

The Efficacy of Third Trimester Cervical Length Measurement as A Predictor of Ante-Partum Haemorrhage Among Pregnancies Complicated with Placenta Previa

Original
Article

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ABSTRACT

Aim: To estimate whether the cervical length and can be used as a method to predict peripartum complications as antepartum haemorrhage and preterm delivery in cases of complete placenta previa.

Methods: Between October 2013 and April 2014, transvaginal measurement of cervical length was done for 30 cases of complete placenta previa identified between 28 weeks and 36 weeks of gestation. This was correlated to the clinical outcome of pregnancy with recordings for the gestational age at time of delivery, occurrence if any complications as antepartum haemorrhage, blood transfusion, caesarean hysterectomy, preterm delivery and the need for NICU admission and whether the caesarean section was elective or emergency caesarean section was needed before 36 weeks due to massive haemorrhage.

Results: Antepartum haemorrhage necessitating emergency cesarean section was observed in 17 patients (56.7%). This was the basis of grouping the patients into two outcome groups: Emergency CS group and elective delivery group. Using receiver-operating characteristic (ROC) curve analysis we found that a cervical length ≤ 33 mm at 28 weeks was predictive of antepartum haemorrhage necessitating emergency caesarean section with a sensitivity of 88.2% and specificity of 61.5% positive predictive value of 75.0% and negative predicative value of 80.0% and accuracy of 76.7%. Area under the curve (AUC) was 0.760.

There was a highly statistical significance between cervical length with antepartum hemorrhage and the type of cesarean section whether emergent or elective with *P-value* < 0.01

Conclusion: Short cervical length measurements at cut-off value ≤ 33 mm may predict increased risk of hemorrhage and emergency caesarean section in patients with complete placenta previa.

Key Words: Antepartum hemorrhage, cervical length, placenta previa.

Received: 26 April 2020, **Accepted:** 19 October 2020

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ISSN: 2090-7265, May 2022, Vol.12, No. 2

INTRODUCTION

Due to the increasing rates of caesarean section and with the advances in ultrasound, the incidence of placenta previa is estimated around 0.2 and 0.3% during third trimester^[1].

Associated haemorrhage with placenta previa can be a life-threatening complication due to antepartum or intrapartum haemorrhage leading to maternal morbidity and mortality. Haemorrhage occurs predominantly during the third trimester when the lower uterine segment is more formed leading to tearing of the placental vessels, associated with inability of the underdeveloped myometrium to contract and constrict the torn vessels. This can lead to unpredictable haemorrhage and consequently an emergent preterm delivery^[2,3].

Ultrasonographic assessment for cervical length can predict the risk for preterm labour^[4,5]. Tenth percentile for cervical length ranges between 26 -30 mm in late 2nd and

early 3rd trimester^[4,6]. 30 mm was used as a cut-off value for cervical length below which cases are more prone to preterm labour of 3.8^[7].

Prediction of antepartum haemorrhage is crucial in the management of placenta previa, regarding the proper method for patient management, type and timing of intervention^[8].

Placenta previa has been classified according to the distance from the internal cervical os, in many studies cases of complete previa is reported to have increased incidence of massive antepartum or intrapartum haemorrhage, blood transfusion, placenta accreta, and hysterectomy. However, massive haemorrhage remains to be the concern of many obstetricians whether it is a case of complete previa or the placenta on the anterior wall of the uterus reaching the caesarean scar. Therefore, many authors studied statistical significance of using the site of the placenta and its being an independent prognostic factor of pregnancy outcomes^[9].

An association between shortening of the cervical canal detected by ultrasound and the increased incidence of antepartum or post-partum haemorrhage requiring an emergency caesarean section was the subject of many studies^[10-12]. Trans-vaginal ultrasound is a safe commonly used technique. Therefore, most of cases of low-lying placentas are detected during the second trimester scan^[3].

The objective of our study is to detect if we can predict antepartum haemorrhage by using ultrasonographic measurement the cervical length in cases of placenta previa or not.

PATIENTS AND METHODS

The current study is prospective cohort study that included healthy pregnant women, aged from 20 to 45 years old, with singleton living fetus & diagnosed as having complete placenta previa (the diagnosis of previa was confirmed by ultrasound scan between 28 & 36 weeks gestation & gestational age was confirmed by a reliable 1st day of last menstrual period or 1st trimester ultrasound scan). Patients were recruited & followed up in obstetrics & gynecology department (Kasr Elainy hospital – Faculty of Medicine – Cairo University) in the duration between October 2013 and April 2014. The study was approved by the hospital ethical committee.

Patients with history of threatened preterm labour, rupture of membrane, restricted-growth or anomalous fetus, underwent cervical cerclage or received progesterone support in the current pregnancy were excluded. Moreover, patients with previous history of preterm labour or cervical incompetence (e.g., cone biopsy, recurrent 2nd trimester abortions) were also excluded.

After obtaining informed consent entailing the aim of the study, the intervention done and the potential hazards, the following was done: history taking, examination (general & obstetric) & ultrasound examination (routine obstetric abdominal ultrasound then transvaginal one to confirm the diagnosis of complete previa & to assess the cervical length). All ultrasounds were done by single sonographer using (Medison SonoAce R5) a machine equipped with multi-frequency Transvaginal probe (7.5 Mhz)

Cervical evaluation was performed using the following technique: women were asked to void their bladder before the examination then a true sagittal plane was obtained in order to visualize the full length of the cervical canal and cervical length was measured by placing the callipers on the internal and external os (the shortest measurement was then recorded – Figures 1,2). CL measurement were repeated bi-weekly during pregnancy to assess cervical length changes throughout the 3rd trimester. After the sonographic confirmation of complete placental previa, elective CS was scheduled after completion of 37 weeks gestation. If the condition complicated by severe vaginal bleeding prior to the scheduled date, emergency CS was decided according to patient clinical condition.



Fig. 1: Transvaginal ultrasound showing the cervical length of 3.12 cm



Fig. 2: Transvaginal ultrasound showing cervical length of 2.72 cm

After termination of pregnancy, participants were divided into 2 groups; “emergency CS” group that included those who underwent emergency caesarean section at less than completed 36 weeks gestation due to massive haemorrhage and ‘elective CS’ group that included those who underwent elective caesarean section at more than or equal to completed 36 weeks in absence of brisk bleeding.

The occurrence of severe antepartum bleeding, receiving blood transfusion, the type of CS performed (elective or emergency), if caesarean hysterectomy were done & the need for NICU admission were all recorded for each patient. The mean cervical lengths were compared for both groups. Primary outcome included the evaluation of the relation between cervical length measurement & the risk of developing severe antepartum hemorrhage. Secondary outcome included the establishment of cervical length cut off value below which the risk of developing severe antepartum hemorrhage is significantly increased.

Statistical analysis

The data were revised, coded and entered to the statistical package for social science (SPSS) version 17 and the following were done. Quantitative data were presented as mean, standard deviations and ranges while

qualitative data were presented as number and percentages. The comparison between two groups with qualitative data was done by using Chi-square test and/or Fisher exact test when the expected count was less than 5. The comparison between two groups with quantitative data was done by using Independent t-test with the parametric data and Mann-Whitney test with the non-parametric data. Receiver operating characteristic curve (ROC) was done to assess the best cut-off point with sensitivity, specificity, positive predictive value and negative predictive value. The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the *p-value* was considered significant at the level of < 0.05 and highly significant if below 0.01.

RESULTS

Thirty pregnant women diagnosed with complete placenta previa were finally included & followed up in this study. Of them, 17 underwent emergency CS & the rest (13 patients) underwent elective CS (flow & classification of patients were summarized in Figure 3). Demographic and obstetrical features & Peripartum Complications for both groups were summarized in (Tables 1,2) shows cervical length measurements in both groups. Cervical length was

used as the independent variable to predict emergency caesarean section and by using receiver-operating characteristic (ROC) curve analysis (Figure 4), we found that a cervical length ≤ 33 mm at 28 weeks was predictive of antepartum haemorrhage necessitating emergency caesarean section with a sensitivity of 88.2% and specificity of 61.5% positive predictive value of 75.0% and negative predictive value of 80.0% and accuracy of 76.7% [Area under the curve (AUC) was 0.760]. Also, in the current study there was a statistical significance between cervical length and mean gestational age at delivery (Patients with cervical length < 33 mm delivered at an earlier gestational age (median of 33) than those with cervical length > 33 mm (median of 36 , *p value* < 0.001) . In the current study, there was a statistical significance between cervical length and neonatal ICU admission with *P-value* < 0.001) and consequently, cervical length < 33 mm was associated with higher rates of neonatal ICU admission. The same was observed with the need for caesarean hysterectomy There was statistical significance in the relation between cervical length and the need for caesarean hysterectomy with *P-value* < 0.03 on the other hand, there was no statistical significance between cervical length and the need for blood transfusion with *P-value* > 0.142 (Table 3).

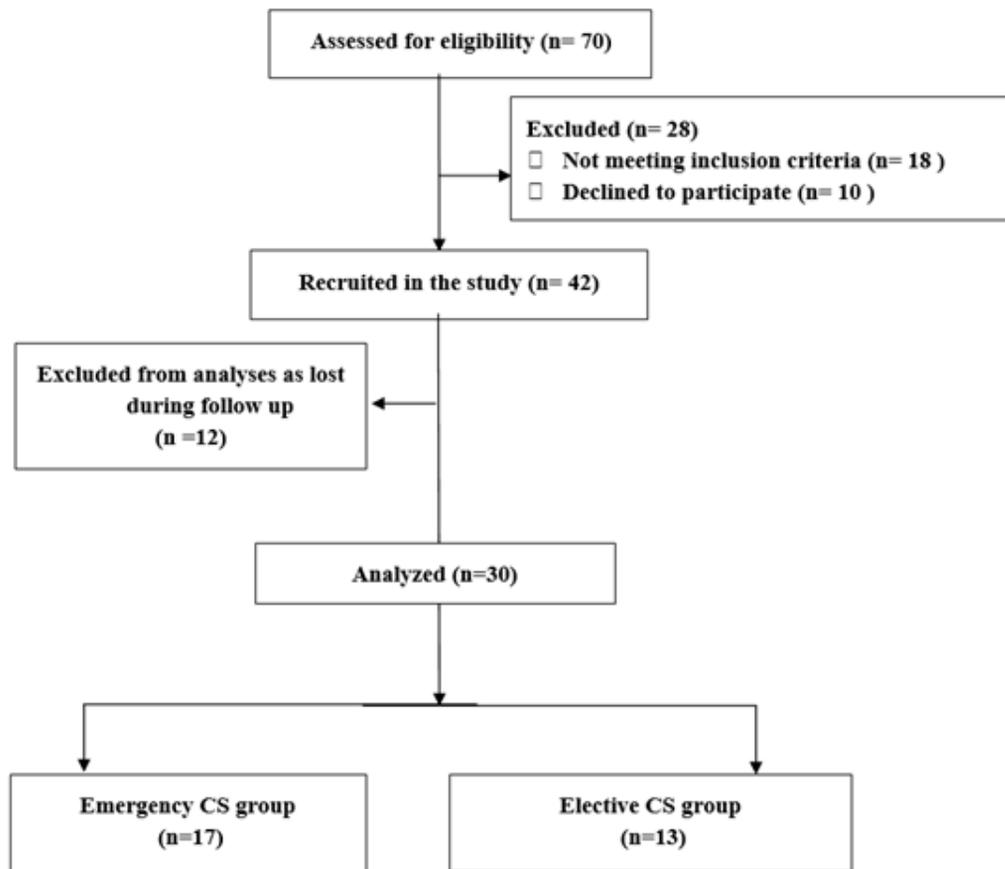


Fig. 3: flow of patients in the study

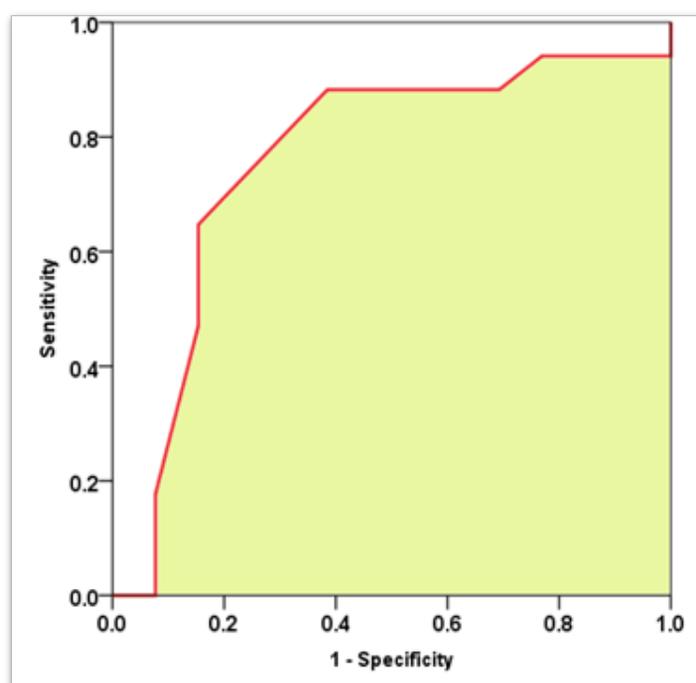


Fig. 4: A receiver-operating characteristic (ROC) curve for prediction of emergency caesarean delivery using cervical length at 28 weeks

Table 1: Comparison between the 2 groups regarding demographic data and Peri-Partum Complications

	Emergency group n=17	Elective group n=13	P value
Age (years)*	34.3±5.1	32.2±4.9	0.363
Gravidity [#]	3 (0-5)	4 (0-6)	0.483
Parity [#]	2 (0-4)	2 (0-4)	0.967
Previous CS [#]	2 (1-4)	2 (1-4)	0.827
Caesarean hysterectomy**	3 (17.6%)	4(30.8%)	0.666
Admission to NICU**	10 (58.8%)	0 (0%)	<0.001
Gestational age [#]	33(28-35)	36(36-37)	<0.001
BMI [#]	33(27-42)	30.3(24-38)	0.143

*Age is presented as mean± SD

[#] parameters presented as median and range

**parameters presented as number and %

Table 2: Cervical length measurements in the two outcome groups

Cervical Length (mm)	Emergency CS group		Elective delivery group		p value
	N	Mean ± SD	N	Mean ± SD	
At 28 weeks	17	31.1±3.7	13	34.0±4.9	0.015
At 30 weeks	15	31.5±3.6	13	33.9±5.0	0.033
At 32 weeks	13	31.9±3.4	13	33.7±5.2	0.081
At 34 weeks	12	31.9±3.6	13	33.6±5.3	0.087
At 36 weeks	6	32.5±3.2	13	33.2±5.4	*

* no p value due to the small number of cases in emergency CS group

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Table 3: Relation between cervical length and need for caesarean hysterectomy and blood transfusion

Caesarean hysterectomy	Needed	Not needed	Total	Expected	P value
Cervical length >33	4	9	13	6.5	0.0335
Cervical length <33	3	14	17	8.5	
Blood transfusion	Needed	Not needed	Total	Expected	P value
Cervical length >33	10	3	13	6.5	0.1426
Cervical length <33	7	10	17	8.5	

DISCUSSION

Placenta previa remains one of the main obstetric challenges that is associated with increased maternal mortality. In this study, we studied how shortening of cervix can predict antepartum haemorrhage. we found that short cervical length (less than 33mm) is a predictor for increased risk for antepartum haemorrhage and emergency CS.

Many studies were done to measure the distance between lower placental edge and the internal os and the likelihood for APH, emergency caesarean section and the increased risk of prematurity in cases of placenta praevia^[8,13,14], Meanwhile few studies investigated the value of cervical length measurement and its impact on the clinical outcome^[10,15]. One of the strengths in our study that we investigated the relationship between cervical length in pregnancies with placenta previa and its relation to outcome of pregnancy. Another point of strength that multiple CL measurements were taken throughout the 3rd trimester in other studies, CL was measured at a certain gestational age point; A single measurement of CL will not represent the CL accurately, in some of the cases they will have a short CL initially, mean values reported at certain points in pregnancy are variable^[4,16,17]. In nulliparas the mean ranges from 34 to 41 mm at 24 weeks, and from 23 to 30 mm at term^[4,16,17]. However, the studies using single measurement of the CL also concluded that short CL correlates strongly with the occurrence of massive APH, preterm emergency CS^[18]. Limitation in our study was the small sample size due to selection of cases of placenta previa complete centralis.

This study agreed with Altraigey and his colleagues who studied 158 women with short cervix and placenta previa/accreta and were found to have higher rates of APH, emergent CS but they were different in collecting their data from single CL measurement^[18].

This study also agreed with Curti and his colleagues, they performed their study on women with placenta previa in the 3rd trimester and found that short cervix <25mm correlated strongly with the increased incidence for APH similar to us they reported these cases to have higher incidence for blood transfusion more NICU admission^[19]. On the contrary Hasegawa and his colleagues did not find that CL in cases of placenta previa has any statistical significance with or without APH^[20].

Although there is a relationship between APH and short cervix, still it is not clear whether the shortening of the cervical canal is responsible for peripartum complications which may occur with cases placenta previa or there are other contributing factors as complete placenta previa, premature uterine contractions and if there is a history of previous CS^[10,14,21]. The question about the main initiative factor behind the uterine contractions and bleeding remains unsettled. Authors suggested that bleeding is due to uterine contractions with the implantation of the placenta over a changing cervix. Cases with placenta previa has a high risk

for preterm labour and placental separation due to its low inelastic insertion and the progressive cervical dilatation to which the placenta may not adapt^[10,14,22]. Other hypothesis is the high vascularity of the low wide uterine segment compared to shortened cervix with a small surface area^[23].

Although transvaginal ultrasound has always been a tool predict the type, and adhesions of placenta previa, it should be used more to predict different maternal and neonatal outcomes through obtaining CL measurement.

CONCLUSION

Increased risk for peripartum complications as emergency caesarean section, massive antepartum haemorrhage and caesarean hysterectomy can be predicted by ultrasonographic detection of shortened cervical canal

CONFLICT OF INTERESTS

There are no conflicts of interest.

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