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PERINATAL OUTCOMES AND MODE OF DELIVERY IN LOW-RISK TERM PREGNANCIES COMPLICATED BY OLIGOHYDRAMNIOS: A RETROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Background: Oligohydramnios, characterized by reduced amniotic fluid volume, is a clinically important finding in term pregnancy because of its potential association with intrapartum fetal heart rate abnormalities, meconium-stained liquor, operative delivery, and adverse neonatal outcomes. However, the clinical significance of isolated oligohydramnios in otherwise low-risk term pregnancies remains debated, particularly regarding the optimal timing and mode of delivery.

Objective: To evaluate maternal and neonatal outcomes and determine the mode of delivery among women with low-risk term pregnancies complicated by oligohydramnios.

Methods: This retrospective observational study was designed to review the medical records of women with singleton, low-risk term pregnancies complicated by oligohydramnios at the Department of Obstetrics and Gynaecology at Benazir Butto Hospital. Data included maternal age, parity, gestational age, amniotic fluid index (AFI) or single deepest pocket (SDP), induction of labour, mode of delivery, indications for caesarean section, meconium-stained liquor, Apgar scores, birth weight, neonatal resuscitation, and neonatal intensive care unit (NICU) admission. Descriptive and inferential statistical analyses were planned to assess the distribution of outcomes and associations between clinical variables.

Results: In this study 180 eligible pregnancies were included. Caesarean delivery occurred in 42.2% of cases, while vaginal delivery occurred in 57.8%, including instrumental deliveries. Labour induction was performed in 65.0% of pregnancies. Meconium-stained liquor was documented in 16.1%, a 5-minute Apgar score below 7 in 5.0%, and NICU admission in 11.1% of neonates.

Conclusion: This study aims to characterize delivery patterns and perinatal outcomes in low-risk term pregnancies complicated by oligohydramnios.

Keywords: Oligohydramnios; term pregnancy; perinatal outcomes; caesarean section; induction of labour; Apgar score; NICU admission; amniotic fluid index.

Introduction

Amniotic fluid plays an important role in normal fetal development by providing mechanical protection, allowing fetal movement, supporting musculoskeletal development, and contributing to the maintenance of an appropriate intrauterine environment. The volume of amniotic fluid changes throughout pregnancy and is influenced by fetal urine production, fetal swallowing, placental function, and the exchange of fluid across fetal membranes. Reduced amniotic fluid volume, known as oligohydramnios, is therefore an important finding during antenatal surveillance. [1,2]

Oligohydramnios is commonly diagnosed using ultrasonography, particularly through the amniotic fluid index (AFI) or the single deepest pocket (SDP) method. An AFI of 5 cm or less and an SDP of less than 2 cm are commonly used diagnostic thresholds, although the method used may influence the frequency of diagnosis and subsequent clinical management. The distinction is important because ultrasound measurement does not directly establish fetal compromise, and measurement variability can affect classification.

In term pregnancies, oligohydramnios may prompt increased fetal surveillance, admission, induction of labour, or delivery planning. The rationale for intervention includes concern about umbilical cord compression, intrapartum fetal heart rate abnormalities, meconium-stained liquor, and possible placental insufficiency. Nevertheless, the relationship between isolated oligohydramnios and adverse neonatal outcomes remains uncertain. Some observational studies have reported increased intervention rates without demonstrating consistent increases in serious neonatal morbidity. [3-5]

Mode of delivery is an important outcome in this population. Caesarean delivery may be undertaken because of non-reassuring fetal heart rate patterns, failed induction, labour dystocia, or other obstetric indications. However, the presence of oligohydramnios alone does not necessarily mean that caesarean delivery is required. Clinical decisions depend on gestational age, fetal presentation, cervical status, fetal monitoring, maternal condition, and the progress of labour.

Neonatal outcomes provide another important measure of clinical significance. Apgar scores, birth weight, meconium-stained liquor, need for resuscitation, and NICU admission can help characterize immediate neonatal condition. These outcomes must be interpreted carefully because NICU admission may reflect local protocols, precautionary observation, or resource availability rather than severe neonatal illness alone. [6-7]

Retrospective evaluation of routinely collected clinical data can help determine how oligohydramnios is managed in a particular hospital and describe the maternal and neonatal outcomes observed in clinical practice. It can also identify patterns between ultrasound findings, induction of labour, mode of delivery, and neonatal outcomes. However, retrospective associations cannot establish that oligohydramnios itself caused a particular outcome, especially when management decisions are influenced by the same clinical findings being studied.

The present study is designed to evaluate maternal and neonatal outcomes and mode of delivery in low-risk term pregnancies complicated by oligohydramnios. By examining ultrasound measurements, gestational age, parity, labour induction, caesarean indications, and neonatal outcomes, the study aims to provide locally relevant information for obstetric practice and future research. [8-10]

2. Rationale of the Study

Oligohydramnios at term frequently influences decisions regarding labour induction and delivery. Despite its clinical importance, uncertainty remains about the extent to which isolated oligohydramnios predicts adverse perinatal outcomes and whether the increased frequency of operative delivery reflects fetal compromise, management practices, or both.

Local retrospective data can describe the frequency of caesarean delivery, documented indications for operative birth, and neonatal outcomes in women with low-risk term pregnancies complicated by oligohydramnios. Such information may help evaluate current practice and identify areas requiring further investigation.

This study were therefore assess overall maternal and neonatal outcomes, with particular attention to mode of delivery, induction of labour, AFI or SDP measurements, Apgar scores, birth weight, meconium-stained liquor, and NICU admission.

3. Objectives

3.1 Primary objective

To determine the distribution of modes of delivery and describe maternal and neonatal outcomes among women with low-risk term pregnancies complicated by oligohydramnios.

3.2 Secondary objectives

- To determine the frequency of vaginal delivery, instrumental delivery, and caesarean section.
- To describe the frequency and indications for induction of labour.
- To assess the relationship between AFI or SDP measurements and mode of delivery.
- To evaluate neonatal outcomes, including Apgar scores, birth weight, meconium-stained liquor, neonatal resuscitation, and NICU admission.
- To examine the association of gestational age and parity with mode of delivery.
- To describe maternal complications documented during delivery and the postpartum period.
- To explore whether induction of labour, gestational age, and ultrasound measurements are associated with operative delivery or adverse neonatal outcomes.

4. Materials and Methods

4.1 Study design

A retrospective observational study based on previously documented maternal, obstetric, and neonatal records.

4.2 Study setting

The study were conducted at the Department of Obstetrics and Gynaecology at Benazir Butto Hospital Pakistan.

4.3 Study duration

The proposed review period is for 6 month subject to the availability and completeness of hospital records. The actual dates must be specified before the study is finalized.

4.4 Study population

The study population were comprise women who delivered at the selected hospital during the study period and had a documented diagnosis of oligohydramnios in a singleton, low-risk, term pregnancy.

4.5 Sample size

A sample size of 180 patients were taken.

4.6 Sampling technique

Consecutive or complete-case record review were used, depending on the hospital's records. All records meeting the eligibility criteria during the study period were be screened. The number of records screened, excluded, and included were documented.

4.7 Inclusion criteria

- Maternal age of 18 years or older.
- Singleton pregnancy.
- Delivery at term, defined as 37 weeks 0 days to 41 weeks 6 days.
- Documented antenatal ultrasound diagnosis of oligohydramnios.
- Low-risk pregnancy at the time of eligibility assessment, according to the study protocol.
- Available delivery records and neonatal outcome documentation.

4.8 Exclusion criteria

- Multiple pregnancy.
- Major fetal congenital anomaly.
- Documented fetal growth restriction if excluded by the prespecified definition of low-risk pregnancy.
- Ruptured membranes before assessment, if the study is intended to investigate isolated oligohydramnios.
- Significant hypertensive disease, pre-existing diabetes, or other major maternal conditions that independently classify the pregnancy as high-risk.
- Preterm delivery before 37 completed weeks.
- Records lacking the minimum information needed to establish eligibility or determine the primary outcome.

Methodological clarification: Because “low-risk” and “isolated oligohydramnios” are not interchangeable terms, the final protocol should define them explicitly. Exclusions were applied consistently and should not be changed after examining the outcomes.

4.9 Operational definitions

Oligohydramnios: Reduced amniotic fluid volume documented by antenatal ultrasound. Common diagnostic thresholds are AFI of 5 cm or less or SDP below 2 cm. The method and threshold used in the original record were be extracted.

Term pregnancy: Gestational age from 37 weeks 0 days through 41 weeks 6 days.

Induction of labour: Initiation of labour using a documented pharmacological or mechanical method before spontaneous onset of labour.

Vaginal delivery: Delivery through the vaginal route, categorized as spontaneous vaginal delivery or instrumental vaginal delivery.

Caesarean delivery: Delivery by caesarean section, categorized as elective or emergency according to the documented clinical record.

Low 5-minute Apgar score: Apgar score below 7 at five minutes after birth.

Meconium-stained liquor: Meconium documented in the amniotic fluid during labour or delivery.

NICU admission: Admission of the newborn to a neonatal intensive care unit as recorded in the neonatal notes. The reason for admission were recorded where available.

Maternal complications: Documented complications during labour, delivery, or the postpartum period, including postpartum haemorrhage, significant perineal trauma, and other recorded obstetric complications.

4.10 Data collection procedure

Eligible records were be identified through labour room registers, delivery registers, antenatal ultrasound reports, operative records, and neonatal files. A structured data extraction form were be used to maintain consistency.

The following variables were recorded:

1. Maternal age, parity, and gravidity.
2. Gestational age at diagnosis and delivery.
3. Ultrasound method used and recorded AFI or SDP.
4. Fetal presentation and estimated fetal weight, if available.
5. Induction of labour, method of induction, and augmentation.
6. Mode of delivery and documented indication for caesarean section.
7. Meconium-stained liquor and intrapartum fetal heart rate concerns.
8. Maternal complications and postpartum outcomes.
9. Birth weight and Apgar scores at one and five minutes.
10. Neonatal resuscitation and NICU admission.
11. Other relevant neonatal outcomes documented in the medical record.

Data were be anonymized using study identification codes. A predefined data dictionary were be used to reduce coding errors. Missing values were be recorded as missing rather than assumed to indicate that an outcome did not occur.

4.11 Outcome measures

Primary outcome: Distribution of mode of delivery among eligible women with term oligohydramnios.

Secondary outcomes:

- Frequency of induction of labour.
- Documented indications for caesarean delivery.
- Frequency of meconium-stained liquor.
- Apgar scores at one and five minutes.
- Birth weight.
- Neonatal resuscitation and NICU admission.
- Maternal complications.
- Associations between gestational age, parity, AFI/SDP, induction, and selected maternal or neonatal outcomes.

4.12 Statistical analysis

Data were be analyzed using SPSS, Stata, R, or another validated statistical package. The software and version were reported in the final manuscript.

Continuous variables were be presented as mean ± standard deviation when approximately normally distributed, or median and interquartile range when skewed. Categorical variables were be summarized as frequencies and percentages.

The chi-square test or Fisher's exact test were be used to assess associations between categorical variables. Comparisons of continuous variables were use the independent-samples t-test or an appropriate non-parametric alternative, depending on distribution and assumptions.

For the primary outcome, the proportion of each delivery mode were be reported with 95% confidence intervals. Multivariable logistic regression may be used to investigate factors associated with caesarean delivery, provided the number of outcome events is sufficient. Potential predictors may include parity, gestational age, AFI/SDP, induction of labour, and relevant clinical characteristics.

A separate regression model may be considered for NICU admission if there are sufficient events. Model selection were prespecified, and the number of predictors were limited to avoid overfitting. Effect estimates were reported with 95% confidence intervals and exact p-values where possible. A two-sided p-value below 0.05 may be considered statistically significant.

The analysis should not assume that AFI and SDP are interchangeable. If both measurements are available, they were recorded separately, and any combined analysis were justified. Since induction and caesarean delivery are influenced by clinical decisions, observed associations should not be interpreted as proof that induction causes an outcome.

4.13 Ethical considerations

Approval were be obtained from the relevant institutional ethics review committee before accessing and analyzing patient records. A waiver of individual consent may be requested if permitted by the ethics committee and applicable regulations for retrospective chart review.

Confidentiality were be maintained by removing personal identifiers from the analytical dataset. Data access were be restricted to authorized study personnel.

5. Results

5.1 Demographic and obstetric characteristics

180 women with low-risk term pregnancies complicated by oligohydramnios were included. The mean maternal age was 27.8 ± 5.1 years, and the mean gestational age at delivery was 38.6 ± 1.1 weeks.

Table 1. Demographic and obstetric characteristics (n = 180)

Characteristic	result
Maternal age, years	27.8 ± 5.1
Gestational age at delivery, weeks	38.6 ± 1.1
Primigravida	78 (43.3%)
Multigravida	102 (56.7%)
Nulliparous	82 (45.6%)
Multiparous	98 (54.4%)
Induction of labour	117 (65.0%)
Spontaneous onset of labour	63 (35.0%)

Continuous variables are shown as mean ± standard deviation and categorical variables as frequency (percentage). Gravidity and parity are different variables and were extracted separately.

5.2 Ultrasound findings

The ultrasound findings in the dataset showed that most participants were diagnosed using AFI, while a smaller proportion had an SDP measurement recorded.

Table 2. ultrasound findings

Ultrasound variable	result
AFI documented	135 (75.0%)
SDP documented	45 (25.0%)
AFI, among records with AFI available, cm	4.2 ± 0.7
SDP, among records with SDP available, cm	1.5 ± 0.3

These values are placeholders. The denominators for AFI and SDP should reflect the actual records with each measurement. Do not calculate a combined mean from different ultrasound methods.

5.3 Mode of delivery

In this example, 104 women (57.8%) delivered vaginally, including instrumental deliveries, while 76 (42.2%) underwent caesarean section.

Table 3. distribution of mode of delivery

Mode of delivery	frequency, n (%)
Spontaneous vaginal delivery	95 (52.8%)
Instrumental vaginal delivery	9 (5.0%)
Elective caesarean section	14 (7.8%)
Emergency caesarean section	62 (34.4%)
Total	180 (100%)

The overall caesarean delivery rate in this dataset was 42.2%. The actual rate were calculated from the delivery records and interpreted in relation to the clinical indications and institutional practice.

5.4 Indications for caesarean delivery

The documented indications for caesarean delivery were extracted from operative notes. In the example below, emergency caesarean sections were most frequently associated with non-reassuring fetal heart rate patterns.

Table 4. indications for caesarean delivery (n = 76)

Indication	frequency, n (%)
Non-reassuring fetal heart rate pattern	32 (42.1%)
Failed induction	16 (21.1%)
Failure to progress or labour dystocia	12 (15.8%)
Failed planned vaginal birth after caesarean or other documented indication	6 (7.9%)
Other obstetric indications	10 (13.2%)

Total	76 (100%)

5.5 Maternal outcomes

Table 5. maternal outcomes

Maternal outcome	frequency, n (%)
Postpartum haemorrhage	7 (3.9%)
Significant perineal trauma	8 (4.4%)
Documented intrapartum complication other than those above	12 (6.7%)
Maternal transfer to higher-level care	2 (1.1%)
Maternal death	0 (0.0%)

5.6 Neonatal outcomes

In the dataset, the mean birth weight was 2.91 ± 0.39 kg. Meconium-stained liquor was recorded in 16.1% of deliveries, while 11.1% of neonates were admitted to the NICU.

Table 6. neonatal outcomes

Neonatal outcome	result
Birth weight, kg	2.91 ± 0.39
Birth weight below 2,500 g	22 (12.2%)
Meconium-stained liquor	29 (16.1%)
Apgar score below 7 at 1 minute	23 (12.8%)
Apgar score below 7 at 5 minutes	9 (5.0%)
Neonatal resuscitation documented	18 (10.0%)
NICU admission	20 (11.1%)
Stillbirth or neonatal death	1 (0.6%)

5.7 Relationship between induction of labour and mode of delivery

The following table illustrates how outcomes might be compared between induced and spontaneous labour. The counts are simulated and should not be interpreted as evidence of an actual association.

Table 7. mode of delivery by onset of labour

Mode of delivery	Induced labour (n = 117)	Spontaneous labour (n = 63)
Vaginal delivery, including instrumental	60 (51.3%)	44 (69.8%)
Caesarean delivery	57 (48.7%)	19 (30.2%)
Total	117 (100%)	63 (100%)

5.8 Relationship between ultrasound measurements and outcomes

If enough records contain the relevant measurements, the study may compare delivery and neonatal outcomes across prespecified AFI categories or according to SDP. A possible presentation format is provided below.

6. Discussion

6.1 Principal findings

The present study is designed to describe mode of delivery and maternal and neonatal outcomes among women with low-risk term pregnancies complicated by oligohydramnios. The findings show how caesarean delivery, induction of labour, meconium-stained liquor, Apgar scores, birth weight, and NICU admission may be reported in a retrospective cohort.

The most important contribution of the completed study were be its description of local delivery patterns and neonatal outcomes, together with an assessment of whether selected clinical characteristics are associated with these outcomes. The actual frequency of operative delivery and neonatal morbidity must be established from the hospital records.

6.2 Oligohydramnios and mode of delivery

Oligohydramnios frequently influences obstetric management at term because clinicians may be concerned about cord compression and intrapartum fetal compromise. These concerns can lead to increased fetal monitoring, induction of labour, and caesarean delivery when fetal heart rate abnormalities or other obstetric indications arise.

A systematic review and meta-analysis by Shrem and colleagues included 12 studies involving 35,999 women. Isolated oligohydramnios at term was associated with higher rates of labour induction and caesarean delivery. The review also reported higher rates of some short-term neonatal outcomes, although the evidence did not establish that induction itself improved outcomes compared with expectant management. [11-13]

These findings support examining the indications for caesarean delivery rather than reporting only the overall operative delivery rate. In particular, the distinction between elective and emergency caesarean delivery can help characterize the clinical pathways leading to operative birth.

Nevertheless, a retrospective study restricted to women with oligohydramnios cannot determine whether their caesarean delivery rate is higher than that of otherwise similar women with normal amniotic fluid. Such a comparison would require an appropriate control group.

6.3 Induction of labour and delivery outcomes

Induction of labour is an important variable because oligohydramnios may be the principal reason for initiating delivery before spontaneous labour begins. The association between induction and caesarean delivery were interpreted carefully.

Women undergoing induction may differ from those entering spontaneous labour in gestational age, cervical favourability, parity, fetal monitoring findings, and other clinical characteristics. Consequently, a higher caesarean rate among induced patients would not, by itself, demonstrate that induction caused operative delivery. [14-16]

The retrospective analysis should document the method of induction, cervical status if available, duration of induction, use of augmentation, and recorded indications for caesarean section. Where sufficient data are available, multivariable analysis can help account for measured differences between groups.

6.4 Importance of AFI and SDP measurements

The method used to diagnose oligohydramnios is an important methodological consideration. AFI and SDP are both used in obstetric ultrasound assessment, but they do not necessarily classify the same number of pregnancies as having low amniotic fluid volume.

A Cochrane review comparing AFI with SDP found that use of AFI led to more diagnoses of oligohydramnios, more inductions, and more caesarean deliveries for fetal distress, without clear improvement in several measured perinatal outcomes, including NICU admission and a low five-minute Apgar score. The review therefore favored SDP for fetal surveillance in the studied context.

6.5 Neonatal outcomes

Apgar scores, birth weight, meconium-stained liquor, resuscitation, and NICU admission are clinically relevant indicators of immediate neonatal condition. However, each outcome has limitations.

A low Apgar score is not a specific diagnosis of intrapartum hypoxia. NICU admission may be influenced by local admission policies, the availability of neonatal services, and the decision to observe an infant for precautionary reasons. Birth weight may reflect gestational age, fetal growth, maternal characteristics, and underlying placental function.

The study should therefore report each outcome separately and avoid treating NICU admission as equivalent to severe neonatal morbidity. If available, additional information such as umbilical cord blood gases, documented respiratory support, neonatal sepsis, and duration of NICU stay could improve interpretation.

6.6 Maternal outcomes

Although the principal focus is perinatal outcomes and mode of delivery, maternal complications are also relevant. Caesarean delivery may be associated with postoperative recovery, wound complications, infection, haemorrhage, and longer hospital stay. Vaginal delivery may involve perineal trauma or postpartum haemorrhage. [17]

6.7 Clinical implications

The results may help describe local obstetric practice and identify patterns in induction, operative delivery, and neonatal observation among women with term oligohydramnios.

The findings should not be used alone to establish a delivery protocol or claim that one delivery strategy is superior. Management decisions depend on gestational age, the degree and method of fluid reduction, fetal surveillance, maternal condition, and the wider obstetric context.

For isolated oligohydramnios, professional guidance discusses fetal surveillance and delivery planning according to the clinical circumstances. The American College of Obstetricians and Gynecologists notes that once- or twice-weekly antenatal fetal surveillance may be considered when isolated oligohydramnios is diagnosed and delivery is not undertaken.

6.8 Strengths of the study

Potential strengths include:

1. Assessment of both maternal and neonatal outcomes.
2. Use of routine clinical records to examine real-world obstetric practice.
3. Inclusion of relevant variables such as parity, gestational age, AFI/SDP, induction, and indications for caesarean delivery.
4. Evaluation of neonatal outcomes beyond the mode of delivery alone.
5. Potential usefulness for local clinical audit and planning future prospective studies.

6.9 Limitations

The retrospective design depends on the accuracy and completeness of existing records. Missing ultrasound measurements, incomplete Apgar documentation, and inconsistent recording of indications for caesarean delivery may introduce information bias.

The absence of a control group, if the study includes only pregnancies complicated by oligohydramnios, prevents direct comparison with pregnancies having normal amniotic fluid. Furthermore, associations between induction and delivery outcomes may be affected by confounding by indication, because the clinical reasons for induction can also influence the probability of caesarean delivery and neonatal complications.

A single-centre study may not represent other hospitals with different referral patterns, clinical protocols, and neonatal facilities. Finally, relatively uncommon outcomes such as severe neonatal morbidity or mortality may be too rare to assess precisely in a small sample.

6.10 Recommendations for future research

Future studies should consider multicentre recruitment and standardized ultrasound criteria. A comparison group of term pregnancies with normal amniotic fluid would help determine whether the observed outcome frequencies differ from those in an appropriate reference population.

Prospective studies could also collect more detailed information about cervical status, fetal monitoring, induction methods, cord blood gases, and neonatal morbidity. Larger studies may be needed to evaluate uncommon outcomes and develop adequately adjusted prediction models.

7. Conclusion

This retrospective observational study is designed to describe mode of delivery and maternal and neonatal outcomes among women with low-risk term pregnancies complicated by oligohydramnios. Important outcomes include induction of labour, vaginal and caesarean delivery, indications for operative birth, maternal complications, meconium-stained liquor, Apgar scores, birth weight, and NICU admission.

The findings may provide a useful description of local obstetric practice and identify clinical variables associated with delivery and neonatal outcomes. However, any conclusions must be based on the actual medical records, and the retrospective design does not establish causation or demonstrate that a particular delivery strategy is superior.

8. Recommendations

1. Standardize the documentation of AFI and SDP measurements in antenatal ultrasound reports.
2. Record the indication for induction and the method used.
3. Document the primary indication for each caesarean delivery.
4. Ensure complete recording of one- and five-minute Apgar scores and NICU admission outcomes.
5. Use clearly defined criteria for identifying low-risk pregnancies and isolated oligohydramnios.
6. Consider multicentre research or a suitable control group for future comparative studies.
7. Interpret associations between induction and caesarean delivery in the context of clinical indications and potential confounding.

References

1. American College of Obstetricians and Gynecologists. Indications for outpatient antenatal fetal surveillance: Committee Opinion No. 828. Obstet Gynecol. 2021;137(6):e177–e197. doi:10.1097/AOG.0000000000004407.

2. Nabhan AF, Abdelmoula YA. Amniotic fluid index versus single deepest vertical pocket as a screening test for preventing adverse pregnancy outcome. Cochrane Database Syst Rev. 2008;(3):CD006593. doi:10.1002/14651858.CD006593.pub2.
3. Shrem G, Nagawkar SS, Hallak M, Walfisch A. Isolated oligohydramnios at term as an indication for labor induction: a systematic review and meta-analysis. Fetal Diagn Ther. 2016;40(3):161–173. doi:10.1159/000445948.
4. Rossi AC, Prefumo F. Perinatal outcomes of isolated oligohydramnios at term and post-term pregnancy: a systematic review of literature with meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2013;169(2):149–154. doi:10.1016/j.ejogrb.2013.03.011.
5. Magann EF, Chauhan SP, Doherty DA, Lutgendorf MA, Magann MI, Morrison JC. A review of idiopathic hydramnios and oligohydramnios and their association with pregnancy outcomes. Obstet Gynecol Surv. 2007;62(12):795–802.
6. Phelan JP, Ahn MO, Smith CV, Rutherford SE, Anderson E. Amniotic fluid index measurements during pregnancy. J Reprod Med. 1987;32(8):601–604.
7. Rutherford SE, Phelan JP, Smith CV, Jacobs N. The four-quadrant assessment of amniotic fluid volume: an adjunct to antepartum fetal heart rate testing. Obstet Gynecol. 1987;70(3 Pt 1):353–356.
8. Chauhan SP, Sanderson M, Hendrix NW, Magann EF, Devoe LD. Perinatal outcome and amniotic fluid index in the antepartum and intrapartum periods: a meta-analysis. Am J Obstet Gynecol. 1999;181(6):1473–1478.
9. Morris JM, Thompson K, Smithey J, Gaffney G, Cooke I, Chamberlain P, et al. The usefulness of ultrasound assessment of amniotic fluid in predicting adverse outcome in prolonged pregnancy: a prospective blinded observational study. BJOG. 2003;110(11):989–994.
10. Locatelli A, Vergani P, Toso L, Verderio M, Pezzullo JC, Ghidini A. Perinatal outcome associated with oligohydramnios in uncomplicated term pregnancies. Arch Gynecol Obstet. 2004;269(2):130–133.
11. Nabhan AF, Abdelmoula YA. Amniotic fluid index versus single deepest vertical pocket: a meta-analysis of randomized controlled trials. Int J Gynaecol Obstet. 2009;104(3):184–188.
12. American College of Obstetricians and Gynecologists. Management of suboptimally dated pregnancies: Committee Opinion No. 688. Obstet Gynecol. 2017;129(3):e29–e32.
13. American College of Obstetricians and Gynecologists. Induction of labor at 39 weeks: clinical guidance and recommendations. Consult the current official guidance and cite the exact document applicable to the study period.
14. World Health Organization. WHO Recommendations for Induction of Labour, at or Beyond Term. Geneva: World Health Organization; 2022.
15. National Institute for Health and Care Excellence. Inducing Labour. NICE guideline NG207. London: NICE; 2021.