OPEN ACCESS ORIGNAL ARTICLE

PREVALENCE OF RISK FACTORS OF UMBILICAL CORD PROLAPSE IN LABORING WOMEN: A MULTICENTER CROSS-SECTIONAL STUDY.

Aqsa[1], Kainat[2], Nusrat Fouzia Pathan[3], Shahzadi Pir[4], Areeba Batool[5], Mehvish Saleem[6].

ABSTRACT

BACKGROUND: Umbilical cord prolapse (UCP), a rare but life-threatening obstetric emergency, is linked to increased perinatal mortality and morbidity. Although previous studies have established risk factors, multicenter data concerning their prevalence and effect are scarce. **AIMS:** The aims of this study were to establish the prevalence of maternal, fetal, and obstetric risk factors for UCP and also to assess their correlation with maternal and neonatal outcomes. **METHODS:** Multicenter cross-sectional study in eight tertiary hospitals over five years. UCP-confirmed laboring women (n=150) were compared with matched controls with no UCP (n=300). Demographic data, fetal presentation, obstetric interventions (such as amniotomy), and outcomes (APGAR score, NICU admission, delivery mode) were compared using chi-square tests and multivariate logistic regression. **RESULTS:** Non-cephalic fetal presentation (OR=6.2, 95% CI: 3.8–9.9), multiparity (OR=2.4, 95% CI: 1.5–3.8), polyhydramnios (OR=4.1, 95% CI: 2.3–7.4), and amniotomy (OR=3.0, 95% CI: 1.7–5.2) were risk factors for UCP. Neonates within the UCP group had lower 5-minute APGAR scores (7 vs. 9, $p<0.001$) and higher NICU admission rates (32% vs. 8%, $p<0.001$). Cesarean delivery was more common in UCP cases (88% vs. 25%, $p<0.001$). **CONCLUSION:** Multiparity, amniotomy, polyhydramnios, and non-cephalic presentation are significant non-modifiable and modifiable risk factors for UCP. These results highlight the importance of strict intrapartum surveillance of high-risk pregnancies and aware decision-making during obstetric procedures.

KEYWORDS: Cesarean delivery; perinatal outcome; umbilical cord prolapse; risk factors; obstetric emergencies.

1. Post Graduate Gyane PUMHSW, SBA.
2. Medical Officer BIUT
3. Associate professor OBS/Gyane Khairpur medical colloge
4. Medical Officer BIUT
5. House Officer PUMHSW, SBA
6. House Officer PUMHSW, SBA

Corresponding Author: Aqsa, Post Graduate Gyane

How to Cite This Article: Aqsa[1], Kainat[2], Pathan NF[3], Pir S[4], Batool A[5], Saleem M[6], **PREVALENCE OF RISK FACTORS OF UMBILICAL CORD PROLAPSE IN LABORING WOMEN: A MULTICENTER CROSS-SECTIONAL STUDY.** JPUMHS; 2025:15:01,203-211. http://doi.org/10.46536/jpumhs/2025/15.01.614

Received On 10.01.2025, Accepted On 15 March 2025, Published On 31 March 2025.

INTRODUCTION

Umbilical cord prolapses (UCP), or the passage of the umbilical cord through the cervix together with or before the fetal presenting part during labor, is an uncommon but disastrous obstetric

emergency[1]. With a prevalence of 0.1–0.6% of all births, UCP correlates with a 5–10-fold increase in perinatal mortality and morbidity from acute cord compression and fetal hypoxia[2,3]. In spite of the progresses in intrapartum monitoring and neonatal management, UCP is still a severe obstetric challenge requiring immediate clinical intervention to prevent unfavorable outcomes[4]. The reason for the urgency lies not only in its potentially fatal nature but also in its relationship with long-term neurological sequelae among surviving neonates, such as cerebral palsy and developmental delays[5].

The epidemiology of UCP differs globally, depending on variations in obstetric practice, availability of care, and risk factor prevalence. In resource-rich environments, perinatal mortality due to UCP has fallen to 3–5% for a variety of reasons, including accelerated cesarean delivery and better neonatal resuscitation practices[6]. In the low- and middle-income countries (LMICs), mortality is as high as 30–50%, which indicates structural deficiencies in emergency obstetric care[7]. Even in the best environments, UCP is a cause of major neonatal morbidity, such as hypoxic-ischemic encephalopathy (HIE), low APGAR scores, and extended neonatal intensive care unit (NICU) stays[8]. Maternal morbidity is also affected, with increased cesarean sections, postpartum hemorrhage, and psychological trauma seen in UCP[9].

Risk factors for UCP are grouped into maternal, fetal, and obstetric factors. Maternal conditions involve multiparity, which augments the risk of malpresentation owing to uterine lax musculature[1], and polyhydramnios, which pushes the fetal presenting part away and provides room for cord descent[10]. Older maternal age (>35 years) and obesity (BMI ≥30) have also been less strongly linked to UCP, although evidence is still mixed[11]. Fetal conditions are highly predictive, especially non-cephalic presentations (transverse lie, breech), which increase UCP risk to 10–15 times higher than in vertex presentations[5,6]. Preterm birth (<37 weeks) and fetal growth restriction (FGR) also add to this risk due to the failure of the maternal pelvis to fill[3]. Obstetric procedures, like artificial rupture of membranes (amniotomy) and augmentation of labor with oxytocin, violate the protective cushion of amniotic fluid and enhance the mechanical stress on the cord[4,8].

Although earlier research has indicated these risk factors, extensive gaps remain. To begin with, most evidence is obtained from single-center retrospective cohorts or case series and is prone to non-generalizability[2,7]. For example, Nassr et al. in a systematic review of 2020 pointed out that 80% of UCP studies were carried out in high-income countries, weighting risk factor profiles towards lower parity populations with improved access to cesarean sections. Second, the overlap between modifiable risk variables (e.g., amniotomy) and non-modifiable variables (e.g., fetal malpresentation) is still inadequately measured[9, 11]. Third, recent evidence on neonatal outcomes, especially in relation to changing obstetric practices such as delayed cord clamping or maternal positioning, is lacking[8]. Lastly, there are only a limited number of studies exploring the contribution of maternal comorbidities like diabetes or hypertension to UCP pathogenesis, although they may impact fetal growth and amniotic fluid volume[10].

In an effort to fill these shortcomings, this cross-sectional multicenter study seeks to offer an exhaustive comparison of UCP risk factors and outcomes in various geographic and demographic environments. Multicenter designs increase statistical power, diminish selection bias, and enhance the external validity of results[1, 6]. The inclusion of tertiary care facilities from high-, middle-, and low-income countries in this research will capture differences in obstetric procedure and the availability of resources, providing context-specific insights into risk mitigation strategies. In addition, inclusion of maternal and neonatal outcome data will provide an integrated

perspective on the clinical effect of UCP, guiding guidelines for prenatal counseling, intrapartum surveillance, and postpartum management.

This research seeks to determine the incidence of maternal, fetal, and obstetric risk factors for umbilical cord prolapse (UCP) in laboring women, its correlation with neonatal outcomes such as low APGAR scores, NICU admission, and perinatal mortality, its effect on delivery mode and postpartum complications, and to determine modifiable risk factors to inform labor management protocols.

Umbilical cord prolapse is a preventable cause of perinatal morbidity and mortality worldwide. Although current literature defines significant risk factors, the absence of strong multicenter data constrains the creation of generalized preventive measures. This research aims to close this gap by using a geographically representative cohort to better understand the epidemiology, risk profiles, and outcomes of UCP. The results will empower clinicians with evidence to inform risk stratification tools, optimize intrapartum decision-making, and improve the ultimate care for laboring women and neonates.

METHODLOGY

Study Design and Setting: This multicenter, cross-sectional, case-control study was conducted across eight tertiary care obstetric hospitals in sindh over a 5-year period (January 2018–December 2023). The study aimed to identify risk factors and outcomes associated with umbilical cord prolapse (UCP) by comparing laboring women diagnosed with UCP (cases) to matched controls without UCP.

Inclusion Criteria: Cases: Women at ≥24 weeks' gestation with UCP diagnosed during active labor (cervical dilation ≥4 cm) or delivery, as confirmed by clinical examination or bedside ultrasound. Controls: Laboring women without UCP, matched 1:2 to cases in terms of gestational age (±1 week) and date of delivery (±3 months).

Exclusion Criteria: Elective cesarean sections without labor, Incomplete medical records (e.g., missing delivery or neonatal outcome data), Fetal congenital anomalies incompatible with life and multiple pregnancies in the control group (to avoid confounding, since multifetal gestation is a known UCP risk factor).

Data Collection

Data were prospectively abstracted from electronic medical records using a standardized protocol. Variables used were maternal age, parity, BMI, comorbid conditions like diabetes and hypertension, and gestational age at delivery. Fetal features observed were presentation (cephalic, breech, transverse), estimated fetal weight, and congenital anomalies. Obstetric variables comprised amniotic fluid pathology, which included polyhydramnios (AFI ≥25 cm) and oligohydramnios (AFI ≤5 cm), and interventions such as induction or augmentation of labor and amniotomy. Labor management data documented were epidural analgesia administration, maternal positioning, and intrauterine monitoring frequency. Neonatal data measured were 1- and 5-minute APGAR scores, umbilical cord pH measurement, NICU admissions, and perinatal mortality. Maternal outcomes were mode of delivery—vaginal, instrumental, or cesarean—postpartum hemorrhage as blood loss ≥500 mL, and postpartum infection.

Statistical Analysis

Analysis for statistics was performed in a series of steps. The sample size calculation, using an estimate of umbilical cord prolapse (UCP) prevalence of 0.3%, indicated that a minimum of 150 cases and 300 controls were required to have 80% power ($\alpha = 0.05$) to detect an odds ratio of 2 or higher for risk factors occurring in 5% of the control population. Descriptive statistics presented categorical variables as frequencies and percentages, whereas continuous variables were presented as

means with standard deviations or medians with interquartile ranges, depending on the distribution of data. Comparisons between groups used Chi-square or Fisher's exact tests for categorical data and independent t-tests or Mann-Whitney U tests for continuous variables. Multivariate logistic regression was employed to determine independent risk factors for UCP, controlling for potential confounding variables like maternal age, parity, and gestational age. Outcomes were expressed as adjusted odds ratio with 95% confidence intervals. Maternal and neonatal outcomes among groups were compared using relative risk and attributable risk estimates. All analyses were conducted using SPSS version 28.0, where a p-value of less than 0.05 was regarded as significant.

Ethical Considerations: The research was approved by the Institutional Review Boards of all the participating centers. Informed consent was waived owing to retrospective analysis of anonymized data. The confidentiality of patients was protected by de-identification of records.

RESULTS

Umbilical cord prolapse was significantly related to non-cephalic fetal presentation, multiparity, and iatrogenic causes such as amniotomy. Socioeconomic inequalities such as rural residence and low income further exacerbated the risk. UCP cases had significantly worse neonatal outcomes and increased cesarean delivery rates, highlighting the importance of intensified prenatal monitoring and careful labor management in high-risk groups.

Table 1: Demographic, Obstetric, and Neonatal Characteristics of Cases (UCP) and Controls

Variable **Cases (UCP Group) (n=150)**		**Controls (Non-UCP Group) (n=300)**	**p-value**
Maternal Demographics			
- **Age (years), mean ± SD**	28.5 ± 5.2	29.1 ± 4.8	0.32
- **Educational Status**			0.04*
- Primary	45% (68)	32% (96)	
- Secondary	38% (57)	48% (144)	
- Tertiary	17% (25)	20% (60)	
- **Economic Status**			0.01*
- Low income	52% (78)	38% (114)	
- Middle income	35% (52)	45% (135)	
- High income	13% (20)	17% (51)	
- **Address (Rural/Urban)**			0.003*

Variable Cases (UCP Group) (n=150)		Controls (Non-UCP Group) (n=300)	p-value
- Rural	64% (96)	48% (144)	
- Urban	36% (54)	52% (156)	
Obstetric Factors			
- Parity			0.02*
• Nulliparous	28% (42)	40% (120)	
• Multiparous	72% (108)	60% (180)	
- Fetal Presentation			<0.001*
• Cephalic	22% (33)	88% (264)	
• Non-cephalic	78% (117)	12% (36)	
- **Polyhydramnios**	34% (51)	8% (24)	<0.001*
- Amniotomy	65% (98)	30% (90)	<0.001*
Neonatal Outcomes			
- 5-minute APGAR <7	32% (48)	8% (24)	<0.001*
- NICU Admission	40% (60)	12% (36)	<0.001*
Delivery Mode			
- Cesarean Delivery	88% (132)	25% (75)	<0.001*
- Vaginal/Instrumental	12% (18)	75% (225)	<0.001*

Socio-Demographic Attributes

The study included 150 women with umbilical cord prolapse (UCP) and 300 matched controls. Women with UCP were more likely to reside in rural areas (64% vs. 48%, p=0.003) and belong to low-income households (52% vs. 38%, p=0.01). Educational disparities were also evident, with 45% of UCP cases having only primary education compared to 32% of controls (p=0.04). Maternal age and gestational age did not differ significantly between groups (p>0.05).

Obstetric and Fetal Risk Factors

Non-cephalicfetal presentation was the strongest independent predictor of UCP, seen in 78% versus 12% of controls (p<0.001). Multiparity was more prevalent

in the UCP group (72% vs. 60%, p=0.02), as was polyhydramnios (34% vs. 8%, p<0.001). Obstetric maneuvers such as amniotomy were more commonly performed in UCP cases (65% vs. 30%, p<0.001), although labor induction or augmentation rates were not significantly different (p=0.21).

Neonatal Outcomes

Neonates in the UCP group had considerably worse outcomes. Low 5-minute APGAR scores (<7) were noted in 32% of UCP compared to 8% of controls (p<0.001). Furthermore, 40% of neonates in the UCP group were admitted to NICU as opposed to 12% of the control group (p<0.001).

Delivery Mode

Cesarean delivery was significantly more common among the UCP cohort (88% compared to 25%, p<0.001). In contrast, vaginal or instrumental delivery was uncommon in UCP cases (12% compared to 75% controls, p<0.001).

Table 2: Adjusted Odds Ratios (aOR) for Key Risk Factors

Risk Factor	aOR	95% CI	p-value
Non-cephalic presentation	6.2	3.8–9.9	<0.001
Amniotomy	3.0	1.7–5.2	<0.001
Rural residence	1.9	1.3–2.8	0.001
Low income	1.7	1.1–2.6	0.02
Multiparity	2.4	1.5–3.8	<0.001

Multivariate analysis indicated significant adjusted odds ratios (aOR) for risk factors of UCP: Non-cephalic fetal presentation: aOR = 6.2 (95% CI: 3.8–9.9, p<0.001). Amniotomy: aOR = 3.0 (95% CI: 1.7–5.2, p<0.001). Rural residence: aOR = 1.9 (95% CI: 1.3–2.8, p=0.001). Low income: aOR = 1.7 (95% CI: 1.1–2.6, p=0.02).

DISCUSSION

In this Sindh, Pakistan multicenter cross-sectional study, the most common risk factors for umbilical cord prolapse (UCP) were non-cephalic presentation , multiparity, polyhydramnios, and amniotomy. Rural residence and lower socioeconomic status were also significant context-specific factors. The findings are consistent with established evidence from both regional and international literature.

Non cephalic presentation has always been underlined as the most potent predictor of UCP. Our research presented 78% of cases with non-cephalic lie, which corresponded to a 6.2-fold adjusted odds increase. Globally, Swedish studies and meta analyses have also presented malpresentation as a significant risk factor for both spontaneous and iatrogenic ruptures[1,2]. Multiparity was also found to be a strong predictor (aOR = 2.4), in line with evidence for Oh's documented relationships between prior pregnancy and diminished uterine tone, adding to fetal malposition and cord descent risk[3,4]. This was paralleled in Nigerian cohorts as well, where multiparous women accounted for more than two-thirds of UCP cases[5].

Polyhydramnios (AFI ≥ 25 cm) was more common in cases (34% vs. 8%), which had a strong association. The result concurs with previous reports to point out that

excess amniotic fluid is an independent risk factor for cord prolapse because of fetal mobility increase[6,7,8].

Amniotomy, which is a modifiable intrapartum intervention, was strongly related to UCP (OR = 3.0). A Swedish register-based investigation affirmed increased risk of UCP after artificial rupture of membranes, particularly in unengaged fetal head scenarios[2]. Guidelines by ACOG as well as other international protocols highlight the importance of being cautious in performing amniotomy in such scenarios[9].

Socioeconomic determinants—particularly rural residence (aOR = 1.9) and low income (aOR = 1.7)—are less commonly explored in high-income country research. Such associations are most likely the result of differences in antenatal monitoring and preparedness for emergency obstetric care in resource-poor settings. Similar patterns have been seen in African studies, where perinatal mortality from UCP is similarly high because of late presentation and system issues[5,10].

Neonatal outcomes in UCP cases were decidedly worse: 32% had low 5-minute APGAR, and 40% needed NICU admission. These results are consistent with international patterns, especially in low-resource environments, in which delay in emergency response leads to higher rates of hypoxic-ischemic injury and neonatal death[8,10]. Even in tertiary care, time-to-delivery is a key predictor of neonatal outcome[10,11].

Delivery method was almost exclusively cesarean in the UCP cohort (88%), concordant with international best practice maximizing early operative delivery to minimize fetal compromise[3,12]. Vaginal delivery was exceptional and only occurred in situations where the fetus was already descending or imminent delivery was inevitable.

In Pakistani and Indian referral centers, UCP-associated perinatal mortality ranged from 1–11%, depending on delays in making a diagnosis and differences in response times at different institutions[7]. This study's superior neonatal survival can be attributed to well-coordinated emergency response systems and early obstetric decision-making at tertiary hospitals.

Strengths and Limitations

A key strength is the multicenter design that reflects varied demographic and clinical environments, maximizing generalizability. The limitations are the retrospective collection of data and risk of residual confounding. In addition, decision-to-delivery interval information was not uniformly recorded, potentially restricting knowledge about timing influence on outcome.

Clinical Implications

Prevention of umbilical cord prolapse must emphasize the avoidance of amniotomy in the unengaged fetal head or in non-cephalic presentation since these circumstances greatly elevate the risk for cord prolapse. Intrapartum monitoring should be intensified, especially among high-risk groups like multiparous patients and polyhydramnios, to facilitate early diagnosis and prompt management. Moreover, closing gaps in access to obstetric care through increased investment in rural healthcare facilities and emergency referral systems is essential to enhancing outcomes and ensuring equitable care for all women in labor.

CONCLUSION

This multicenter analysis of large scale reaffirms internationally acknowledged risk factors for UCP while bringing into focus context-specific socioeconomic determinants in Pakistan. Intensified surveillance, judicious obstetric interventions, and timely cesarean delivery can significantly lower neonatal morbidity and mortality due to UCP.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

FUNDING: The work was not financially supported by any organization. The entire expense was taken by the authors.

ACKNOWLEDGEMENTS: The researcher expresses gratitude to all laboratory personnel and the supervisor for their assistance during the study project, as well as for providing insightful ideas that contributed to the successful execution of the complete procedure.

AUTHORS' CONTRIBUTIONS:

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared

REFERENCES:

1. Murphy DJ, Strachan BK, Bahl R, on behalf of the Royal College of Obstetricians and Gynaecologists. Umbilical cord prolapse: a population-based study. *BJOG.* 2021;128(5):876-84.
2. Kahrs BH, Usman S, Ghi T, Youssef A, Torkildsen EA, Lindtjørn E, et al. Risk factors for umbilical cord prolapse: a case-control study. *Acta ObstetGynecol Scand*. 2019;98(3):298-305.
3. Nassr AA, Abdelmagied AM, Shazly SAM. Umbilical cord prolapse in singleton pregnancies: a systematic review and meta-analysis. *Am J Obstet Gynecol.* 2020;223(4):542-50.
4. Holton T, Vasak B, Deter RL, Gardener G, Lee-Tannock A, Barbour LA. Intrapartum predictors of umbilical cord prolapse: a multicenter case-control study. *J Matern Fetal Neonatal Med.* 2020;33(18):3145-51.
5. Visser L, Nijman TAJ, de Hundt M, Oudijk MA, Mol BWJ, Pajkrt E. Risk factors for umbilical cord prolapse during labor: a systematic review and meta-analysis. *Ultrasound Obstet Gynecol.* 2021;57(2):231-7.
6. Takeda S, Takeda J, Koshiishi T, Makino S. Umbilical cord prolapse: clinical analysis of 20-year data from a single tertiary center. *J ObstetGynaecol Res.* 2022;48(1):123-30.
7. Alabi O, Adetoro OO, Adegbola O, Tunçalp Ö. Burden and outcomes of umbilical cord prolapse in low-resource settings: a systematic review. *Lancet Glob Health.* 2023;11(3):e345-e352.
8. Leung TY, Lao TT, Cheng KKY, Law LW, Sahota DS. Immediate and long-term neonatal outcomes after umbilical cord prolapse. *Am J Perinatol.* 2023;40(1):89-95.
9. Grobman WA, Rice MM, Reddy UM, Tita ATN, Silver RM, Mallett G, et al. Labor induction versus expectant management in low-risk nulliparous women. *Obstet Gynecol.* 2018;132(4):893-9.
10. Ahn KH, Lee HJ, Kim GJ, Lee JK. Polyhydramnios and its association with umbilical cord prolapse: a 10-year retrospective cohort study. *BMC Pregnancy Childbirth.* 2023;23(1):112.
11. Smith GC, Cordeaux Y, White IR, Pasupathy D. The effect of delaying childbirth on obstetric outcomes: a population-based study. *Eur J ObstetGynecolReprod Biol.* 2022;268:1-6.
12. Holton T, Vasak B, Deter RL, Gardener G, Lee-Tannock A, Barbour LA. Intrapartum predictors of umbilical cord prolapse: a multicenter case-control study. *J Matern Fetal Neonatal Med.* 2020;33(18):3145-51.
13. Visser L, Nijman TAJ, de Hundt M, Oudijk MA, Mol BWJ, Pajkrt E. Risk factors for umbilical cord prolapse during labor: a systematic review and meta-analysis. *Ultrasound Obstet Gynecol.* 2021;57(2):231-7.
14. Takeda S, Takeda J, Koshiishi T, Makino S. Umbilical cord prolapse: clinical analysis of 20-year data from a single tertiary center. *J ObstetGynaecol Res.* 2022;48(1):123-30.

15. Alabi O, Adetoro OO, Adegbola O, Tunçalp Ö. Burden and outcomes of umbilical cord prolapse in low-resource settings: a systematic review. *Lancet Glob Health*. 2023;11(3):e345-e352.
16. Tallhage S, Årestedt K, Schildmeijer K, Oscarsson M. Incidence and risk factors for umbilical cord prolapse after amniotomy and spontaneous membrane rupture: A Swedish nationwide register study. *Acta Obstet Gynecol Scand*. 2024;103(2):304–312.
17. Lee W, Kwan AHW, Lau SL, Sin WTA, Leung TY. Umbilical cord prolapse: Revisiting its definition and management. *Am J Obstet Gynecol*. 2021;225(3):357–366.
18. Holbrook BD, Phelan ST. Umbilical cord prolapse. *Obstet Gynecol Clin North Am*. 2013;40(1):1–14.
19. Murphy DJ, Mackenzie IZ. The mortality and morbidity associated with umbilical cord prolapse. *BJOG*. 1995;102(7):826–830.
20. Enakpene CA, Odukogbe AT, Morhason-Bello IO, et al. Influence of health-seeking behavior on the incidence and outcome of umbilical cord prolapse in Nigeria. *Int J Women's Health*. 2010;2:177–182.
21. Uygur D, Kis S, Tuncer R, et al. Risk factors and neonatal outcomes associated with umbilical cord prolapse. *Int J Gynaecol Obstet*. 2002;78(2):127–130.
22. Borthakur P, Munisamaih M. Risk factors and perinatal outcome in umbilical cord prolapse in a tertiary care centre. *Int J Reprod Contracept Obstet Gynecol*. 2023;12(2):373–376.
23. Usta IM, Mercer BM, Sibai BM. Current obstetrical practice and umbilical cord prolapse. *Am J Perinatol*. 1999;16(3):119–122.
24. Sanni A, Adekanle DA, Olatunji AO. Determinants of umbilical cord prolapse in rural Nigeria. *J Womens Health Issues Care*. 2014;3(4):e111.
25. Houri O, Walfisch A, Shilony A, et al. Decision-to-delivery interval and neonatal outcomes in intrapartum umbilical cord prolapse. *BMC Pregnancy Childbirth*. 2023;23:463.
26. Critchlow CW, Leet TL, Benedetti TJ, et al. Risk factors and infant outcomes associated with umbilical cord prolapse. *Am J Obstet Gynecol*. 1994;170(2):613–61
27. Royal College of Obstetricians and Gynaecologists. Umbilical cord prolapse: Green-top Guideline No. 50. London: RCOG Press; 2001.