficulties concerning the administration of the surfactant in four positions. In the application of certain surfactant preparations, infants are not obliged to be in position.[10] In addition, the fact that surfactant can be administered in a neutral position has also established a tendency in neonatologists to apply surfactant in positions other than the four positions offered by the manufacturer. In different countries, many neonatologists use the beractant either in the two positions or in the neutral position, despite manufacturer's instructions. Although widespread in practicality, there are no data concerning the efficacy and diverse effects of the beractant application apart from those of the four positions in the early and late periods.

In this randomized controlled multicenter study, our aim was to compare the efficacy and side effects of beractant application in the four positions suggested by the manufacturer, in two positions, and in the neutral position in the early and late periods.

2. Methods

The following randomized controlled multicenter study was conducted in four different centers in Turkey. Preterm newborns were considered eligible for the study when they met the following inclusion criteria: being between 26 weeks and 32 weeks of gestational age, having a birth weight between 600 g and 1500 g, having received clinical and radiological confirmation for the diagnosis of RDS within 3 hours of life, having been born in one of the centers where the study was carried out, and having fractions of inspired oxygen (FiO_2) $\geq$ 0.40 to maintain oxygen saturation by pulse oximeter at 88–96%. Preterms with chromosomal defects, asphyxia, congenital heart and lung diseases, and those who had or needed chest compression or drug use in the delivery room, along with preterm babies who were delivered from mothers with membrane rupture for $>$ 2 weeks were all excluded from the study. The Institutional Ethics Committee of Inonu University, Malatya, Turkey approved the initiation of the study, and parental consent was obtained for all participants.

All newborns in the study were diagnosed with RDS both clinically and radiologically. Tachypnea ($>$ 60 breaths/min), retractions, nasal flaring, grunting, the need to maintain the oxygen saturation at $\geq$ 86% with $FiO_2 \geq 0.40$ in addition to the chest radiograph results with $\geq$ 2 Grade 2 RDS findings confirmed the RDS diagnosis. The classification of pulmonary X-ray findings for RDS included the following criteria: Grade 1, slight reticular (slightly granular) decrease in transparency of the lung with no certain difference from normal findings; Grade 2, soft decrease in transparency with an air–bronchogram overlapping the heart; Grade 3, gradual but strong decrease in transparency, as well as a blurry diaphragm and heart; and Grade 4, practically homogenic lung opacity.[11]

The patients were randomized into three different groups according to surfactant administration positions. In Group I, the surfactant was administered in four positions whereas it was administered in two positions in Group II, and in the neutral position in Group III (Figures 1–3). In Group I, the manufacturer's suggested positions were followed: head and body inclined 5–10° down with the head turned to the right; head and body inclined 5–10° down