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ТИББИЁТДА ЯНГИ КУН НОВЫЙ ДЕНЬ В МЕДИЦИНЕ NEW DAY IN MEDICINE

*Илмий-рефератив, маънавий-маърифий журнал
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OUTCOMES OF DIFFERENT METHODS OF LABOR INDUCTION IN PREGNANT WOMEN WITH FETAL MACROSOMIA: A COMPARATIVE ANALYSIS WITH SPONTANEOUS LABOR

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✓ **Resume**

The increasing number of labor inductions, including in women with a large fetus, necessitates the search for the safest and most effective methods of cervical ripening. A large fetus is associated with a higher risk of obstetric complications and cesarean section, making the choice of labor management strategy particularly important.

Keywords. Labor induction, large fetus, misoprostol, dinoprostone, Foley catheter, delivery, cesarean section.

ИСХОДЫ РАЗЛИЧНЫХ МЕТОДОВ ИНДУКЦИИ РОДОВ У ПАЦИЕНТОК С КРУПНЫМ ПЛОДОМ В СРАВНИТЕЛЬНОМ АСПЕКТЕ С ЕСТЕСТВЕННЫМИ РОДАМИ

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✓ **Резюме**

Увеличение числа индукций родов, в том числе у женщин с крупным плодом, требует поиска наиболее безопасных и эффективных методов подготовки родовых путей. Крупный плод ассоциирован с повышенным риском акушерских осложнений и кесарева сечения, что делает выбор тактики ведения родов особенно важным.

Ключевые слова. Индукция родов, крупный плод, мизопропростол, динопростон, катетер Фолея, роды, кесарево сечение.

TABIY TUG'RUQQA NISBATAN YIRIK HOMILALI BEMORLARDA TUG'RUQNI KELTIRIB CHIQARISHNING TURLI USULLARI NATIJALARI

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✓ Rezyume

Tug'ruq induksiyasi sonining ko'payishi, shu jumladan yirik homilali ayollarda, tug'ruq yo'llarini tayyorlashning eng xavfsiz va samarali usullarini izlashni talab qiladi. Yirik homila akusherlik asoratlari va kesarcha kesish xavfining ortishi bilan bog'liq bo'lib, bu tug'ruqni olib borish taktikasini tanlashni alohida ahamiyatga ega qiladi.

Kalit so'zlar. Tug'ruq induksiyasi, yirik homila, mizoprostol, dinoproston, Foley kateteri, tug'ruq, kesarcha kesish.

Relevance

The increasing number of labor inductions, including in women with a large fetus, necessitates the search for the safest and most effective methods of cervical ripening. A large fetus is associated with a higher risk of obstetric complications and cesarean section, making the choice of labor management strategy particularly important.

Objective: To evaluate the effectiveness of pre-induction/induction methods, the frequency of obstetric complications, and perinatal outcomes in pregnant women with a large fetus.

Materials and methods

This prospective cohort study included 120 pregnant women with a large fetus at City Maternity Hospital No. 5 in Almaty during the second half of 2024. All participants underwent scheduled pre-induction and induction of labor using various methods. Patients were divided into four groups based on the induction method: group I – oral prostaglandin E1 (misoprostol) (n=25), group II – prostaglandin E2 (dinoprostone) in the posterior vaginal fornix (n=30), group III – Foley balloon catheter in the cervical canal (n=35), group IV (control, n=30) – women who delivered spontaneously without pre-induction/induction.

Result and discussions

An analysis of the demographic and obstetric characteristics of patients in the main groups undergoing pre-induction/induction methods, as well as the comparison group, is presented in Table 1.

Table 1.

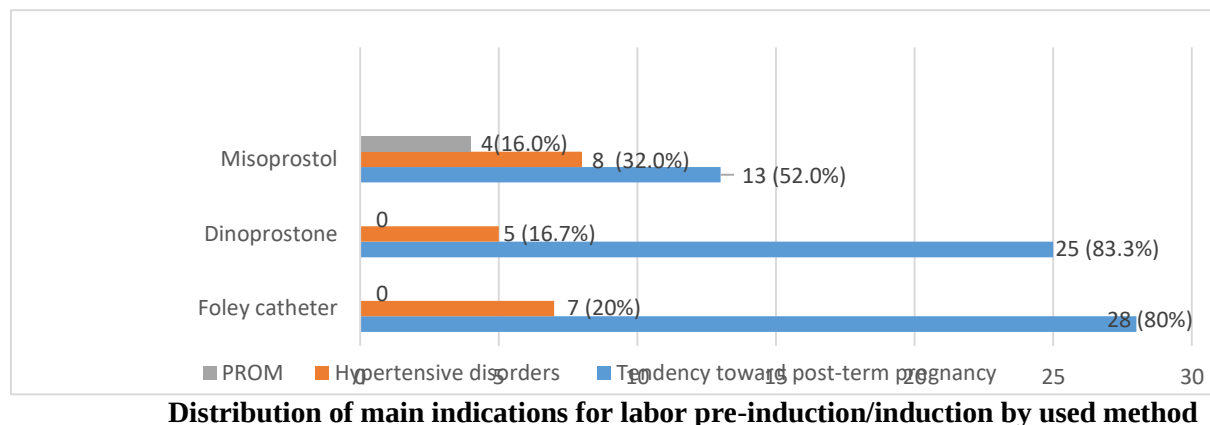
Comparative analysis of demographic and obstetric characteristics

Indicator/Method		Misoprostol	Dinoprostone	Foley catheter	Spontaneous labor
Maternal age, M±m (SD)		29.25±1.38 (5.56)	29.53±1.25 (5.46)	30.12±0.99 (5.42)	30.56 ± 1.19 (5.60)
Gestational age at admission (weeks), M±m (SD)		39.80±0.39 (1.20)	40.00±0.31 (1.23)	40.10±0.1 (1.25)	39.90 ± 0.13 (1.18)
Fetal weight (g), M±m (SD)		4189.54 ± 54.44 (266.71)	4195.12 ± 81.71 (270.82)	4212.85 ± 52.79 (259.81)	4220.52 ± 51.47 (268.86)
Parity	Primiparous, n=48 (40%)	16 (64%)	12 (40%)	12 (34.3 %)	8 (26.7%)
	Multiparous, n=72 (60%)	9 (36%)	18 (60%)	23 (65.7%)	22 (73.3%)

As shown in Table 1, comparative analysis of maternal age revealed no statistically significant differences between the groups. The mean age ranged from 29.25 ± 1.38 to 30.56 ± 1.19 years ($p = 0.178$). Gestational age at admission was also comparable across all groups, including the control group, with no statistically significant differences, ranging from 39.80 ± 0.39 to 40.10 ± 0.10 weeks ($p = 0.580$). The mean fetal weight varied from 3993.12 ± 81.71 to 4286.85 ± 52.79 grams ($p = 0.268$). Thus, maternal age, gestational age, and fetal weight were statistically homogeneous across the groups, with no significant differences observed.

A statistically significant difference was found in terms of parity ($p = 0.034$). In the misoprostol group, primiparous women predominated (64.0%), while in the other groups, multiparous women were more prevalent (up to 87.5%).

Figure 1.



Distribution of main indications for labor pre-induction/induction by used method

The main indications for labor pre-induction/induction were as follows:

- Tendency toward post-term pregnancy: Group I – 52.0%, Group II – 83.3%, Group III – 80.0% ($p = 0.0096$).
- Hypertensive disorders during pregnancy: Group I – 32.0%, Group II – 16.67%, Group III – 20.0% ($p = 0.5985$).
- Premature rupture of membranes, observed exclusively in the misoprostol group – 16.0% ($p = 0.0010$) (Figure 1).

*Hypertensive disorders: chronic arterial hypertension, gestational hypertension, preeclampsia.

As shown in Figure 1, analysis of the indications for labor pre-induction/induction demonstrates differences in clinical strategies based on the patient's condition and urgency of delivery. In all three groups, the leading indication was a tendency toward post-term pregnancy, especially pronounced in Group II (83.3%) and Group III (80.0%), reflecting a preference for more controlled and less aggressive methods (Prepidil gel and Foley catheter) in patients with borderline cervical ripeness and absence of acute clinical indications.

In Group I (misoprostol), the rate of post-term pregnancy was also high (52%), but a significant proportion of patients had hypertensive disorders (32%) and premature rupture of membranes (16%), indicating the use of this method in cases requiring more active and urgent cervical ripening, particularly in situations posing a risk to the mother or fetus. The Foley catheter was mainly used in planned settings, where immediate delivery was not required, whereas misoprostol was more commonly used under urgent conditions. Prepidil gel occupied an intermediate position, applied in cases with moderate clinical indications and partially mature cervix.

The effectiveness of cervical pre-induction with misoprostol was 84.0%, with spontaneous onset of labor in 71.43% of patients. In 28.57% of cases, amniotomy was performed based on cervical maturity, followed by labor augmentation with oxytocin (5 IU in 500 ml of 0.9% sodium chloride solution, IV drip infusion) according to standard protocol. The main indications for cesarean section in 16% of patients with failed pre-induction using misoprostol included a combination of factors: post-term pregnancy, fetal macrosomia, and complicated obstetric history. In the vast majority of patients (80.0%),

the average misoprostol dose was 150–175 mcg for primiparous and 100–125 mcg for multiparous women. The full dose of 200 mcg was used in 20% of cases.

The effectiveness of cervical ripening with dinoprostone was 86.67%, with spontaneous labor onset in 84.62% of patients. Amniotomy followed by oxytocin infusion was required in 15.38% of cases. Cesarean delivery due to failed dinoprostone pre-induction was performed in 13.33% of cases.

In the study group of 35 pregnant women who received the Foley balloon catheter, the method showed an effectiveness of 91.4%. In 56.25% of women, spontaneous labor occurred after catheter placement. In 43.75% of cases, when the cervix reached a Bishop score of ≥ 7 , amniotomy was performed, with oxytocin infusion required in 8 cases (25%). In 8.6% of cases with ineffective Foley catheter use, pharmacologic induction with misoprostol was added, resulting in 100.0% effectiveness. In 6.3% of patients, intrapartum complications occurred, such as clinically contracted pelvis and threatened fetal condition, which required cesarean section as the mode of delivery. The outcomes of labor pre-induction/induction methods are presented in Table 2.

Table 2.

Statistics of effectiveness of delivery methods in induced labor

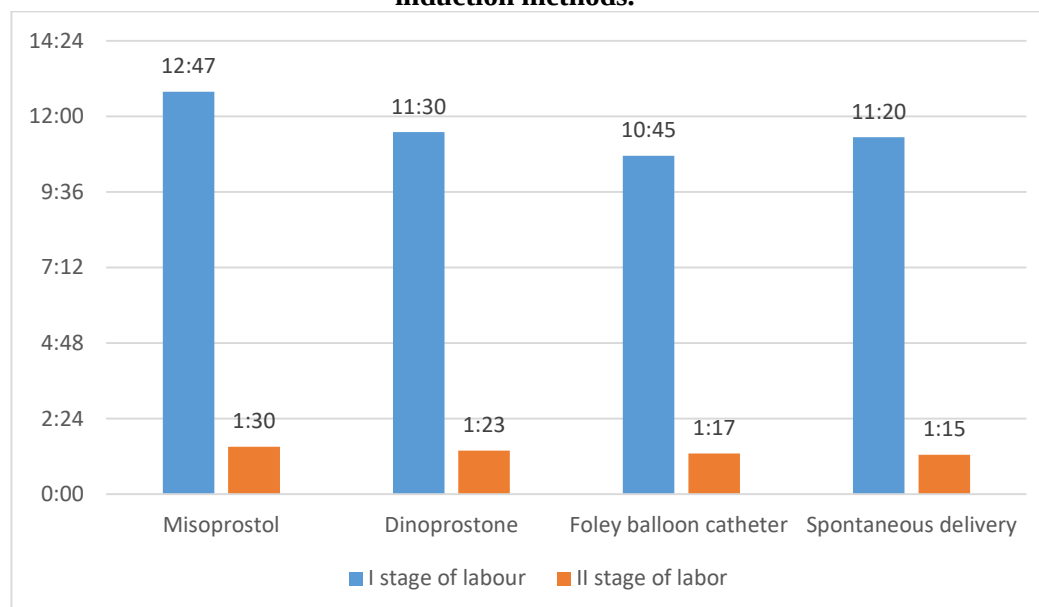
Indications	Misoprostol (n=25)	Dinoprostone (n=30)	Foley balloon catheter (n=35)
Effectiveness	84%	86,67%	91,4%
Inefficiency	16%	13,33%	8,6% *
Spontaneous onset of labor	71,43%	84,62%	56,25%
Amniotomy	28,57 %	15,38%	43,75%
Labor augmentation with oxytocin	27,27%	15,38%	25%
Cesarean section due to failed pre-induction	16%	13,33%	-

*Combined use of a balloon catheter with misoprostol = 100.0% efficiency.

The course of the first and second stages of labor in a comparative aspect with spontaneous labor is presented in Figure 2.

Figure 2.

Comparison of mean durations of the first and second stages of labor using different induction methods.



The mean duration of the first stage of labor was as follows: group I – 12 hours 47 minutes, group II – 11 hours 30 minutes, group III – 10 hours 45 minutes, group IV – 11 hours 20 minutes. The second stage of labor lasted on average: group I – 1 hour 30 minutes, group II – 1 hour 23 minutes, group III – 1 hour 17 minutes, group IV – 1 hour 15 minutes. According to the clinical protocol of the Ministry of Health of the Republic of Kazakhstan No. 177 dated January 13, 2023, "Labor Management", the average duration of the first stage of labor ranges from 8 to 12 hours, and the second stage from 1 to 3 hours [18]. Statistical analysis revealed significant differences in the duration of the first stage of labor between the groups ($p = 0.00000083$). The longest duration was observed in group I, likely due to a prolonged latent phase under the effect of prostaglandin E1 and the high proportion of primiparous women. The shortest durations were recorded in group III, where multiparous women predominated.

The duration of the second stage of labor did not differ significantly between groups ($p = 0.092$), indicating that the pushing phase is less influenced by the chosen method of induction.

When comparing the frequency of obstetric complications depending on the method of pre-/induction, the highest rate was noted in the misoprostol group: atonic hemorrhage – 12.0%, fetal hypoxia – 8.0%, shoulder dystocia – 4.0%, need for neonatal observation in the NICU – 8.0%. The complication rate in this group was significantly higher compared to spontaneous labor ($p = 0.0315$; OR = 6.59; 95% CI: 1.25–34.74). In the dinoprostone group, complications occurred in 6.6% of cases and included: hemorrhage – 3.3%, fetal hypoxia – 3.3%, which is comparable to spontaneous labor ($p = 1.0000$; OR = 1.00; 95% CI: 0.13–7.60). In the Foley catheter group, complications were observed in 11.4% of women: atonic hemorrhage – 5.7%, fetal hypoxia with subsequent NICU admission – 2.9%. Despite the higher rate, the differences compared to the spontaneous labor group were not statistically significant ($p = 0.6783$; OR = 1.81; 95% CI: 0.31–10.63). (See Table 3.)

Table 3.

Comparison of the frequency of obstetric complications across different methods of pre-/induction and spontaneous labor.

Complications	Misoprostol	Dinoprostone	Foley balloon catheter	Spontaneous labor
Atonic hemorrhage	12,0%	3,3%	5,7%	-
Fetal distress	8,0%	3,3%	2,9%	3.3%
Shoulder dystocia	4,0%	-	-	3.3%
Neonatal intensive care unit (NICU) admission	8,0%	-	2,9%	-

Discussion: This study examined the effectiveness and safety characteristics of various labor pre-induction methods in pregnant women with suspected fetal macrosomia. The methods evaluated — Foley balloon catheter, misoprostol, and dinoprostone — demonstrated high overall effectiveness; however, differences in complication rates and cesarean delivery rates were observed ($p < 0.05$).

The results showed that the highest rate of successful vaginal delivery and the lowest rate of cesarean section were observed in the Foley catheter group (97.14% and 2.86%, respectively). These findings are consistent with current studies supporting the effectiveness of mechanical cervical ripening in patients with an unfavorable cervix and suspected macrosomia [15,16].

Mechanical induction methods are considered safer and associated with fewer complications compared to pharmacological agents.

Misoprostol showed adequate effectiveness (84%), but was associated with a higher rate of obstetric complications (32%). This may be attributed to factors such as dosage, route of administration, and the higher proportion of primiparous patients in this group, who often require higher doses, thereby increasing the risk of uterine hyperstimulation, tachysystole, fetal heart rate abnormalities, and the need

for emergency cesarean delivery [19,20,21]. Nevertheless, misoprostol remains widely used in obstetric practice due to its accessibility and efficacy.

Dinoprostone demonstrated intermediate levels of effectiveness (86.67%) and safety, aligning with existing data regarding its balanced pharmacological effect and established role in labor induction [17].

Although differences in complication rates between the study groups did not reach statistical significance ($p > 0.05$), the findings support the acceptable safety profiles of all evaluated methods when proper patient selection and intrapartum monitoring are ensured.

The results highlight the importance of an individualized approach when selecting a method of labor pre-induction, taking into account the clinical context and patient-specific factors. The Foley catheter may be considered a preferred method of induction in women with fetal macrosomia and an unfavorable cervix.

Further studies with larger sample sizes and evaluation of long-term maternal and neonatal outcomes are needed to strengthen the reliability of these conclusions.

Conclusion

Based on the present study evaluating the effectiveness of various methods of labor pre-/induction in pregnant women with suspected fetal macrosomia, the following key findings were obtained:

1. Effectiveness of pre-induction methods:

- Misoprostol – 84%
- Dinoprostone (Prepidil gel) – 86.67%
- Foley balloon catheter – 91.4%

The highest effectiveness (100%) was achieved with the combined use of the Foley catheter and misoprostol, suggesting a potential synergistic effect in comprehensive cervical ripening.

2. Rate of operative delivery:

Among patients who underwent labor pre-/induction due to suspected macrosomia, the overall cesarean section rate was 10.8%. The main indications for cesarean delivery in cases of failed pre-/induction included combined factors such as:

- Tendency toward post-term pregnancy (gestational age ≥ 41 weeks)
- Fetal macrosomia
- Insufficient response to induction method and use of epidural analgesia

During labor, the primary indications for operative intervention were clinically contracted pelvis and threatened fetal condition.

3. Rate of obstetric complications:

The highest number of complications was observed in the misoprostol group, predominantly:

- Atonic postpartum hemorrhage
- Threatened fetal condition
- Shoulder dystocia

These findings underscore the need for cautious use of misoprostol, particularly in primiparous women with an unfavorable cervix.

Based on the obtained data, the Foley balloon catheter appears to be the safest and most predictable method for cervical ripening in patients with fetal macrosomia, due to its high effectiveness, low complication rate, and minimal cesarean section frequency.

Method selection based on clinical context:
The final choice of pre-/induction method should be guided by individual patient factors such as maternal age, parity, comorbidities, and pregnancy progression. The most appropriate method for a given patient should be chosen in consultation with the obstetrician, taking into account both efficacy and potential risks.

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