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Predictive value of cervical length in placenta previa totalis: a single-center experience

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ABSTRACT

Aims: In our study, we aimed to scientifically assess the utility of measuring cervical length in predicting the risk of postpartum hemorrhage and the necessity for emergency preterm cesarean delivery in women diagnosed with placenta previa totalis.

Methods: We conducted a retrospective study at a single medical center, comprising 48 pregnant women diagnosed with placenta previa totalis. Cervical length was precisely measured through transvaginal ultrasound. Patients were categorized based on cervical length (CL): CL >30mm, CL 25-30 mm, and CL <25 mm. Primary outcomes included preterm birth, postpartum hemorrhage, and emergency cesarean section.

Results: Women with CL <25 mm exhibited a notably elevated risk of postpartum hemorrhage (60%) and emergency cesarean section (80%). While preterm birth rates displayed variations among groups, statistical significance remained elusive. APGAR scores demonstrated consistency across cervical length categories.

Conclusion: Evaluation of cervical length holds promise as a valuable tool in the comprehensive management of placenta previa totalis. Women presenting with a cervical length less than 25 mm may warrant intensified monitoring and targeted interventions to mitigate adverse perinatal outcomes. Further research endeavors are imperative to corroborate these findings and advance the care provided for these intricate pregnancies.

Keywords: Placenta previa, hemorrhage, preterm birth, ultrasonography

INTRODUCTION

Placenta previa totalis, characterized by complete coverage of the cervical os by the placenta, presents a formidable challenge within obstetrics due to its significant association with adverse perinatal outcomes.[1-3] It exhibits an approximate incidence rate of 1% among all pregnancies[4,5], and its prevalence seems to be on the ascent, possibly attributed to escalating rates of cesarean sections and the increasing age of expectant mothers.[6,7] Despite advances in management and monitoring, the accurate prediction and prevention of unfavorable outcomes in these cases continue to be intricate endeavors.

Cervical length, a well-established metric in obstetrics, has surfaced as a potential pivotal factor in the comprehension and management of pregnancies complicated by placenta previa totalis.[8-12] Extensively scrutinized for its prognostic capacity regarding preterm birth risk across diverse obstetric scenarios,[13] cervical length has gained pronounced relevance in this specific context. An investigation by Ghi et al.[14] manifested that women afflicted with placenta previa totalis, bearing a cervical length measuring less than 31 mm, exhibited a staggering 16-fold greater likelihood of delivering preterm before 34 weeks of gestation when contrasted with those possessing a cervical length of 31 mm or greater.

Notwithstanding this burgeoning fascination with cervical length as a predictive determinant, its precise role and impact in the realm of placenta previa totalis cases endure as enigmatic facets. Within the confines of this research article, our primary objective is the exhaustive exploration of the intricate interplay between cervical length and perinatal outcomes in patients bearing the diagnosis of placenta previa totalis. Our exclusive focus on cervical length is aimed at illuminating its predictive efficacy, prospective complications, and ramifications for clinical management.

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This study is imbued with the aspiration of furnishing a profound comprehension of the role of cervical length in pregnancies marred by placenta previa totalis. Our findings have the potential to proffer invaluable insights to clinicians, thereby facilitating risk assessment, early intervention, and the formulation of bespoke management strategies for expectant mothers grappling with this multifaceted obstetric challenge. Ultimately, our overarching objective resides in the enhancement of care and the amelioration of outcomes for both mothers and neonates ensnared within the labyrinthine confines of these taxing pregnancies.

METHODS

This study was conducted in accordance with the Helsinki Declaration and received approval from Haseki Training and Research Hospital Clinical Researches Ethics Committee. (Date: 20.09.2023, Decision No: 162-2023). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Study Participants

The study included pregnant women admitted to our clinic between January 2021 and August 2023, diagnosed with placenta previa totalis with a gestational age between 33-37 weeks. Only singleton pregnancies were considered.

Exclusion criteria encompassed multiple pregnancies, placenta accreta, active genital tract infections, a history of preterm delivery, prior cervical surgeries, severe medical conditions potentially impacting pregnancy outcomes, and fetal anomalies.

Clinical data such as patients' age, parity, presence of antepartum bleeding (APH), type of caesarean section (emergency or elective), gestational age, birth weight, and Apgar scores were retrieved from patients' medical records. Obstetric outcomes were extracted from hospital maternity records.

Perinatal Outcome Assessment

Perinatal outcomes were assessed at the time of delivery. The primary outcome of interest was preterm birth, defined as delivery occurring before 37 weeks of gestation. Secondary outcomes included rates of emergency cesarean section, postpartum hemorrhage, and neonatal complications.

Measurement of Cervical Length (CL)

Cervical Length (CL) was meticulously measured through transvaginal ultrasound examinations using a Voluson E6 ultrasound system (GE Medical Systems, Milwaukee, WI, USA) equipped with a 2-8 MHz probe. All cervical measurements were consistently performed by the same experienced fetal medicine consultant.

For CL measurement, we recorded the distance from the internal os to the most distal edge of the cervix. Cervical evaluation adhered to a strict and uniform protocol to ensure precision. Prior to the examination, participants were instructed to empty their bladder to optimize ultrasound imaging clarity. A true sagittal plane was obtained during ultrasound to visualize the full cervical canal length. CL was measured three times, and the shortest measurement among the three was recorded for each participant. This standardized approach minimized variability and bolstered the data's reliability, enhancing the study's robustness.

Statistical Analyses

To evaluate the normality of continuous variables, appropriate normality tests were conducted. Non-normally distributed data were described using median and interquartile range (25^{th}-75^{th} percentile), while normally distributed continuous data were presented as mean and standard deviation. Categorical variables were compared using the Chi-square test or Fisher's exact test, depending on the data's nature. Statistical significance was defined as $p \leq 0.05$. All statistical analyses were carried out using IBM SPSS software, version 21 (IBM, US).

RESULTS

Study Population

Initially, a total of 63 asymptomatic women diagnosed with placenta previa totalis were retrospectively enrolled for this study. However, after applying stringent exclusion criteria, four cases were excluded due to the presence of placenta accreta, while ten cases were excluded for various reasons including a history of previous cervical surgeries (1 case), multiple pregnancies (2 cases), a history of preterm delivery (3 cases), maternal comorbidities such as preeclampsia (4 cases), and fetal anomalies (1 case). This meticulous screening and exclusion process culminated in a final study population of 48 women. A comprehensive summary of patient data and pregnancy outcomes for this ultimate cohort is meticulously presented in **Table 1**, and **Figure**.

Table 1. Patient characteristics and pregnancy outcome

Characteristics/outcome	n(%) or mean±SD (n=48)
Maternal age	34.2±4.5
Parity	
Nulliparous	13 (27)
Multiparous	35 (72.9)
Previous Cesarean section	
0	9 (18,7)
1	7 (14,5)
>1	32 (66,6)
Gestational age at diagnosis (week)	30.3±3.2
Cervical length (mm)	
>30	31 (64.6)
25-30	12 (25)
<25	5 (10.4)
Blood transfusion	17 (35.4)
Gestational age at delivery (weeks)	35.4±2.5
Birth weight (g)	2938.5±330.6
APGAR score	
>7	41 (85.4)
<7	7 (14.5)

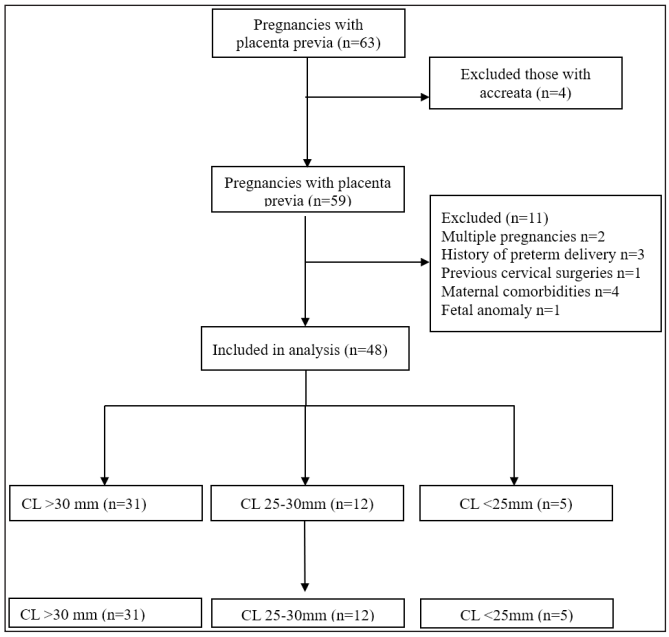

Figure. Flow diagram of the cohort

Demographics and Obstetric Characteristics

Within this definitive study population, 13 women (27%) were nulliparous. The mean gestational age at the time of transvaginal ultrasound assessment was 30.3±3.2 weeks. In all instances, the mode of delivery selected was cesarean section, and it was executed at a mean gestational age of 35.4±2.5 weeks. Neonates in this cohort exhibited a mean birth weight of 2938.5±330.6 g. Pertaining to cervical length measurements, 31 women (64.6%) demonstrated cervical lengths exceeding 30 mm, 12 women (25%) exhibited cervical lengths ranging between 25 mm and 30 mm, and 5 women (10.4%) displayed cervical lengths less than 25 mm. Furthermore, 17 cases (35.4%) necessitated blood transfusion during the course of their clinical management.

Outcome of Pregnancy According to Cervical Length

In addition to the abovementioned demographic and obstetric characteristics, Table 2 provides an all-encompassing overview of pregnancy outcomes meticulously categorized based on cervical length (CL) measurements. Participants were meticulously stratified into three distinct cervical length categories: those harboring CL >30 mm, CL 25-30 mm, and CL <25 mm.

Table 2. Outcome of pregnancy according to cervical length

Outcomes	CL >30 mm n=31 (%)	CL 25-30 mm n=12 (%)	CL <25 mm n=5 (%)	p
Postpartum haemorrhage	4 (12.9)	6 (50)	3 (60)	<0.05
Emergency cesarean section	7 (22.5)	6 (50)	4 (80)	<0.05
Preterm birth	8 (25.8)	5 (41.6)	5 (100)	0.3
APGAR score (5 min)				
>7	29 (93.5)	9 (75)	3 (60)	0.07
<7	2 (6.5)	3 (25)	2 (40)	0.07

Postpartum hemorrhage rates exhibited notable variations among the cervical length groups (p <0.05). Notably, among women with CL>30 mm, merely 12.9% encountered postpartum hemorrhage. In stark contrast, this rate significantly escalated to 50% in the CL 25-30 mm group and surged further to 60% in the CL<25 mm group.

Statistical analysis unveiled a noteworthy difference in the incidence of emergency cesarean sections across the cervical length categories (p<0.05). Specifically, within the CL>30 mm group, 22.5% underwent emergency cesarean sections. This rate surged to 50% in the CL 25-30 mm group and peaked at 80% in the CL<25 mm group.

Although numerical disparities in preterm birth rates were observable among the groups, statistical significance remained elusive (p=0.3). Concretely, preterm birth rates stood at 25.8% in the CL >30 mm group, 41.6% in the CL 25-30 mm group, and 100% in the CL<25 mm group.

APGAR scores, while generally consistent across the cervical length groups, warrant attention. Notably, the CL <25 mm group displayed a lower percentage of neonates with APGAR scores >7 (60%) and a higher percentage with scores <7 (40%) in comparison to the other groups.

These findings underscore the profound associations between cervical length and specific perinatal outcomes in placenta previa totalis cases, shedding light on the intricate nuances of clinical management and risk assessment.

DISCUSSION

Our findings distinctly revealed that women with a cervical length measuring less than 25 mm faced a significantly elevated risk of postpartum hemorrhage and emergency cesarean section. These outcomes align with the results of previous investigations, which consistently demonstrated that a shorter cervical length in women with placenta previa totalis is associated with an increased susceptibility to adverse perinatal outcomes, including preterm birth and low birth weight infants.[14-17]

The precise mechanistic link between a shorter cervical length and the heightened risk of adverse perinatal outcomes in placenta previa totalis cases remains not entirely elucidated. Nonetheless, it is postulated that a shorter cervical length may render the cervix more susceptible to dilatation and effacement, potentially culminating in preterm birth or necessitating emergency cesarean delivery. Additionally, a shorter cervical length may pose challenges in managing postpartum hemorrhage, potentially complicating efforts to control bleeding after delivery.[18]

In a study conducted by Zaitoun et al.[19] which focused on cases of placenta previa totalis, the research highlights the potential value of measuring cervical length in predicting the likelihood of APH and underscores the importance of early emergency cesarean delivery. The results indicate that individuals with cervical lengths equal to or less than 30 mm frequently face a substantially increased risk of severe APH, often requiring urgent medical intervention. In another study, Stafford et al.[20] observed that women with placenta previa totalis and a cervical length of 30 mm or less had a threefold higher likelihood of experiencing preterm birth compared to those with longer cervixes. Additionally, among women with cervical lengths of 30 mm or less, the risk of hospitalization prior to delivery due to vaginal bleeding was more than twice as high as the risk of delivery due to bleeding.

The increased risk of preterm birth and hemorrhage among women with placenta previa totalis and a shortened cervix could be attributed to an elevated likelihood of spontaneous preterm labor. Notably, sonographically detected cervical shortening consistently serves as a predictive indicator of earlier labor initiation. In the context of placenta previa totalis, even minor cervical shortening might precipitate premature labor initiation and the potential detachment of the placenta from its low insertion site. Our study highlights that, in women with placenta previa totalis, the risk of minor APH may not substantially differ with cervical length. However, even slight cervical shortening may portend earlier placental detachment with the potential for significant hemorrhage.

Limitations

We acknowledge that our study possesses several limitations, primarily due to its retrospective nature and the fact that it was conducted at a single medical center. These factors may potentially restrict the applicability of our findings to broader patient populations. Furthermore, the relatively modest sample size in our study constitutes another limitation, which may have reduced the statistical power and rendered it more challenging to discern statistically significant differences among the cervical length groups.

However, it is worth highlighting a strength of our study, which lies in the consistent care provided by the same team throughout all procedures, including delivery. This uniformity ensured accuracy and reliability in data collection, and all fetal evaluations and follow-ups were conducted by a specialized perinatology team, thereby further enhancing the precision of our findings.

CONCLUSION

Our findings hold substantial clinical implications for the management of women diagnosed with placenta previa totalis. Specifically, women with a cervical length measuring less than 25 mm necessitate vigilant monitoring and may benefit from more proactive interventions to mitigate the risk of adverse perinatal outcomes. This pursuit of knowledge will ultimately lead to enhanced care and improved outcomes for women facing the complex challenges of placenta previa totalis during pregnancy.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of Haseki Training and Research Hospital Clinical Researches Ethics Committee (Date: 20.09.2023, Decision No: 162-2023).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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