Relationship between Ultrasonic Marker of Fetal Lung Maturity and Lamellar Body Count

Khadije Rezaie Keikhaie, Kolsoum Rezaie Kahkhaie, Nooshin Mohammadi, Nooshin Amjadi, Aliye Ahmadi Forg, Abbas Ali Ramazani

Abstract: Background: The aim of this study was prediction the fetal lung maturity by ultrasonic markers and comparison by lamellar body count and fetal outcome.

Methods: A prospective Longitudinal study Department of perinatology of performed Emam Khomeini hospital and Mirza Kochak Khan Hospital in Tehran, Iran from March 2013 to January 2014. 100 pregnant women (37-40 weeks of gestation) who were admitted for elective cesarean section and referred for an obstetric ultrasound scan at the same day of their elective cesarean section were included. Scanning with linear ultrasound with convex transducer frequency of 3.5 MHZ was utilized to measure the biparietal diameter, Amniotic fluid vernix and placental grading. Statistical analysis was performed using Spss version 20. Validity of the indicators compared with lamellar body count and fetal outcome.

Results: In this study, from 100 patients under study, 8 cases were hospitalized in NICU (neonatal intensive care unit) which all of them had LAMELAR BODY COUNT < 14000 (10000-14000). There were 6 boys and 2 girls. In this study, there was no perinatal mortality.

Conclusions: In study we used ultrasonic marker of fetal lung maturity and related this to lamellar body count and neo natal outcome. The ultrasonic marker of fetal lung maturity can reduce mortality and morbidity in neonate.

Keywords: Fetal lung maturity by ultrasound■Placental grading■Lamellar body count

Author affiliations: Khadije Rezaie Keikhaie, Maternal Fetal Medicine, Obstetric and Gynecology, Maternal and Fetal Health Research Center, Zabol University of Medical Sciences, Zabol, Iran; Kolsoum Rezaie Kahkhaie, Zabol Medicinal Plants Research Center, University of Medical Sciences, Zabol, Iran; Nooshin Mohammadi, Maternal Fetal Medicine, Obstetrics and Gynecology, Kermanshah University of Medical Sciences, Kermanshah, Iran; Nooshin Amjadi, Maternal Fetal Medicine, Obstetric and Gynecology, Maternal and Fetal Health Research Center, Zabol University of Medical Sciences, Zabol, Iran; Aliye Ahmadi Forg, Maternal Fetal Medicine, Obstetric and Gynecology, Maternal and Fetal Health Research Center, Zabol University of Medical Sciences, Zabol, Iran; Abbas Ali Ramazani, Maternal Fetal Medicine, Obstetric and Gynecology, Maternal and Fetal Health Research Center, Zabol University of Medical Sciences, Zabol, Iran

Correspondence: Khadije Rezaie Keikhaie, Maternal Fetal Medicine, Obstetric and Gynecology, Maternal and Fetal Health Research Center, Zabol University of Medical Sciences, Zabol, Iran., email: rezaie.azar@ymail.com

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INTRODUCTION

Respiratory distress syndrome (RDS) is a major cause of neonatal mortality and morbidity where the lung cannot provide sufficient oxygen.[1,2] A study in united states conclude RDS is common, expensive and usually fatal[3] and many of these infants will require long term follow up[4,5] disorder of the surfactant system have a major role in RDS[6,7] in management of elective cesarean section to avoid Iatrogenic.

RDS American College of obstetricians and gynecologist (ACOG) recommends that obstetricians confirm fetal pulmonary maturity prior to elective delivery less than 39 weeks gestation.[8] Although Gold standard measures of fetal lung maturity is by Amniocentesis.[9]

This procedure is invasive and some complication.[10,11]

Lamellar body count used to determine fetal lung maturity and found to be an easy, rapid and cost effective and a diagnostic test in predict neonatal respiratory distress syndrome.[12–14]

Fetal lung maturity can assess indirectly by ultra sonographic marker of fetal lung maturity.

In view of complication of Amniocentesis it has become necessary to find alternative method to lamellar body count to determination for timing for repeat cesarean section fetal lung maturity (FLM) can assess indirectly by ultrasonic Biparietal diameter[15] placental grading[16–18] breathing movement[19–22] and by performing of Doppler ultrasound[23,24] and by obtain ratio of the lung and liver[25] FLM can assess by MRI.[26] Also can assess by detection of echogenic thalamus in fetus ultra-sonogram[27] and by ultrasonic Image of fetal intestine.[28]

The purpose of this study was to evaluate the relation between ultrasonically determined FLM and lamellar body count and neonatal outcome.

MATERIAL AND METHODS

This study is a prospective study done on 100 pregnant women aged at 36-40 years old referring to Emam Khomeini, Vali-asr and Mirza Koochak khan hospital in Tehran, Iran for elective cesarean during March 13th and Jan 2014. Gestational age (GA) was recorded to be at the first quarter by means of Ultrasonic devices and in case of certain last menstrual period, recorded to be at the second quarter. The exclusion criteria included multifetal pregnancy, fetal growth for less than 10th percentile or 90th percentile for GA, structure or chromosome disorders. The internal diseases such as diabetes, kidney failure, hypertension, vaginal bleeding, uterine contraction, oligohydramnios or premature rupture of membranes (PROM). All patients were aware of the study and they were signed a written constant.

As a sonographic amniotic fluid index <5 cm, active infection and reported illicit drug. The samples were excluded from the terminal analysis in case of Meconium or Blood in amniotic fluid[29] or in case of major anomaly in fetus shown after birth. Inclusion criteria were Singleton

Table 1. Indication of cesarean section.

	Indication of cesarean section s%
Once previous cesarean	32
Twice previous cesarean	28
Elective	37
Breech	2
Previous myomectomy	1
Total	100

pregnancy, a proportionate amount of amniotic fluid and mothers with RH^{+}.

All of the included subjects were monitored by Ultrasonic by Ultrasonic devices, model of SIEMENS with 230 v made in USA and linear probe with 3.5 MHZ (before Cesarean). During Cesarean, amniotic fluid was extracted for 5cc. The investigation from the viewpoint of lamellar body count was done by Lab using the method of Hematology Analysis.[13] The blood samples and samples with Meconium were excluded from analysis. Demographic information of mother and fetus and also the outcome were investigated.

None of the samples received Curtin during pregnancy. Mother's information including the Gestational age, the reason of Cesarean, the results of lamellar blood count (LBC), the number of children, the height and weight of mother were investigated.

Fetus information included the gender of fetus, fetal weight, Apgar, the results of chest radiography in case of being done, hospitalized in NICU, Hypoglycemia and hypothermia A, RDS, TTN (transient tachypnea of the newborn) and supplementary Oxygen therapy.

The sample of amniotic fluid was extracted by Syringe 5cc after cutting KERR on Uterus and sent to Lab for investigation of LBC and more than 46×10^3 was considered to be mature, 45×10^3 intermediate and 14×10^3 immature.[30]

In case of blood in the amniotic fluid, the collected sample was excluded by vaginal.[29]

During ultrasound examination we look for the biparital diameter, and the state of echogenicity of the thalamus was recorded as echogenic or echolucent in comparison with the brain tissue between the thalamus and the parital bone which is echogenic throughout pregnancy, if the echogenicity of the thalamus appear like brain tissue, it is considered echogenic, while if it appear without echoes inside the thalamus it is echolucent.

Ultrasonic image of fetal intestine, the amniotic fluid particles (vernix) and the placental changes were also measured as a part of fetal wellbeing assessment.

Ultra sonic image of fetal

Intestine divided to four stage:

In stage 1, the intestine has a uniform gray appearance.

In the stage 2, the colon can be identified by small echo free areas.

In stage 3, these areas become larger.

In stage 4, colon becomes redundant and the haustra appear.

Statistical analysis

Statistical analysis was performed using Spss version 20. Data are presented as frequency and percentage. Validity of the indicators compared with lamellar body count and fetal outcome.

RESULTS

During this study 100 pregnant women from 36 to 40 (average 33 y, 38w+3d) included. Indication of cesarean section showed in Table 1.

Sensitivity and specificity of 5 ultrasonic criteria reported in Table 2. Among ultrasonic criteria BPD (BiParetal Diameter) above 9.2 cm showed the most

Table 2. Sensitivity and specificity of 5 ultrasonic criteria.

Ultrasound parameters	Sensitivity	Specificity	PPV	NPV
BPD (BiParetal diameter) above 9.2 cm	87.5%	92.39%	50%	98.83%
Placental calcification	75%	86.90%	33.33%	97.56%
Presence of amniotic fluid vernix	62.5%	88.04%	31.25%	96.42%
Echogenic thalamus	75%	70.65%	18.18%	97.01%
Fetal intestine	62.5%	98.91%	83.33%	96.80%

PPV, positive predictive values; NPV, negative predictive values.