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Comparison between Amniotic Fluid Lamellar Body Count and Fetal Pulmonary Artery Doppler Indices in Predicting Fetal Lung Maturity in Cases of PPROM

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Abstract

Background: Preterm premature rupture of membranes (PPROM) causes serious neonatal complications mainly respiratory distress syndrome (RDS) which affect large portion of pregnancies complicated by PPROM.

Aim of Study: To compare between lamellar body count and fetal pulmonary artery Flow velocity wave forms for prediction of fetal lung maturity.

Patients and Methods: This study was carried on 120 patients presented with pre-labor rupture of membranes at Al-Galaa Teaching Hospital, to compare between the roles of fetal pulmonary artery flow velocity waveforms and amniotic fluid lamellar bodies count for prediction of fetal lung maturity, in a prospective cohort study. Sonographic and amniotic fluid characteristics revealed mean amniotic fluid index (AFI) of 4.1cm with mean At/Et ratio (0.2). A mean level of lamellar body count 41683 was detected.

Results: The cutoff value for LBC in predicting fetal lung maturity in our study was >20,000/µL. Comparison between cases with RDS and cases without RDS regarding LBC level and fetal MPA Doppler indices revealed statistically significant differences on basis of LBC level (*p*-value 0.002), fetal MPA PI (*p*-value 0.003), RI (*p*-value 0.002) and At/Et ratio (*p*-value <0.001). It was noted that S/D ratio was of no significance between cases with RDS & those without RDS. Fetal MPA At/Et ratio was more sensitive and also more specific in prediction of lung maturity than lamellar body count which makes it a better choice than the invasive procedure entailing LBC measurement.

Conclusion: Both main pulmonary artery (MPA) At/Et ratio and lamellar body count (LBC) be used in detecting fetal lung maturity and predicting neonatal respiratory distress but MPA AT/ET ratio are more sensitive, specific and less invasive.

Key Words: *PPROM – LBC – Fetal pulmonary artery doppler – Predicting fetal lung maturity.*

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Introduction

PRETERM premature rupture of membranes (PPROM) affects about 3% of pregnancies and is associated with serious maternal complications, which result in significant neonatal morbidity and mortality **[1]**.

Among the serious neonatal complications, respiratory distress syndrome (RDS) has been reported to affect between 23% and 68% of pregnancies complicated by PPROM, and it is more prevalent in pregnancies complicated by PPROM in the second trimester. Delivery of infants with documented lung maturity in pregnancies with PPROM from 32 to 36 weeks of gestation may decrease both maternal and neonatal infectious morbidity without worsening neonatal outcomes **[2]**.

To assess the FLM, several methods can be used to determine the relative concentration of surfactant-active phospholipids in the amniotic fluid. Currently, the gold standard for the determination of FLM is the evaluation of phospholipids (i.e., measurement of lecithin/sphingomyelin ratio and quantification of phosphatidylglycerol) in amniotic fluid samples by thin-layer chromatography **[3]**.

These tests are, however, time-consuming and not continuously available at most hospitals. A rapid test that does not require any reagents is the quantification of the number of lamellar bodies in the amniotic fluid. Lamellar bodies are lamellated phospholipids that represent a storage form of surfactant. For this purpose, a consensus lamellar body count (LBC) protocol is published 11 for which an LBC cutoff value of 50,000/ gL is used

to suggest lung maturity, depending on the hematology analyzer used [4].

Among the multiple ultrasound parameters studied to predict neonatal respiratory complication (NRCs), the pulmonary artery acceleration to ejection time (PATET) ratio has been shown to predict respiratory complications in late preterm neonates [5].

As reported by several studies, the technical feasibility of PATET measurement in all included cases support its utility in clinical arena. In addition, the simplicity of the calculations involved and the safety profile make this method an attractive alternative to amniocentesis-based approaches. The PATET measurement may provide a non-invasive means of determining fetal lung maturity with relatively acceptable levels of sensitivity, specificity and predictive values. Investigations involving a broader gestational age range and a bigger sample size showed its accuracy for predicting neonatal outcomes and demonstrated a better correlation coefficient and thereby predictive value [6].

Aim of the study was to compare between lamellar body count and fetal pulmonary artery Flow velocity wave forms for prediction of fetal lung maturity.

Patients and Methods

The study included 120 patients presented with pre-labor rupture of membranes at Al-Galaa Teaching Hospital, to compare between the roles of fetal pulmonary artery flow velocity waveforms and amniotic fluid lamellar bodies count for prediction of fetal lung maturity, in a prospective cohort study. The study was conducted during the period from 2017 to 2021.

The study included women aging between 20-40 years, with singleton pregnancies, without major congenital anomalies, in gestational ages between 32-36 weeks, who are presenting with pre-labor rupture of membranes or undergoing caesarian section. Women with major fetal anomalies, bloody or meconium-stained amniotic fluid and women with pre-existing medical disorders were excluded from the study.

The study purpose and procedures were explained in plain terms to each of the subjects and a written informed consent was taken.

Population of the study were subjected to the following:

History taking including; (1) Personal history (name, age, marital status, parity, occupation, address, special habits of medical importance) (2) History of present pregnancy, focused on risk factors associated with pregnancy as well as recognition of inclusion and exclusion criteria. (3) Menstrual history. (4) Obstetric history. (5) Past history. (6) Family history.

Examination: A careful examination and assessment was done with special attention to inclusion and exclusion criteria among all couples as follows: (1) General examination; blood pressure, pulse, temperature. etc. (2) Abdominal examination; inspection, palpation (Leopold's maneuvres) and fetal heart rate. (3) Ultrasound study for assessment of fetal biometry for gestational age, fetal weight estimation and amniotic fluid index measurement. Gestational age was determined from menstrual history.

Routine pregnancy investigations as follows: (1) Blood typing (ABO) and antibody typing (RH), complete blood count (CBC). (2) Fasting blood glucose. (3) 2-hours oral glucose tolerance test.

Ultrasound protocol: patients were asked to remove their clothes and put on a gown or cover for the procedure. Both abdominal and vaginal ultrasound protocols were done. Pregnant women were scanned in the supine position and all fetuses were in sinus rhythm and in a quiet state without fetal breathing or movements. Doppler velocity waveform measurements of fetal MPA were performed by a single operator after a routine prenatal sonographic examination.

Fetal MPA was then visualized by rotating the transducer from the four-chamber view to the short axis view of fetal heart, thereby showing the pulmonary valves and the bifurcation of right and left branches of the pulmonary artery. The pulsed Doppler sample gate was placed at the middle of the fetal pulmonary artery (between the valve and bifurcation) and away from the arterial wall.

After enlarging images as much as possible, the sample gate was adjusted to 3mm and the angle of insonation was maintained at <20º. Doppler gain and scale were adjusted for optimal velocity waveform display clearly showing the peak systolic velocity (PSV) and early diastolic notch. The high-Pass filter was set at 100Hz to record diastolic blood flow. The blood flow waveform was then displayed with a velocity range of 100cm/s and a sweep speed of 200mm/s. The shortest time interval that could be measured was 1ms.

The Doppler velocity waveform in the fetal MPA produced a specific "spike and dome" pattern.

After the optimal fetal MPA waveform was obtained, relevant Doppler velocity variables were measured three times using manual trace, and measurements were averaged. The Doppler variables were acceleration time (AT), ejection time (ET), Peak systolic velocity (PSV), end-diastolic maximum velocity, mean velocity, pulsatility index (PI) and resistance index (RI). From these measurements, the AT/ET ratio was calculated.

Amniocentesis and Lamellar body count:

Amniotic fluid was collected under complete aseptic conditions. Amniocentesis was performed according to guidelines of the ACOG.

Before the start of the procedure, a local anesthetic was given to the mother in order to relieve the pain felt during the needle insertion. The needle was directed towards a clear pocket of amniotic fluid.

A 20-22 gauge spinal needle with adequate length was placed in one side of the transducer at an angle almost parallel to the transducer. The clinician inserted the needle under direct ultrasound visualization until the tip of the needle is at the center of an amniotic fluid pocket. The clinician removes the guide of the needle and places a syringe on top of it, making sure the needle does not move during that step. Aspirating and discarding the first 2-4ml. of amniotic fluid was done.

Samples of amniotic fluid were tested within 4-6 hours of collection or preserved at 4ºC until they were taken for testing. LBC was done using automated hematological cell counter.

Neonates were followed up and neonatal RDS was diagnosed by presence of at least 2 of the following criteria: (1) Evidence of respiratory compromise (tachypnea, retractions, and/or nasal flaring) shortly after delivery and persistent oxygen requirement for longer than 24 hours. (2) Administration of surfactant. (3) Radiological evidence of hyaline membrane disease.

Statistical analysis:

The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 22 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Quantitative Data were reported as mean SD, while qualitative data were reported as number and percentage. Accuracy was represented using sensitivity (true positive/true positive + false negative) and specificity (true negative/true negative + false positive), PPV (true positive/all tested positive) and NPV (true negative/ all tested negative). The chi square test was used to compare categorical variables. p-value <.05 was considered significant.

Results

The study included 120 patients with pre-labor rupture of membranes at a gestational age between 32 and 36 weeks attending at El-Galaa Hospital, in a cohort study, to compare between lamellar body count and pulmonary artery Doppler indices for prediction of fetal lung maturity.

Maternal characteristics revealed a mean age of 29.2 year, mean BMI of 31.3kg/m^2, 53.3% were primiparas, 92.5% were singletons and CS was the mode of delivery in 30.8% of cases (Table 1).

Table (1): Maternal characteristics.

Parameter	(N=120)
Age	29.2±5.1
BMI	31.3±8.7
Parity:	
Primipara	64 (53.3%)
Para 1	27 (22.5%)
Para 2	13 (10.8%)
Para 3	9 (7.5%)
≥ Para 4	7 (5.8%)
Gestational age at delivery	34.6±11.3
Mode of delivery:	
VD	83 (69.2%)
CS	37 (30.8%)
Smoking	9 (7.5%)
Duration of ROM	13.1±3.7

*Data are represented as numbers and percentages.
*Age, BMI, GA, Duration of ROM are represented as mean & SD.

Neonatal characteristics revealed 44.2% male newborns & a mean birth weight of 2410 grams. 42.5% were NICU-admitted. RDS cases included 71.7% of cases, most of them were mild cases. Surfactant was used in 31.7% of cases (Table 2).

Sonographic and amniotic fluid characteristics revealed mean AFI of 4.1 cm with mean At/Et ratio (0.2) (Table 3).

Cases resulting in newborns with RDS were compared with cases without RDS. There were statistically significant differences in aspects of parity, mode of delivery, ultrasound EFW, birth weight, newborn sex and APGAR scores at 1 & 5 minutes, RDS incidence significantly higher in primipara, after CS, EFW <2000gm, Neonatal Birth weight <2000 and low APGAR score (Table 4).

Table (2): Neonatal characteristics.

Parameter	(N=120)
Sex:	
Male	53 (44.2%)
Female	67 (55.8%)
Birth weight (gm)	2410±612
APGAR score:	
1 min.	5.7±0.68
5 min.	7.9±1.08
5 min. APGAR score <7	89 (74.2%)
NICU admission	51 (42.5%)
NICU admission >10 days	32 (26.7%)
RDS:	
Total	86 (71.7%)
Mild	39 (32.5%)
Moderate	26 (21.7%)
Severe	21 (17.5%)
Radiologically confirmed RDS	46 (38.3%)
NICU Support:	
Nasal O2	49 (40.8%)
CPAP	27 (22.5%)
Ventilation	10 (8.3%)
Surfactant therapy	38 (31.7%)

*Data are represented as numbers and percentages.
*APGAR score is represented as mean & SD.

Table (3): Sonographic and amniotic fluid characteristics.

Parameter	Value
EFW (gm)	2392±591
AFI (cm)	4.1±0.9
LBC	41683±2023
Fetal MPA Doppler indices:	
S/D Ratio	6.7±1.5
PI	2.0±0.2
RI	0.8±0.5
At/Et Ratio	0.2±0.05

*Data are represented as means and SD.

Table (4): Comparison between RDS and NO RDS cases: general characteristics.

	RDS (N=86)	NO RDS (N=34)	*p*-value
Maternal age	30.1±2.1	28.6±1.9	0.478
Primipara	41 (47.7%)	23 (67.6%)	0.047
Mode of delivery:			
VD	57 (66.3%)	26 (76.5%)	0.275
CS	31 (36.04%)	6 (17.6%)	0.048
U/S Parameters:			
AFI <5cm*	29 (33.7%)	6 (17.6%)	0.08
EFW <2000gm	34 (39.5%)	7 (20.6%)	0.048
Neonatal:			
Birth weight <2000 gm	37 (43.02%)	8 (23.5%)	0.046
Male sex	43 (50.00%)	10 (29.41%)	0.040
1min. APGAR	4.1±0.61	6.2±0.68	0.023
5min. APGAR	6.8±0.54	9.1±0.59	0.031

*Data are represented as numbers and percentages.
*Age, parity, APGAR score is represented as means and SD.

Comparison between cases with RDS and cases without RDS regarding LBC level and fetal MPA Doppler indices revealed statistically significant differences on basis of LBC level (*p*-value 0.002), fetal MPA PI (*p*-value 0.003), RI (*p*-value 0.002) and At/Et ratio (*p*-value <0.001) (Table 5).

In terms of sensitivity, specificity, PPV & NPV, LBC, At/Et ratio is more specific and also more sensitive in detecting fetal lung maturity (Table 6).

Table (5): Comparison between RDS & NO RDS: LBC VS. MPA Doppler indices.

Parameter	RDS (N=86)	NO RDS (N=34)	*p*-value
LBC (mean level)	17641±1113	56123±2873	0.002
Fetal MPA Doppler:			
S/D ratio	6.92±0.29	6.86±0.29	0.183
PI	2.27±0.23	2.18±0.23	0.003
RI	0.8±0.11	0.76±0.09	0.002
At/Et Ratio	0.209±0.054	0.332±0.066	<0.001

*Data are represented as means and SD.
(PI) pulsatility index, (RI) resistance index.

Table (6): Performance of LBC and fetal MPA Doppler indices in RDS prediction in PROM cases.

Parameter	Sensitivity	Specificity	PPV	NPV
LBC	83.6%	74.1%	28.1%	96.8%
At/Et ratio (cut off value 0.327)*	87.3%	78.8%	81.6%	88.9%

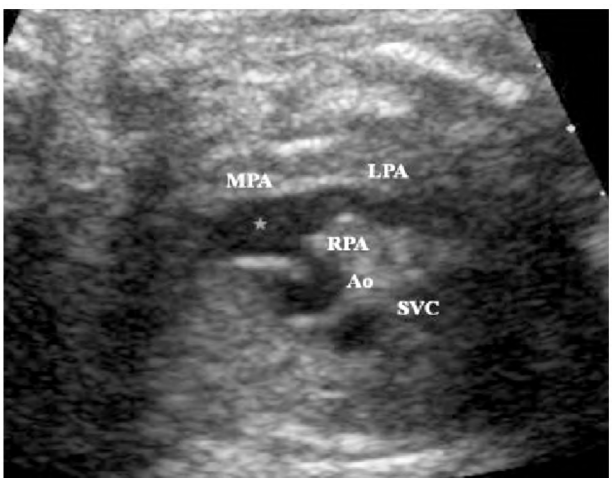

Fig. (1): Sonographic view of the main pulmonary artery.

Abbreviations: Ao: Aorta, LPA: Left pulmonary artery, MPA: Main pulmonary artery, SVC: Superior vena cava, RPA: Right pulmonary artery.

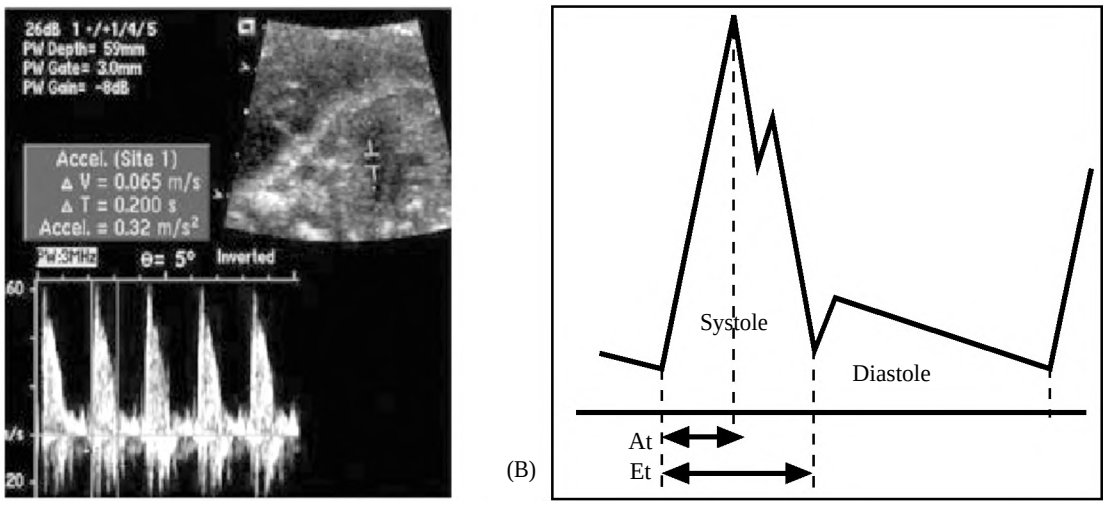

Fig. (2): Measurement of fetal pulmonary artery Doppler velocity waveform at the level of the main pulmonary artery. (A) The blood flow velocimetry of the main pulmonary artery. (B) Abbreviations: At, time interval from the beginning of ventricular systole to the peak of systole; Et, time interval from the beginning to the end of ventricular systole.

Fig. (3): Measurement of the main pulmonary artery (MPA) acceleration time and ejection time. The acceleration time/ejection time (At/Et) ratio can then be calculated.

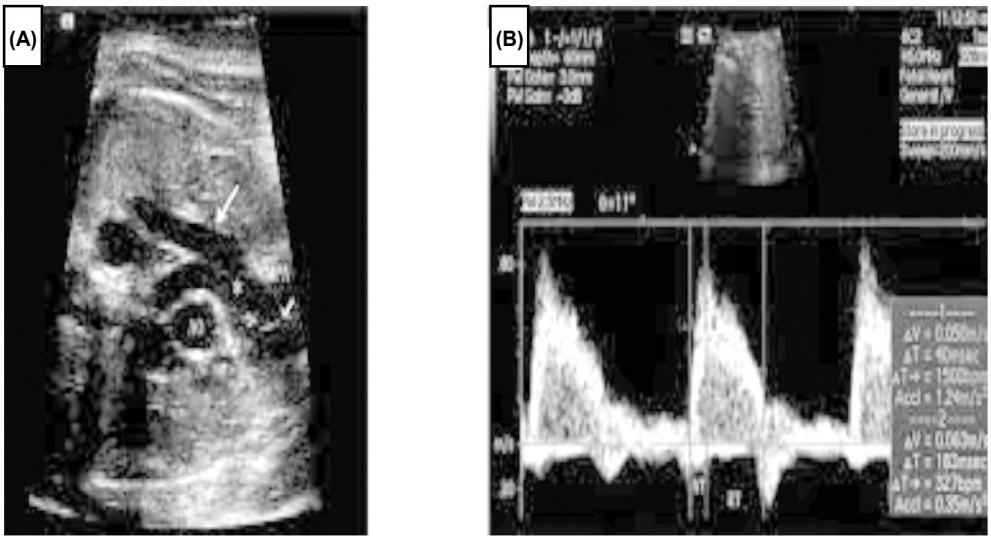

Fig. (4): Blood flow velocity waveform in the fetal main pulmonary artery (MPA). (A) The short-axis view of the fetal heart is shown at the level of the MPA stem and the bifurcation of the left and right pulmonary arteries (long arrow). The short arrow points to the pulmonary valves. The asterisk indicates the sample point where the main pulmonary artery Doppler measurements are taken. Ao, aorta. (B) A representative real-time blood flow velocity waveform in fetal main pulmonary artery. The acceleration time (AT) and ejection time (ET) can then be measured.

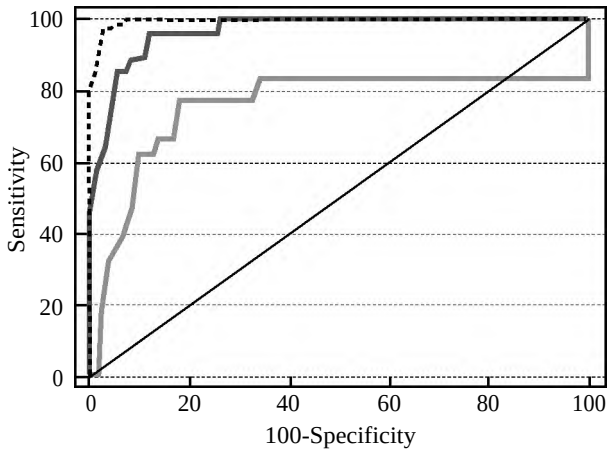

Fig. (5): Receiver operating characteristic curve for lamellar body count in predicting neonatal respiratory distress syndrome. The cutoff value for LBC in predicting fetal lung maturity in our study was ›_20,000/µL.

Discussion

This study included 120 patients, with age ranging between 20-40 years, presenting with PPROM at gestational age between 32-36 weeks to compare between amniotic fluid Lamellar Body Count (LBC) and fetal MPA At/Et ratio for prediction of fetal lung maturity.

In this study, Maternal characteristics revealed a mean maternal age of 29.2 years, a mean BMI of 31.3kg/m^2, 53.3% were primiparas and CS was the mode of delivery in 30.8% of cases.

Neonatal characteristics revealed 44.2% male newborns & a mean birth weight of 2410 grams. 42.5% were NICU-admitted. RDS cases included 71.7% of cases, most of them were mild cases. Surfactant was used in 31.7% of cases. Nasal O2 was used in 40.8% while 8.3% were mechanically ventilated. 38.3% were confirmed radiologically.

Sonographic and amniotic fluid characteristics revealed mean AFI of 4.1 cm with mean At/Et ratio (0.2). A mean level of lamellar body count 41683 was detected.

Cases resulting in newborns with RDS were compared with cases without RDS. Most cases without RDS were detected in primiparas (67.6% VS. 47.7% with RDS with p-value 0.047. Caesarian delivery was associated with a statistically significant difference in RDS rates (36.04% vs. 17.6%, p-value 0.048), illustrating the impact of CS on rates of RDS. In the same context, sonographic EFW and birth weight were associated with a statistically significant increase on RDS (p-values 0.048 & 0.046, respectively). Male sex was also associated with RDS (p-value 0.04), thus may be used as a prognostic factor. In terms of APGAR score, low scores at 1 & 5 minutes were associated with RDS (p-values 0.023 & 0.031).

We used the Receiver operating characteristic curve (ROC curve) to estimate the cutoff point of LBC. The cutoff value for LBC in predicting fetal lung maturity in our study was ›_20,000/gL. Comparison between cases with RDS and cases without RDS regarding LBC level and fetal MPA Doppler indices revealed statistically significant differences on basis of LBC level (p-value 0.002), fetal MPA PI (p-value 0.003), RI (p-value 0.002) and At/Et ratio (p-value <0.001). It was noted that S/D ratio was of no significance between cases with RDS & those without RDS.

In terms of sensitivity, specificity, PPV & NPV, LBC and At/Et ratio were evaluated. As for LBC, sensitivity, specificity, PPV & NPV were revealed to be 83.6%, 74.1 %, 28.1 % & 96.8% respectively. On the other hand, for fetal MPA At/Et ratio, values of 87.3%, 78.8%, 81.6% & 88.9% respectively were detected.

The high sensitivity & specificity of fetal MPA At/Et ratio in prediction of lung maturity makes it a better choice than the invasive procedure entailing LBC measurement.

Many studies have discussed the efficacy of both LBC and fetal MPA Doppler indices. Duncan et al., [7] discussed fetal pulmonary artery acceleration/ejection time prognostic accuracy for respiratory complications in preterm prelabor rupture of membranes. They concluded that PATET was a significant predictor of NRC (AUC 0.74; 95%CI: 0.61-0.83; p≤.001) and RDS (AUC 0.69; 95%CI: 0.57-0.80; p /4.021) in PPROM. Gestational age at delivery and gestational age at PPROM were also significantly associated with NRC and RDS. Their predictive accuracy for NRC was 0.87 and 0.84, and for RDS 0.85 and 0.86, respectively. However, PATET clinical use may be limited as gestational age is a better predictor of these outcomes [7].

Azpurua et al., [8], studied whether sonographic fetal pulmonary artery flow velocity waveforms correlate with amniotic fluid biomarkers of fetal lung maturity. The acceleration-time/ejection-time ratio was inversely correlated with the lecithin/sphingomyelin ratio (r0.76; p.001). This relationship was maintained after controlling for potential confounders. Other fetal pulmonary artery flow velocity measurements were not associated with the lecithin/sphingomyelin ratio. This suggests that ultrasound evaluation of fetal pulmonary artery

blood flow may be a promising new noninvasive technique to evaluate fetal lung maturity [8].

Another study performed by Moety et al., [9], to study whether fetal main pulmonary artery (MPA) Doppler indices can predict the development of neonatal respiratory distress syndrome (RDS). PSV, PI, RI and At/Et were positively correlated with gestational age. The strongest correlation was found with At/Et (r=0.602, po0.001). PI and RI were significantly higher, whereas At/Et and PSV were significantly lower in fetuses that developed RDS. A cutoff value of 0.305 for At/Et predicted the development of RDS (sensitivity: 76.4%; specificity: 91.6%). Development of neonatal RDS can be predicted using the MPA At/Et with high sensitivity and specificity [9].

Ultrasonographic evaluation of fetal lung histogram versus lamellar body count in the prediction of fetal lung maturity was performed by Gharib et al., [3] one hundred twenty women and their neonates were included in the study. There was a statistically significant decrease in the levels of both GLHW and LBC among those neonates that showed distressed respiration after Apgar testing as compared with those who did not show similar distress, with p-value <0.001. The Receiver Operating Characteristic Curve (ROC) for LBC levels in the prediction of respiratory distress shows the best cutoff point for LBC was found at <20214/gL with a sensitivity of 100.0%, specificity of 75.47% and area under the curve (AUC) of 88.4%. The ROC curve for GLWH levels in the prediction of respiratory distress shows the best cutoff point for GLWH was found at ‹_0.93 with sensitivity of 100.0%, specificity of 84.91% and AUC of 97.1%. They concluded that ultrasonographic evaluation of GLHW of the fetal lung and liver is a noninvasive, inexpensive and time-efficient test for prediction of fetal lung maturity that has higher sensitivity and specificity [3].

Schenone et al., [6], studied predicting fetal lung maturity using the fetal pulmonary artery doppler wave acceleration/ejection time ratio. Forty-three patients were included in this study. The receiver operating characteristic curve demonstrated that a PATET cutoff of 0.3149 provided a specificity of 93% (95% CI 77-98%), a sensitivity of 73% (95% CI 48-89%), a negative predictive value of 87% (95% CI 70-95%), and a positive predictive value of 85% (95% CI 58-96%) for predicting immature surfactant/albumin ratio results.

Again, the PATET may provide a noninvasive means of determining fetal lung maturity with acceptable levels of sensitivity, specificity, and predictive values [6].

Our study came in agreement with studies done in the same context. Despite the use of LBC is sensitive and specific, it is an invasive procedure. The use of fetal MPA Doppler indices is of better sensitivity & specificity and is not invasive. It can be used as an alternative to lamellar body count for prediction of fetal lung maturity as it also inversely correlates with lamellar body count levels.

The limitations of the use of fetal MPA At/Et ratio is the ultimate need for an experienced sonographer for completing the procedure, the effect of gestational age on fetal lung maturity and false positivity in cases if pulmonary hypoplasia and other causes of fetal pulmonary hypertension.

Conclusion:

Both main pulmonary artery (MPA) At/Et ratio and lamellar body count (LBC) be used in detecting fetal lung maturity and predicting neonatal respiratory distress but MPA AT/ET ratio are more sensitive, specific and less invasive.

Recommendations:

1- Pregnant women at risk of pPROM should be tested by MPA doppler flow velocity for detecting neonatal RDS.

2- MPA flow velocity is recommended for use rather than LBC because it is noninvasive technique; moreover, it is highly sensitive and specific.

3- Delivery is recommended for infants with documented lung maturity in pregnancies with PPROM from 32 to 36 weeks to decrease both maternal and neonatal infectious morbidity and to improve neonatal outcomes.

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مقارنة بين عدد الجسم الرقائقى للسائل الذى يحيط بالجنين ومؤشرات دوبلر الشريان الرئوى للجنين فى التنبؤ بنضج رئة الجنين فى حالات تمزق الأغشية قبل الأوان

خلفية الدراسة: يسبب تمزق الأغشية قبل الأوان مضاعفات خطيرة للولدان خاصة متلازمة الضائقة التنفسية التى تؤثر على جزء كبير من حالات الحمل المعقدة بواسطة تمزق الأغشية قبل الأوان.

الهدف من الدراسة: المقارنة بين عدد الجسم الرقائقى وأشكال موجات سرعة تدفق الشريان الرئوى للجنين للتنبؤ بنضج رئة الجنين.

المريضات وطرق الدراسة: المرضى والطرق أجريت هذه الدراسة على ١٢٠ مريضة تعرضن لتمزق للأغشية قبل المخاض فى مستشفى الجلاء التعليمى، وذلك للمقارنة بين أدوار الأشكال الموجية لسرعة تدفق الشريان الرئوى للجنين والأجسام الصفائحية للسائل الذى يحيط بالجنين للتنبؤ بنضج رئة الجنين.، فى دراسة جماعية مستقبلية. أظهرت خصائص السائل الأمنيوسى والموجات فوق الصوتية أن متوسط مؤشر السائل الأمنيوسى يبلغ ٤.١ سم بمتوسط وقت التسارع / نسبة وقت الطرذ (٠.٢). تم الكشف عن متوسط مستوى تعداد الجسم الرقائقى ٤١٦٨٣.

نتائج الدراسة: النتائج كانت القيمة الفاصلة لعدد الجسم الرقائقى فى التنبؤ بنضج رئة الجنين فى دراستنا ٢٠٠٠٠٠/ميكرو لتر. تم الكشف إحصائياً عن المقارنة بين الحالات المصابة بمتلازمة الضائقة التنفسية والحالات غير المصابة بمتلازمة الضائقة التنفسية فيما يتعلق بمستوى تعداد الجسم الرقائقى ومؤشرات دوبلر الشريان الرئوى الرئيسى للجنين. فروق ذات دلالة إحصائية على أساس مستوى عدد الجسم الرقائقى (قيمة 0.002 p)، مؤشر نيض الشريان الرئوى الرئيسى للجنين (قيمة 0.003 p)، مؤشر المقا ومة (قيمة 0.002 p ونسبة و التسارع / وقت الإخراج (قيمة p<0.002). لوحظ أن نسبة الضغط الانقباضى / الانبساطى ليس لها أهمية بين حالات متلازمة الضائقة التنفسية وأولئك الذين لا يعانون من متلازمة الضائقة التنفسية. الشريان الرئوى الرئيسى للجنين كان معدل تسريع الوقت / وقت الإخراج أكثر حساسية و أكثر تحديداً فى التنبؤ بنضج الرئة من عدد الجسم الرقائقى مما يجعله خياراً أفضل من الإجراء الغازى الذى يستلزم قياس عدد الجسم الرقائقى.

الاستنتاج: تعد نسبة تدفق الدم فى الشريان الرئوى للجنين للجنين أداة حساسة ومحددة للتنبؤ بنضج رئة الجنين. يرتبط عكسياً بنضج رئة الجنين، وبالتالى، يمكن استخدام نسبة التفق فى الشريان الرئوى الجنينى كوسيلة غير جراحية لتحديد نضج رئة الجنين كبديل لتعداد الجسم الرقائقى.