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Fate of second trimester low-lying placentae

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Abstract

Background: Placenta previa and low-lying placenta are potentially fatal conditions for both mother and child. The purpose of this work was to evaluate the cut-off level distance between lower edge of placenta and internal cervical os and whether it can predict third trimester placenta previa or not.

Methods: This prospective observational work was carried out on 50 low-lying placenta cases with single living pregnancy with 18–24-week gestation. Patients were splitted into two groups: group 1 consists of 46 individuals; group 2 consists of 4 individuals. They were recruited from Obstetrics and Gynecology departments at Tanta University Hospitals and Kafr El-Sheikh General hospital.

Results: Second-trimester internal os distance (IOD) associated significantly with placental position in the third trimester also when considering those with an anteriorly and posteriorly located placenta, IOD values of at least 5 mm for posteriorly and at least 2 mm for anterior located placenta had a likelihood ratio of 0.1 and 0 respectively in the prediction of an abnormally positioned placenta in the third trimester. All women with an IOD at or above these cut-off values can be reassured without follow-up that their final placental position will be normal. Regarding IOD; AUC was 0.937, 0.850 the sensitivity was 93%, 92% & the specificity was 57%, 64% Anterior and posterior respectively.

Conclusions: IOD cut-off value of 5mm or less was highly sensitive in predicting placenta previa in third trimester.

Keywords: Second trimester, low-lying placentae, placenta previa

Introduction

In the whole globe, bleeding is a factor in 25% of maternal deaths. Placenta previa (PP), often known as a low-lying placenta, is a significant contributor to postpartum and antepartum hemorrhage and is linked to various fetal and neonatal problems as well ^[1].

When the placenta sits exactly over the internal os, the expression "placenta previa" should be utilized. The phrase "low-lying placenta" should be used for pregnancies that exceed over than 16-weeks along in gestation when the placental margin is below twenty millimeters from the internal os upon transabdominal or transvaginal scanning (TVS) ^[2].

This severe condition's specific pathogenesis is not well understood. Uterine cancer is a possible risk factor, nevertheless. High parity, advanced mother's age, a history of placenta previa, and congenital uterine abnormalities are additional indicators of risk for placenta previa ^[3] among the most dangerous issues associated with pregnancy is placenta previa, which may need an emergency cesarean-section (CS) if there is a sudden and significant bleeding throughout the antepartum period. Emergency premature deliveries may result in infant illness or fatality, and severe bleeding can cause major maternal morbidity or even death ^[4]

Throughout the pregnancy, it's critical to detect low-positioned placental tissue to enhance mother and fetal outcomes. However, approximately 90% of women with placenta previa or a low-lying placenta in the 2nd trimester will cease to have this problem in the 3rd trimester because to "placental migration" ^[5].

However, all believe that the frequency of "migrating" low-positioned placenta throughout pregnancy is substantial and that follow-up in the third trimester will, in the majority of instances, confirm appropriate placental position. Several recommendations advocate re-evaluation in the 3rd trimester of pregnancy. Thus, it is debatable whether all women who have a low-positioned placenta in the 2nd trimester really need a follow-up ultrasound screening in the third trimester ^[6]. A low-positioned placenta diagnoses in the 2nd trimester can give rise to unnecessary worry about bleeding or other pregnancy issues, which might lead to additional elective and emergent CS as well as to the higher expenditures of follow-up ultrasounds.

In order to provide the required resources to pregnant women who are most at risk for maternal and fetal issues, early detection of a low-positioned placenta in the 3rd trimester is thus essential^[5]. The purpose of this study was to determine whether or not the cut-off level between the lower border of the placenta and the internal cervical os may predict third trimester PP.

Patients and Methods

This prospective observational study was performed on 50 low-lying placenta cases with single living pregnancy with 18–24-week gestation.

After receiving clearance from the Ethics Committee of Tanta University Hospitals and Kafr El-Sheikh General hospital, Egypt the research was carried out, from May 2020 till February 2022. The participants provided written informed permission.

Criteria of exclusion were cases with missing last menstrual period, congenital uterine malformation.

Two groups of patients were formed: group 1 consisted of 46 individuals, whereas group 2 had just four.

The following history-taking procedures were performed on all individuals personal, obstetric, medical, and surgical, menstrual, and obstetric histories, as well as general examination.

Rhythm and rate were evaluated using a radial pulse. Nails, skin, and hair were examined, along with overall look, body habitus, hair distribution, muscle mass, movement coordination, scents, and breathing rhythm. Brachial blood pressure was also measured. The axillary and epi-trochlear nodes were looked at with the person being examined seated while the breasts were being inspected. The patient was asked to lean forward if required while having their heart examined. The vertebral column, the costovertebral regions, and the curvature of the spines or chest deformity were assessed. Auscultation was done on the lateral and posterior lung areas.

The individual was shifted to the left lateral decubitus position while still supine and the breasts and heart were examined the structures of the anterior lungs are auscultated. Examination, percussion, auscultation, and listening for bowel and abdominal bruits were performed. Check for adenopathy and pulses in the femoral, inguinal, and popliteal areas determining the hip, knee, and ankle ranges of motion.

Male external genitalia were inspected while the patient was standing, gait and station were assessed, and the examination of the rectum was carried out with the patient bending forward. On an examination table with stirrups, a pelvic examination was conducted on female patients. Occult blood tests and rectal examination were done concurrently.

Physical examination of the abdomen: the patient was positioned supine on a table or bed for the examination. For relaxation and to ease the muscles of the abdominal wall, the head and legs were supported with little pillows or folded sheets.

The whole abdominal wall's general shape was first noted. For distention, the contour was thoroughly examined. Any anomaly seen was reported and recorded. The flanks were also examined for any bulging.

The skin on the abdomen wall was thoroughly examined for anomalies. In the abdominal wall, the skin was carefully examined for engorged veins.

By pushing a visible vein with the tips of your index fingers together, you may determine the direction of blood flow in these veins. After maintaining compression, the fingertips were moved apart to create a vacant venous segment between the fingers. On one end, a finger was taken away and the vein's fullness was checked, then inspected for masses from several angles with documentation of any abnormality. In palpating the abdomen

patient was positioned supine, the abdominal wall was gently examined with the tips of the fingers.

By pressing firmly and steadily with the flat of the palm on the abdominal wall, the abdomen was deeply palpated. The quadrant just across from any painful location (if present) was where the seep palpation began and careful examination for each quadrant was done. At each costal margin, the flank was lifted to be inspected somewhat by putting one hand on the lower ribs of that flank and then pushing the retroperitoneal components up to the examining hand. The patient is profoundly motivated to help in the palpation of the gallbladder, liver, and spleen.

For many minutes, the stethoscope was used to listen across various locations of the abdomen for the existence of bowel noises. Firm yet moderate pressure was given to the abdomen wall with the stethoscope's diaphragm.

Auscultation for abdominal bruits was then done. We carefully checked for bruits across the aorta, both renal arteries, and the iliac arteries.

Obstetric examination: the abdomen was exposed and inspected, light palpation was performed over each of the nine regions of the abdomen by applying gentle pressure to find any lumps or pain that may not be related to the pregnancy.

The uterus was palpated for assessment of: Fetal lie: hands were placed on other side of the patient's uterus. Each side of the uterus was palpated by gentle pressure. On one side of the uterus, it was full by the fetal back and the fetal limbs were felt in the other side.

Symphyseal-fundal height: Utilizing the left ulnar border of the hand, the abdomen was palpated immediately below the xiphisternum. The higher pubic symphysis boundary was then where the uterus' fundus was discovered. Using a tape measure, the distance between the pubic symphysis and the upper uterine boundary was measured in cm.

Fetal heartbeat: the Pinard stethoscope was placed on the fetal back between the fetal shoulders. The maternal pulse was palpated. The Pinard was held against the abdomen using your ear only. A gentle pressure was applied, to ensure a good seal between the ear and the Pinard, as well as between the Pinard and the abdomen. The fetal heartbeat was noted and documented.

Using a 5–9 MHz trans-vaginal probe, a transvaginal ultrasound examination (TVS) was carried out to estimate the distance between the cervical internal os and the lower placental edge.

The transvaginal transducer was implanted, paying close attention to how the picture was facing. The external cervical OS or the distal vagina were the locations for the probe. With side-to-side motions of the probe from one adnexa to the next, sagittal imaging was achieved.

The probe's 90° rotation produced a transverse/semi-coronal orientation. The probe was then moved from anterior to posterior to conduct further imaging. At the bilateral adnexa, the probe was initially swept from the midline to the lateral borders as a preliminary examination. The probe was then moved anteriorly and laterally while being rotated 90 degrees.

It was noted if the placenta was anterior or posterior. Serial ultrasound re-evaluation until delivery was done.

Statistical analysis

SPSS (Statistical Package for Social Science) version 26 was used for the statistical analysis. The mean and standard deviation (SD) of quantitative parameters were reported, and they were compared for the same group using a paired Student's t-test. The Shapiro Walk test was used to determine if information had a normal distribution before presenting qualitative characteristics

like frequency and percentage. IOD ROC curve study for placental position prediction in the third trimester. Significant results were defined as two tailed P values < 0.05.

Results

A statistically substantial association was existed between abnormal 3rd trimester placental site and prior history of

caesarean also a statistically substantial variation was existed across normal group and PP group regarding estimated fetal weight in the end of 2nd and 3rd trimesters. also no statistically substantial variation was existed across both groups as regard age, BMI, DM, chronic hypertension, gravidity, parity, history of previous abortion, blood pressure, pulse, temperature. Table 1.

Table 1: Basic maternal characteristics, obstetric history, vital signs, transabdominal ultrasonography among the studied groups

Variable	Group I n= 46	Group II n=4	P value
Age	27.4±5.7	27.9±5.1	0.715
BMI	24.6±1.8	24.4±2.4	0.728
DM	8 (17%)	1 (25%)	0.349
HTN	9 (19.5%)	1 (25%)	0.334
Gravidity	3.9±2.2	3.8±1.9	0.738
Parity	1.8±1.6	1.9±2.1	0.702
Previous abortion	14 (30%)	1 (25%)	>0.999
Previous caesarean	22 (48%)	4 (100%)	<0.001*
Systolic blood pressure	116±7.6	115±6.5	0.843
Diastolic blood pressure	66.8±6.9	68.0±5.8	0.508
Pulse	84.6±4.6	85.5±4.1	0.474
Temperature	37.5±0.2	37.5±0.2	0.952
EFW 2 nd trimester	600.8±21.8	550.3±29.6	0.037*
EFW 3 rd trimester	2700±21.8	2400±29.6	0.007*

Data are presented as mean±standard deviation or frequency (%).DM: diabetes mellitus, HTN: hypertension, BMI: body mass index * P value<0.05 is significant.

A statistically substantial correlation was existed between placental side and abnormal third trimester placental location. no statistically substantial correlation was existed between PP and

placental maturity, amniotic fluid index and amniotic fluid turbidity. Table 2.

Table 2: Comparing transabdominal ultrasound between the two studied groups.

Variable	Group I (n= 46)	Group II (n=4)	P value
Placental side	Anterior	19 (41.3%)	1 (25%)
	Posterior	27 (58.7%)	3 (75%)
Placental maturity	33 (71.7%)	3 (75%)	0.072
AFI	12.0±2.7	11.5±7.3	0.955
Turbidity	9 (19.5%)	1 (25%)	>0.999

Data are presented as mean±standard deviation or frequency (%). AFI: amniotic fluid index * P value<0.05 is significant.

A statistically substantial correlation was existed between PP and placental abruption, antepartum haemorrhage, preterm labor,

abnormal fetal presentation, fetal growth restriction, preterm delivery and post-partum haemorrhage. Table 3

Table 3: Comparison between both groups regarding outcome

Variable	Group I n (%)	Group II n (%)	P value
Confirmation of placenta previa	0 (0)	4 (100%)	<0.001*
Placental abruption	5 (10.9%)	1 (25%)	0.001*
Antepartum Hmg	7 (15%)	3 (75%)	0.012*
Preterm labor	14 (30%)	3 (75%)	0.019*
Abnormal fetal presentation	12 (26%)	2 (50%)	0.005*
Fetal growth restriction	1 (2%)	1 (25%)	0.005*
Preterm delivery	4 (8.7%)	2 (50%)	0.011*
1-min APGAR<7	2 (4.3%)	3 (75%)	0.463
5-min APGAR <7	2 (4.3%)	1 (25%)	0.189
Post-partum Hmg	1 (2.2%)	1 (25%)	0.002*

Data are presented as frequency (%) APGAR: appearance, pulse, grimace, activity, and respiration *P value<0.05 is significant.

The 2nd trimester IOD had a substantial association with placental position in the 3rd trimester, even when anteriorly and posteriorly located placentas were taken into account. Women with posteriorly located placentas had higher IOD values and greater percentages of women with normal placental position in the 3rd trimester. IOD values of at least 5 mm had a likelihood

ratio of 0.1 in predicting an abnormally positioned placenta in the 3rd trimester. IOD values of no less than 2 mm with overlapping of the placental edge over the internal os of the cervix resulted in a probability ratio of 0 in women with an anteriorly placed placenta. Table 4.

Table 4: For various ranges of the distance between the internal os and placental edge (IOD) in the second trimester, multilevel probability ratios for aberrant third-trimester placental position are calculated

IOD range in second trimester	Third trimester placental position		Likelihood ratio	
	Abnormal	Normal		
Posterior	0 to <5 mm	2	3	0.2
	5 to 15 mm	1	24	0.1
	Total	3	27	-
Anterior	0 to <5 mm	1	3	.001
	5 to <10 mm	0	16	.01
	Total	1	19	-

Using ROC curve analysis for IOD among women with posterior placenta in 2nd trimester in predicting placenta previa in 3rd trimester: regarding IOD (Anterior); AUC was 0.937, the sensitivity was 93% & the specificity was 57%. Regarding IOD (Posterior); AUC was 0.850, the sensitivity was 92% & the specificity was 64%. Figure 1

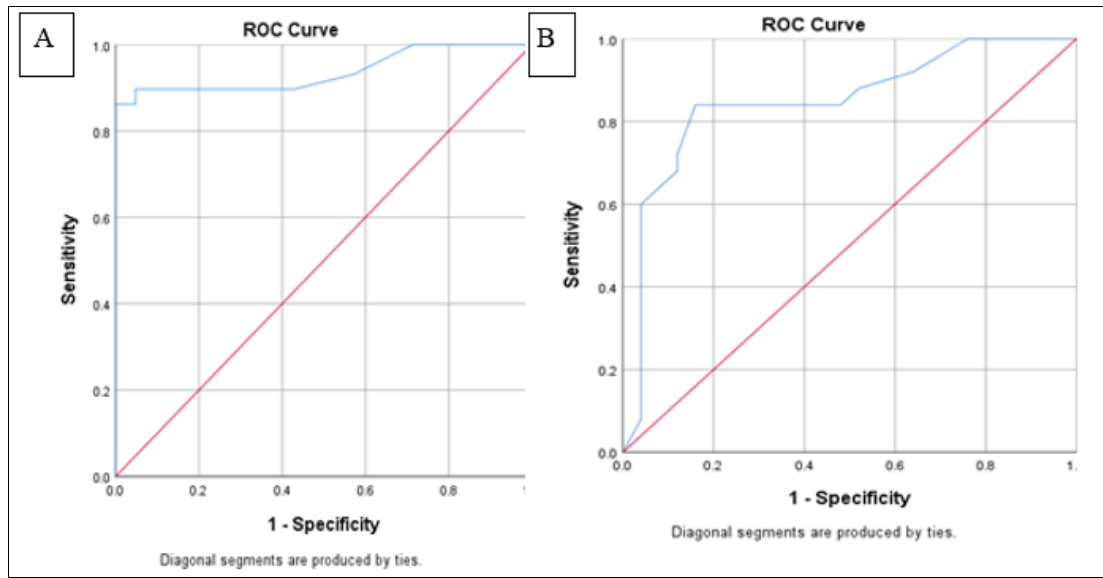


Fig 1: ROC curve analysis for IOD among women with (A) anterior and (B) posterior placenta in second trimester in predicting placenta previa in third trimester

Discussion

Both the mother and the infant might die from placenta previa and low-lying placentas [7]. According to the current investigation, no statistically substantial variation was existed between the two study groups in terms of gravidity, prior abortion history, age, BMI, diabetes mellitus, or chronic hypertension. The aberrant 3rd trimester placental position and prior caesarean delivery were statistically significantly associated.

The findings of this investigation were consistent with those of Magann *et al.*'s study [8], which found no statistically significant differences in age, diabetes mellitus, or hypertension between the groups they analyzed. While there was a clear correlation among PP and maternal age of 35 years or higher in the research by Shobeiri *et al.* [9], there was also a direct correlation between past uterine cavity procedures and PP. There was a statistically significant correlation between many pregnancies, past spontaneous abortions, and previous CSs with the risk of PP.

According to these findings, Jansen *et al.*'s research [10], was conducted because it demonstrated links between an aberrant placental position in the third trimester and a prior caesarean birth.

However, older women were fewer inclined to have relief on follow-up US in the research by Durst *et al.* [6], Race, previous caesarean conception, and parity did not vary across groups in a way that was statistically significant (resolver, not resolved).

The placental side and aberrant third trimester placental placement were statistically significantly associated in the present investigation. no substantial correlation was existed between PP and amniotic fluid index, turbidity, or

placental maturity.

These findings were corroborated by a study by Jansen *et al.* [10], who found correlations between abnormal third-trimester placental site, placenta type (PP or low-lying placenta), placenta side (Anterior vs. posterior), and placenta position. The likelihood of having an improperly positioned placenta in the 3rd trimester was greater in women who had PP, a posteriorly situated placenta, or had had a prior caesarean surgery.

Regardless of the quantity of past cesareans, Oben *et al.*'s [11] study found no elevated incidence of early preterm birth among women with placenta accreta spectrum.

According to Elwaan *et al.* [12], the majority were PP central in 51.9% of cases, and 65.6% had fully covered internal cervical OS with a probability of accreta in 43.8% of cases.

According to the current research, a statistically substantial variation was existed in the estimated weight of the fetus at the end of the second and third trimesters between the normal group and the PP group. Preterm labor, placental abruption, antepartum hemorrhage, atypical fetal presentations, fetal growth restrictions, preterm birth, and post-partum hemorrhage were all statistically significantly associated with PP.

The findings of Magann *et al.*'s research [8], which found that pregnancies with low implantations (Low) are more likely to result in preterm labor and delivery as well as less fetuses with macrosomia and a lower risk of postpartum hemorrhage, confirmed the findings of the present study. High 1 (left and right high) implantations had a higher likelihood of low 1- and 5-min Apgar scores.

According to DeBolt *et al.*, [13], women with resolved poor

placentation continue to be at higher risk for postpartum hemorrhage than those who had normal placentation throughout the whole pregnancy.

According to Elwaan *et al.*'s research, ^[12] there were no other significant differences or associations save the ones between NICU and central and marginal kinds and poor APGAR.

The findings of this study demonstrated a significant relationship between second-trimester IOD and placental position in the third trimester, as well as when taking into account those with a both posteriorly and anteriorly located placenta. A greater percentage of women had normal placental position in their 3rd trimester for higher IOD values in women with a posteriorly located placenta, and IOD values of at least 5 mm had a probability ratio of 0.1 in predicting of an abnormally placed placenta in the 3rd trimester. For IOD values of no less than 2 mm and overlapping of the placental edge across the internal os of the cervix, a probability ratio of 0 was attained in those with an anteriorly placed placenta. Without further testing, any women who have an IOD that is greater than or equal to these cut-off levels may be certain that their placental position will be normal during delivery.

The 2nd trimester data from Jansen *et al.*'s research ^[10] IOD was substantially correlated with placental position in the 3rd trimester, even when taking into account women with an anteriorly and posteriorly placed placenta. A larger percentage of women in the 3rd trimester with normal placental position had higher IOD levels ($P < 0.01$ for all). IOD values of at least 15.5 mm exhibited a probability ratio of 0 in predicting of an improperly positioned placenta in the 3rd trimester in those with a posteriorly situated placenta. IOD values of at least -4.5 mm, which indicate a 4.5-mm overlapping of the placental edge across the internal os of the cervix, were shown to result in a probability ratio of 0 in women with an anteriorly placed placenta. Without further testing, any women with an IOD that exceeds or equals these cut-off levels may be certain that their placental position will be normal during delivery.

While the obstetric and newborn outcomes in this cohort were comparable for the two placental sides, another research by Feng *et al.* ^[14] indicated a greater incidence of proper placental position in the 3rd trimester for posteriorly situated placentae.

To properly prepare for delivery, we advised that thorough scanning during follow-up is necessary to determine if a fetal vessel or a portion of the placenta has crossed the internal surface of the cervix. In order to underline our recommendation for early identification of the 2nd trimester LIP with the cut of value of 10 mm, more research with bigger sample sizes and on broader geographic scales are also encouraged.

Conclusions

Postpartum hemorrhage, antepartum hemorrhage, and small-for-dates newborns have all been linked to low-lying placentas detected in the 2nd trimester that continue to or near term; there is increased incidence of placental abruption, antepartum hemorrhage, preterm labor, abnormal fetal presentation, fetal growth restriction, preterm delivery, and post-partum hemorrhage. IOD cut-off value of 5mm or less was highly sensitive in predicting PP in third trimester.

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