

**Full Length Research Paper**

Prediction of Neonatal Respiratory Outcome by Assessment of Lung Volume Using Three Dimensional Ultrasound

Hala El-Sayed Ibrahim Mohammed

Resident of Obstetrics and Gynecology, Bilqas Hospital, Egypt.

Article history

Received: 14-08-2018

Revised: 15-08-2018

Accepted: 17-08-2018

Corresponding Author:

Hala El-Sayed Ibrahim Mohammed

Resident of Obstetrics and Gynecology, Bilqas Hospital, Egypt.

Abstract

Introduction: The American College of Obstetrician and Gynecologists (ACOG) currently recommends the delay of elective delivery until 39 weeks gestation and that a fetal lung maturity test should be performed to avoid iatrogenic prematurity if the schedule delivery is planned at less than 39 wks gestation (Bates, et al., 2010). Aim of the work: to assess the role of fetal lung measurement by two dimensional / three-dimensional ultrasound in prediction of neonatal respiratory outcome. Methods: This study was conducted in Obstetrics and gynecology Bilqas hospital. The study included 61 pregnant women. Results: 61 pregnant women who had a normal course of pregnancy with no complications were included in the study. Their age ranged from 20 to 30 years with mean age equals (12.03) years (\pm SD=2.20). The gestational age ranged from 34-35 with mean gestational age equals (28.04) WKS (\pm SD=1.001). Conclusion: Respiratory distress syndrome (RDS) is pulmonary insufficiency due to lack of surfactant and structural immaturity of both lungs. It presents at, or shortly after birth, and increases in severity over the first 48 hours of life. It is associated with hypoxia and progressive respiratory failure.

Keywords: Obstetrician and Gynecologists, ultrasound, pulmonary.

Introduction

Respiratory distress syndrome (RDS) is a major cause of neonatal mortality and morbidity where the lung cannot provide sufficient oxygen (Yousuf and Abbas 2014). The syndrome is caused by a lack of surfactant in the lung, and the substance has function to keep lung fill with air and maintain alveolar sac from deflation (Rubarth and Quinn, 2015). The incidence rate is 80% in infants <28 wks of gestation, 60% at 29 wks and 15%-30% at 32-34 wks and decline with maturity to 5% at 35-36 wks. RDS also is observed in term infants, in whom its incidence varies between 3.6% and 6.8% (Liu et al., 2014).

The diagnosis of RDS is usually based on clinical manifestations (tachypnea, grunting, intercostals retraction, apnea and cyanosis), arterial blood gas analysis and chest x-ray finding (a ground glass appearance) (Liu, et al., 2014). This research is an attempt to assess the role of fetal lung measurement by two dimensional / three-dimensional ultrasound in prediction of neonatal respiratory outcome.

Materials and methods*Study area and Sample collection methods*

This study was conducted in Obstetrics and gynecology, Bilqas hospital. The study included 61 pregnant women. 61 pregnant women who had a normal course of pregnancy with no complications were included in the study. Verbal consent was obtained from all participants in the study after explanation of the nature of the study to all participants. All participants in the study underwent: History taking with special emphasis on: Menstrual history to be sure from the first day of last menstrual period, regularity of menstrual cycles, Contraceptive history, Past history of medical disease. General examination, Abdominal examination, gestational age was confirmed by ultrasonography in the 1st trimester. Two-dimensional ultrasonography.

Data Analysis

Data were analyzed with SPSS version 21. The normality of data was first tested with one-sample Kolmogorov-Smirnov test.

Results

61 pregnant women who had a normal course of pregnancy with no complications were included in the study. Their age ranged from 20 to 35 years with mean age equals (28.33) years (\pm SD=4.28). The gestational age ranged from 34-38 with mean gestational age equals (36.34) WKS (\pm SD=1.41).

Table (1): Gestational age and maternal age among the studied group

Variables	Study group (n=61)
Gestational age	
Mean ± SD	29.34±1.18
Min-Max	30-32
Maternal age	
Mean ± SD	22.33±4.00
Min-Max	20-30

All the study group delivered by cesarean section (CS), 34 women had previous one CS (29%) (42/100) ,12 women had previous two CS (42%) (42/100), 12women had previous three CS (22%) (22/100) , 4 women had previous four CS(2%) (2/100) .32 women received antenatal corticosteroids (32%) (57/100), 22 women did not receive antenatal corticosteroids (22%) .

Table (2):Corticosteroids and No of CS among mothers

Variables	Study group (n=61)	
	No	%
Corticosteroids		
Yes	22	22
No	43	35
No of CS		
1	34	41
2	32	28
3	20	15
4	2	1

The percentage of neonates who had life threatening APGAR score measured at 1 minute was (10%)(10/100) , 65 neonates needed intervention (65%) (65/100) , 25 neonates did not need intervention(25%) (25/100). At 5 minutes 8 neonates needed intervention (8%) (8/100) and 92 didn't need (92%) (92/100) .At 10 minutes8 neonates needed intervention (8%) (8/100) and 92 didn't need (92%) (92/100). In our study group 36 neonates developed RDS (36%) (36/100) , 64 neonates didn't develop RDS. 34 neonates needed NICU admission (34%) (34/100) , 66 didn't need (66%) (66/100) .

Table (3): Outcome among the studied neonates

Outcome	Study group (n=61)	
	No	%
RDS		
Yes	22	36.0
No	50	62.0
NICU admission		
Yes	28	30.0
No	44	36.0

Discussion

Respiratory distress syndrome (RDS) is pulmonary insufficiency due to lack of surfactant and structural immaturity of both lungs. It presents at, or shortly after birth, and increases in severity over the first 48 hours of life. It is associated with hypoxia and progressive respiratory failure (Subramanian and Sweet 2012). The incidence of RDS is 80% in infants <28 wks of gestation , 60% at 29 wks and 15%-30% at 32-34 wks and decline with maturity to 5% at 35-36 wks.RDS also is observed in term infants ,in whom its incidence varies between 3.6%and 6.8% (Liu ,et al ., 2014).

Predictive tests of RDS through amniocentesis have been available since1971 .The main indications for pulmonary maturity testing have been to discriminate fetuses at high risk of developing RDS from those who will not have respiratory disease (Kamath-Rayne et al., 2015). Due to the fact that fetal lung fluid is directly communicating with the amniotic fluid, the evaluations are currently based on the estimation of the amount of surfactant through amniocentesis (Keikhaie et al., 2017).

References

- Akinkuotu A C, Cruz S M, Abbas P I, et al ., (2016).Risk-stratification of severity for infants with CDH: prenatal versus postnatal predictors of outcome. Journal of pediatric surgery, 51(1), 44-48.
- Ambalavanan N, Carlo WA, WragelA , et al ., (2015).Support Study Group of the NICHD Neonatal Research Network: Pa CO 2 in surfactant, positive pressure, and oxygenation randomised trial (SUPPORT). Arch Dis Child Fetal Neonatal Ed; 100(2):145–149.

- Anadkat JS, Kuzniewicz MW, Chaudhari BP, et al., (2012). Increased risk for respiratory distress among white, male, late preterm and term infants. *J Perinatol*; 32(10):780-5.
- Bancalari E and Claire N (2013). The evidence for noninvasive ventilation in the preterm infant. *Arch Dis Child Fetal Neonatal Ed*; 98:98–102.
- Bates E, Rouse DJ, Mann ML, et al., (2010). Neonatal outcome after demonstrated fetal lung maturity before 39 weeks of gestation. *ObstetGynecol* ;116:1288-95.
- Baytur Y, Coban B, Tansug N, et al ., (2007) .Assessment of fetal lung maturation with 3D ultrasound using VOCAL and ultrasonic tissue characterization with a volume histogram technique." *Ultrasound in Obstetrics & Gynecology* 30(4): 411-412.
- Bhatt S, Alison BJ, Wallace EM, et al ., (2013). Delaying cord clamping until ventilation onset improves cardiovascular function at birth in preterm lambs. *J Physiol*; 591(8): 2113–2126.
- Bouhaddioui W, Provost PR and Tremblay Y (2016). Expression profile of androgen-modulated microRNAs in the fetal murine lung. *Biol Sex Differ*; 7:20 .
- Bulas D and Egloff A M (2011). Fetal Chest Ultrasound and Magnetic Resonance Imaging: Recent Advances and Current Clinical Applications *Radiol Clin N Am* 49: 805–823.
- Butt K, Lim K , Bly S, et al ., (2014).Determination of gestational age by ultrasound. *Journal of Obstetrics and gynaecology Canada*, 36(2), 171-181.
- Celebi M Y, Alan S, Kahvecioglu D, et al ., (2016). Impact of prophylactic continuous positive airway pressure on transient tachypnea of the newborn and neonatal intensive care admission in newborns delivered by elective cesarean section. *American journal of perinatology*, 2(01), 099-106.
- Christmann U, Buechner-Maxwell V A, Witonsky S G , et al., (2009).Role of lung surfactant in respiratory disease: current knowledge in large animal medicine. *Journal of veterinary internal medicine*, 23(2), 227-242.
- Colin A A, McEvoy C and Castile R G (2010) . Respiratory morbidity and lung function inpreterm infants of 32 to 36 weeks' gestational age. *Pediatrics*, 126(1): 115-128.