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Comparative Study Between Extracapsular Dissection and Superficial Parotidectomy in Treatment of Benign Parotid Tumors

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Cervical length Measurements and Uterine Artery Doppler in Prediction of Preterm Labour of High-Risk Women

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ABSTRACT

Background: Preterm delivery occurrence (especially in thiose wome with a high risk) Predection is a matter of great importance in order to achieve careful antenatal care and decrease the incidence of associated maternal and fetal complications. Pregnant women US assessment, Since the development of transvaginal probes and the growing adoption of transvaginal sonography during pregnancy by patients, has been an essential aspect of obstetric diagnostic imaging recently.

Aim of the work: to see if using ultrasound for cervical length measurements and uterine artery doppler may help predict preterm labour, especially in the high-risk mothers.

Patients and methods: Our study included 100 pregnant women at gestational age 18-26 weeks with history of preterm labor & threatened preterm labor who were recruited from Port Said Obstetrics and Gynecology Specialized Hospital, Port Said, Egypt.

Results: There was no discernible change in basic sociodemographic data based on the presence of premature labour. Except for the percentage of previous preterm, which was higher in the cases with preterm, there was no statistically significant variation in obstetric history according to the occurrence of preterm. When comparing the moms who gave birth to preterm babies to the mothers who gave birth to term babies, the percentage of HTN and dyslipidemia was statistically considerably greater. The preterm group had a statistically significantly greater rate of newborn problems.

Conclusion: Diagnostic accuracy of cervical length measurement was higher as compared with the PI of uterine artery.

Keywords: *Cervical length Measurements; Uterine Artery Doppler; Prediction of Preterm Labour.*

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INTRODUCTION

Premature birth is the greatest cause of neonatal morbidity and mortality, particularly when it happens before 34 weeks of pregnancy, and it is also one of the most prevalent reasons for hospitalisation during pregnancy.[1]

Preterm labour affects more than one-fifth of all women admitted to the hospital. Early premature births are caused by maternal or foetal indications for iatrogenic premature births, such as preterm premature rupture of membranes, while the rest are caused by maternal or foetal indications for iatrogenic premature births, such as preeclampsia and foetal growth restriction.[2]

Preterm births account for roughly 12%–13% of all births in the United States, and 5%–9% in many other affluent countries.[3]

A combination of cervical length (CL) determined by ultrasonography, maternal factors, and obstetric history is the best model for predicting women at risk of early PTD during the second trimester of pregnancy. However, because the utility of ultrasonography CL assessment as a predictor of PTD is still debatable, few studies have examined its role in the first trimester. [4]

In the first and second trimesters, uterine artery (UtA) Doppler is believed to be an excellent approach to assess for disorders connected to placental insufficiency, such as pre-eclampsia and FGR.[5]

Furthermore, evidence from histology and hemodynamics suggests that abnormal spiral artery remodelling is linked to spontaneous preterm delivery (sPTD), including preterm membrane rupture.[6]

In addition, according to a limited study, increased early intraplacental vascular impedance has been linked to the development of preeclampsia and/or preterm labour in pregnant women after in-vitro fertilization/intracellular sperm injection. Two recent studies that looked at the relationship between UtA Doppler indices and sPTD in the first trimester revealed no indication of such a link.[7]

The purpose of this study was to explore if using ultrasound to identify cervical length and uterine artery doppler may help high-risk women predict premature labour.

PATIENTS AND METHODS

A prospective observational cohort study, the current study included 100 pregnant women at gestational age 18-26 weeks with history of preterm labor & threatened preterm labor who were recruited from Port Said Obstetrics and Gynecology Specialized Hospital, Port Said, Egypt.

Inclusion criteria: Age: 18-35 years old, singleton pregnancy, gestational age of 18 to 26 weeks, known last menstrual period and history of regular menstruation, adverse perinatal outcome due to abdominal trauma, patients with a history of cervical surgery or cerclage, and obstetrical history based and/or transvaginal ultrasound based vaginal cerclage

Exclusion criteria: Current or previous history of medical diseases associated with pregnancy (DM, HTN, or cardiac), congenital malformations such as (Hydrops fetalis), intrauterine growth restriction, intrauterine foetal death, last menstrual period unknown or uncertain, irregular menstrual cycle, abnormal placenta, poor visualisation of placenta, placentas with variations in umbilical cord insertions and placental abruption, cases of spontaneous miscarriage, and women

Each participant completed a written informed consent form before being included in the study, which stated the study's goal as well as the protocols that would be followed.

All patients were subjected to the following:

History taking was taken from all the participants including: Demographic data, general medical history and associated comorbidities, history of present pregnancy, past obstetric history, menstrual history, and risk factors.

Examination: (a) General examination: Assessment of vital signs (pulse, blood pressure, and temperature) and general condition. (b) Abdominal examination: Detailed abdominal examination was done with emphasis on uterine examination to detect the fundal level.

Obstetric ultrasound: This was done to ensure the pregnancy's viability and gestational age. Transabdominal and transvaginal ultrasounds were performed on all of the ladies. During the transvaginal scan, The Pulsatility Index (PI) of the uterine artery and the cervical length were measured. All ultrasound exams were performed by a single investigator utilising GE (voluson E6) ultrasonography machines with pulsed and colour Doppler capabilities (GE Medical Systems, Zipf, Austria). The frequency range of the 3D curved multifrequency transabdominal transducer is 3.5 to 7.5 MHz. All measurements were collected with the head and chest lifted slightly in a semi-recumbent position.

Cervical length measurements : (1) At the age of 18 weeks, two measurements were taken. (2) At 22 weeks of age. The probe is After the device is implanted in the anterior fornix of the vaginal canal, transvaginal real-time ultrasound imaging is conducted. The distance between the internal and external os was measured after locating the endocervical mucosa and removing it from the isthmus. For the purposes of this study, at least two CL measurements were performed, with the shorter of the two being used in the analysis.

Uterine artery Doppler : The surgery took place between weeks 24 and 26 of pregnancy. The left and right uterine arteries were discovered using transvaginal ultrasonography with colour flow imaging at the level of the internal cervical os. The mean PI was calculated using pulsed-wave Doppler from three comparable subsequent waveforms recorded from each of the arteries.

Statistical analysis:

The data entered into the computer was examined with IBM SPSS program, version 22.0. To represent qualitative data, we utilised the terms number and percentage. Quantitative data were presented using the median and range (Minimum and Maximum) for non-parametric data and the mean and standard deviation for parametric data. When two or more groups are compared, the Chi-Square test is employed. When more than 25% of cells in tables (>2*2) have a count less than 5, Monte Carlo test is used as a correction for Chi-Square test. Fischer When more than 25% of cells in 2*2 tables had a count less than 5, the exact test was utilised as a correction for the Chi-Square test. Analysis of the Receiver Operating Characteristic (ROC) curve: The following indices are used to assess a test's diagnostic performance, or its ability to distinguish diseased from non-diseased instances. P value less than 0.05 represents a significant difference between included groups.

RESULTS

Variables	Preterm group (N=34)	Term group (N=66)	Test of significance
Age (years)			
Mean ± SD	27.89 ± 3.88	26.27 ± 3.59	t= 1.815 P = 0.245
BMI (kg/m^2)			
Mean ± SD	28.35± 6.59	27.83± 5.77	t= 1.107 P = 0.375
Residence			
Urban	19 (55.9%)	39 (59.1%)	χ2= 1.987 P= 0.101
Rural	15 (44.1%)	27 (40.9%)	

Table 1: Sociodemographic data of the cases within the study groups

Preterm birth women had a mean age of 27.89 3.88 years, which was higher than the mean age of term delivery mothers (26.27 3.59 years), although the difference was not statistically significant (p= 0.245). Furthermore, there was no significant difference in mean BMI or residence between the two groups (Table 1).

Variables	Preterm group (N=34)	Term group (N=66)	Test of significance
GDM	8 (23.5%)	2 (3.1%)	$\chi2$= 5.863 P < 0.001*
Hypertensive disorders of pregnancy	14 (41.2%)	9 (13.6%)	$\chi2$= 7.668 P < 0.001*
Antepartum hemorrhage	11 (32.4%)	8 (12.1%)	$\chi2$= 5.820 P < 0.001*
Anemia	18 (52.9%)	24 (36.4%)	$\chi2$= 4.324 P = 0.013*
UTI	18 (52.9%)	18 (27.3%)	$\chi2$= 4.843 P = 0.005*

Table 2: Complications during pregnancy of the cases within the study groups

As shown in table (2), the percentage of different complications during pregnancy including GDM, Hypertensive disorders of pregnancy, Antepartum hemorrhage, Anemia and UTI were statistically significantly higher among the mothers who gave birth for preterm deliveries as compared with the term group.

Variables	Preterm group (N=34)	Term group (N=66)	Test of significance
Uterine artery PI	1.28± 0.42	0.76± 0.29	t =6.541 P < 0.001*
Cervical length (Cm)	2.53 ± 0.59	3.91 ± 0.66	t = -10.279 P < 0.001*

Table 3 : Uterine artery PI and Cervical length of the cases within the study groups

Preterm moms had a greater uterine artery PI (1.18 0.42 compared 0.76 0.29, respectively) than term mothers (as measured by transvaginal ultrasonography), with a statistically significant difference between the two groups (1.18 0.42 versus 0.76 0.29, respectively) (P 0.001). Preterm birth mothers' cervical length was 2.53 0.59 cm, compared to 3.91 0.66 cm in term birth mothers, a statistically significant difference (P 0.001).

Variables	Preterm group (N=34)	Term group (N=66)	Test of significance
Birth weight (gm)	1738.84 ± 368.23	2906.22 ± 419.42	t= 9.784 P < 0.001**
5 min ARGAR score	7 (4 – 9)	9 (6 – 10)	z = 2.962 P = 0.024*
NICU	16 (36.4%)	7 (7.8%)	$\chi2$ = 6.752 P < 0.001**

Table 4 : The neonatal outcomes in each of the study groups

The preterm group's birth weight was statistically significantly lower than the term group's (P 0.001). The preterm group's median 5-min APGAR score was statistically substantially lower than the term group's (p=0.024). The preterm group had statistically significantly more NICU admissions than the term group (P 0.001). (Table 4)

Test characteristics	Uterine artery PI
Best cutoff value	> 0.845
AUC	0.756
P-value	<0.001 ^{HS}
Sensitivity %	76.5
Specificity %	62.1
PPV %	74.5
NPV %	68.2
Accuracy %	66.4

Table 5: Diagnostic performance and test characteristics of uterine artery PI to predict the preterm delivery

As shown in table (5), the best cutoff point of uterine artery PI to predict the preterm delivery was > 0.845 with 76.5% sensitivity, 62.1% specificity and 66.4% accuracy. The prediction ability showed high statistically significant value (p <0.001).

Test characteristics	Cervical length
Best cutoff value	< 3.25 cm
AUC	0.934
P-value	<0.001 HS
Sensitivity %	88.2
Specificity %	81.8
PPV %	84.6
NPV %	90.4
Accuracy %	86.4

Table 6: Diagnostic performance and test characteristics of uterine artery cervical length to predict the preterm delivery

As shown in table (6), the best cutoff point of cervical length to predict the preterm delivery was < 3.25 cm with 88.2% sensitivity, 81.8% specificity and 86.4% accuracy. The prediction ability showed high statistically significant value (p <0.001).

DISCUSSION

Preterm mothers had a mean age of 27.89 3.88 years, which was higher than the mean age of moms who had term births (26.27 3.59 years) in the current study, despite the fact that there was no statistically significant difference between the two groups (p= 0.245). Furthermore, there was no statistically significant difference in mean BMI or residence between the two groups. Murad and Abdelhamid [8] showed no significant differences in maternal age or BMI between preterm and term birth groups, and our data agreed with their findings.

Our findings, on the other hand, contradicted those of Abd Razek and Abd El Ghany [9], who found a significant difference (P0.05) in patient age between preterm and full-term groups, with a mean of 32.3 years in the preterm group compared to 30.3 years in the full-term group. They also discovered a statistically significant difference in BMI between preterm and full-term groups (P0.05), with the preterm group having a higher mean BMI (26.7 kg/m2) than the full-term group (24.3 kg/m2).

In the current study, there was no statistically significant difference in the number of gravidities or parity between the preterm and term groups. The preterm group had a larger percentage of primigravida cases than the term group, despite the fact that the difference was not statistically significant (32.4 percent vs. 28.8 percent, respectively).

Our results disagreed with Abd Razek and Abd El Ghany [9] reported a positive significant correlation was present between preterm birth and increased parity with higher incidence in multigravida and 52% of preterm birth may be due to the risk of multigravidity.

Our results also were in contrast to the study that stated that null-parity is associated with significant increase in low birth weight and preterm birth more than grand multiparity.[10]

In the current study, the percentage of females with GDM was statistically significantly higher among the mothers who gave birth for preterm deliveries as compared with the term group (P < 0.001).This was comparable with the report denoting that increased incidence of preterm birth is an adverse outcome of poorly managed diabetes during pregnancy.[11]

In the current study, the percentage of CS delivery among the mothers who gave birth to preterm deliveries was higher as compared with the term group (64.7% and 57.6% respectively), but it didn't reach a statistically significant value (p=0.218)

This contradicts the results of Rao et al. [12] who showed that The most prevalent mode of delivery was spontaneous vaginal delivery, which accounted for 41.4 percent of preterm deliveries and 51.2 percent of term deliveries, respectively. The preterm group had more emergency lower segment caesarean sections (LSCS) than the control group.

The gap could be explained by Egypt's more favourable attitude toward CS. The overall CS rate was 53 percent, although it varied a lot amongst hospitals, ranging from 22.9 percent to 94 percent. 13 Given the inherent variety in each hospital's patient population case-mix, as well as the size and kind of facilities, some variance in CS rates and medical indication distribution should be expected.[15]

Cervical length is measured sonographically in women at risk of preterm labour to help distinguish between true and false labour, and there is an inverse relationship between cervical length and the risk of an early birth. 15 The mean cervical lengths of preterm and term mothers differed significantly (2.53 0.59 cm and 3.91 0.66 cm, respectively), with a statistically significant difference between the two groups (2.53 0.59 cm and 3.91 0.66 cm, respectively) (P 0.001).

According to Ibrahim et al. [16], there is a statistically significant difference in cervical length between term and preterm birth women (3.77 0.61 cm and 2.04 0.5 cm, respectively) (p=0.001). Abdel-Ghany [17] discovered a significant difference in cervical length between groups, with the preterm group having considerably lower cervical length (2.86 0.81 vs. 3.23 0.67 cm), (P=0.013).

The optimal cervical length cutoff point for predicting preterm delivery was found to be 3.25 cm in the current study, with 88.2 percent sensitivity, 81.8 percent specificity, and 86.4 percent accuracy. The ability to foresee has a statistically significant value (p0.001). According to Ibrahim et al. [16], cervical length assessment by transvaginal ultrasonography in the prediction of preterm birth in patients with threatened preterm labour was highly promising, with sensitivity, specificity, PPV, NPV, and accuracy of 93.8, 94.0, 85.4, 95.0, and 93.0 percent, respectively. A threshold value of cervical length >2.3 cm was required, according to the ROC curve.

Moreover, for prediction of preterm delivery, Abdel-Ghany [17] showed that cervical length <2.5 cm had a sensitivity, specificity, PPV and NPV of 33.3%, 68.2%, 63.2%, and 64.1%, respectively.

With 86.4 percent sensitivity, 71.9 percent specificity, 34.5 percent PPV, and 96.8% NPV, Paternoster et al. [18] discovered that a cervical length of 26 mm was the best cut-off value for predicting premature delivery. These results were better than those found in the study by Kim et al.[15] Transvaginal sonographic cervix length measurement, according to Mubark et al.,[19] has a sensitivity and specificity of 60% and 80%, respectively, for predicting spontaneous preterm birth 37 weeks in patients with imminent preterm labour.

In the current study, the mean uterine artery PI (as determined by transvaginal ultrasonography) was greater in preterm women than in term mothers (1.18 0.42 versus 0.76 0.29, respectively), with a statistically significant difference between the two groups (1.18 0.42 versus 0.76 0.29, respectively) (P 0.001). According to Murad and Abdelhamid [8], preterm delivery groups showed a considerably higher UtA PI than term delivery groups.

In this study, the best cutoff point of uterine artery PI to predict the preterm delivery was > 0.845 with 76.5% sensitivity, 62.1% specificity and 66.4% accuracy. The prediction ability showed high statistically significant value (p <0.001). Abdel-Ghany [17] reported that pulsatility index of the uterine artery (≥ 1.04) had a sensitivity, specificity, PPV and NPV of 19.1%, 84.5%, 47.1% and 59%, respectively to predict preterm delivery.

In the ROC curve analysis of the arithmetic mean of UtA PI, Murad and Abdelhamid [8] reported that the cut-off value was considered to be 0.99 with 62.22% sensitivity, 83.87% specificity, 53.83% PPV, 88.44% NPV, and AUC= 0.769 for the prediction of PTD.

In the current study, utilization of UtA PI showed a statistically significant predictive ability for occurrence of preterm delivery. However, the predictive ability was lower as compared with the utilization of cervical length.

To date, many authors evaluated the uterine artery Doppler indices in the preterm labor. Di Renzo et al.[20] and Spencer et al.[21] in their studies included normal population which found that UtA PI was significantly higher in the preterm delivery group than the term delivery group; however, its diagnostic significance was poor either alone or in conjunction with other parameters.

CONCLUSION

Measurements of second trimester cervical length and uterine artery pulsatility index can be used to predict the actual incidence of preterm delivery in pregnant women at high risk for preterm delivery with a high degree of sensitivity and specificity in pregnant women at high risk for preterm delivery, according to the findings of this study.

The length of the cervix determined by transvaginal ultrasonography during the second trimester is negatively associated to the risk of a premature delivery.

The uterine artery pulsatility index, which is measured by transvaginal ultrasonography in the second trimester, is inversely associated to the risk of premature birth.

The diagnostic accuracy of the uterine artery pulsatility index is lower than that of determining cervical length.

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