CLINICAL AND SUBCLINICAL CHARACTERISTICS OF PARTURIENTS UNDERGOING CESAREAN SECTION DUE TO FETAL HEAD NON-ENGAGEMENT AT THE NATIONAL HOSPITAL OF OBSTETRICS AND GYNECOLOGY

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A cross-sectional descriptive study was conducted on 218 parturients who underwent cesarean section for fetal head non-engagement at the National Hospital of Obstetrics and Gynecology. The maternal age ranged from 19 to 39 years old, with the 25 – 29 age group as the most common (51.4%). The majority of patients had spontaneous pregnancies (91.3%) and were primigravidas (91.3%). Upon admission, 60.1% were not yet in labor. Normal amniotic fluid volume was observed in 87.6% of cases, with oligohydramnios in 4.1% and polyhydramnios in 8.3%. A normal fetal heart rate was recorded in 66.5% of cases, while transient early decelerations (DIP I) were noted in 33.5%. The most common fetal position was right occiput posterior (ROP) at 40.4%, followed by left occiput anterior (LOA) at 21.6% and left occiput transverse (LOT) at 20.2%. Cesarean sections for fetal head non-engagement are predominantly concentrated in the primary childbearing age group (25 – 34 years old) and among primigravida women. Associated factors include amniotic fluid status, caput succedaneum, and fetal position, with right occiput posterior (ROP) being a common unfavorable presentation.

Keywords: Cesarean section, fetal head non-engagement, fetal position.

I. INTRODUCTION

A cesarean section is a procedure in which the fetus and its associated products of conception (placenta and membranes) are delivered from the uterus through incisions in the uterine wall and the abdominal wall. It is one of the most common obstetric procedures indicated for cases where a natural vaginal delivery is difficult. In the mechanism of vertex delivery, the presentation is considered engaged when its engaging diameter has passed through the plane of the pelvic inlet.[1]

A diagnosis of fetal head non-engagement is made when the cervix is fully dilated, and the fetal head fails to progress for 2 hours in a primiparous woman not using epidural analgesia. If epidural analgesia is used, this period can be extended to 3 hours. For a multiparous woman, the period of non-progression can be 1 hour, extending to 2 hours if epidural analgesia is used.[2] However, the actual monitoring time may vary if the mother or fetus shows signs such as hypertonic uterine contractions, threatened uterine rupture, uterine rupture, a large caput succedaneum, or fetal distress. Failure of the fetal head to engage is a common cause of abnormal labor and a significant indication for cesarean section, particularly in nulliparous women.

To provide a more comprehensive and updated perspective on the clinical and

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subclinical symptoms of parturients undergoing cesarean section due to fetal head non-engagement, we conducted this study with the objective: To describe the clinical and subclinical characteristics of parturients undergoing cesarean section for fetal head non-engagement at the National Hospital of Obstetrics and Gynecology.

II. MATERIALS AND METHODS

1. Subjects

***Study Population**:* The study subjects were the medical records of parturients who underwent a cesarean section for fetal head non-engagement at the National Hospital of Obstetrics and Gynecology during the first 6 months of 2024.

Definition of Fetal Head Non-Engagement: For the purposes of this study, a diagnosis of fetal head non-engagement was defined as the failure of the fetal head to progress for 2 hours after the cervix was fully dilated in a primiparous woman not using epidural analgesia (extended to 3 hours with epidural). For a multiparous woman, this period was 1 hour (extended to 2 hours with epidural).

Inclusion Criteria

Singleton pregnancy, live fetus, no abnormality, gestational age ≥ 37 weeks.

Primary cesarean section.

Medical records must contain all necessary information according to the study's standards.

Exclusion Criteria

Cases of cesarean section for fetal head non-engagement transferred from other facilities.

Cases with other primary indications for cesarean section (e.g., placenta previa, previous uterine surgery).

2. Methods

***Study Design**:* A retrospective, cross-sectional descriptive study.

***Sample Size**:* A total population sampling method was used. All medical records of parturients undergoing cesarean section for fetal head non-engagement at the National Hospital of Obstetrics and Gynecology in the first 6 months of 2024. In our study, 218 records met the inclusion criteria.

Study Location and Time

Location: National Hospital of Obstetrics and Gynecology.

Time: From January 1, 2024, to June 30, 2024.

Variables and Indicators

Age.

Method of conception: Natural, assisted reproductive technology.

Parity: Primigravida, Multigravida.

Amniotic fluid status: Ruptured membranes, intact membranes, clear fluid, meconium-stained fluid.

Fetal presentation and position, caput succedaneum, fetal heart rate.

3. Research ethics

The study protocol was approved by the Thesis committees of Hanoi Medical University and the National Hospital of Obstetrics and Gynecology. All collected research data were used for research purposes only.

III. RESULTS

1. Age of Study Subjects

The highest rate of cesarean section for fetal head non-engagement was in the 25 - 29 age group, accounting for 51.4%, while the lowest rate was in the < 20 age group at 0.5%. The youngest parturient was 19 years old, and the oldest was 39 years old.

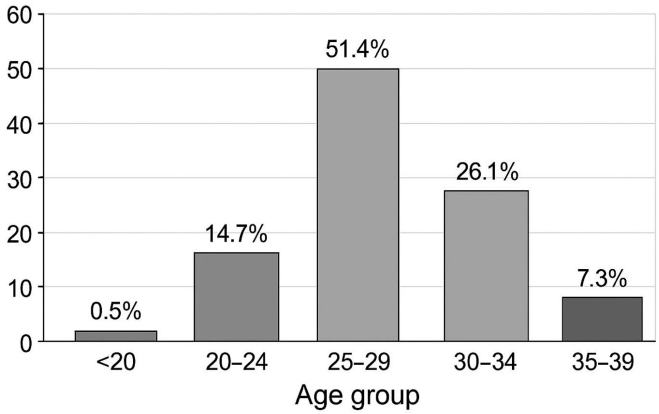

Chart 1. Age Distribution of Study Population

2. Method of Conception and Parity Distribution

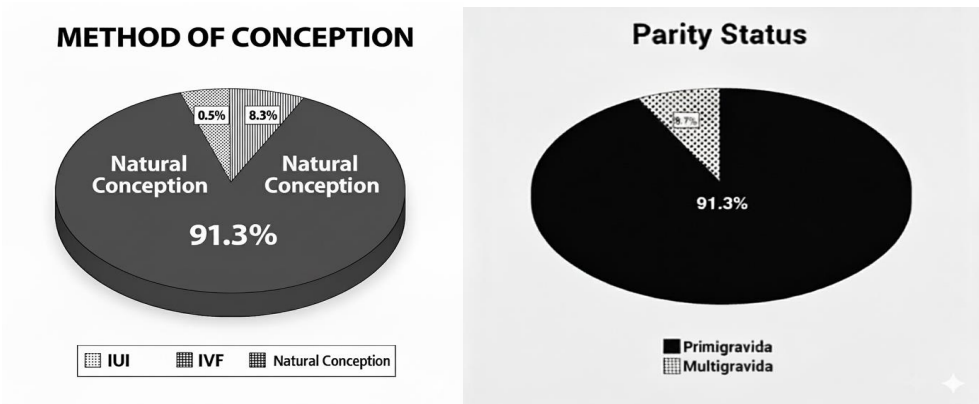

Chart 2. Conception Method and Parity Distribution

Parturients who conceived naturally accounted for the largest proportion at 91.3%, while those who conceived via assisted reproductive technology (ART) made up 8.8%. Primigravida parturients constituted the largest group at 91.3%, while multigravida parturients accounted for 8.7%.

3. Amniotic Fluid Status on Admission

Table 1. Amniotic Fluid Status on Admission (n = 218)

Stage of Labor	Membrane Status	Fluid Color	Primigravida	Multigravida	Total
Not in Labor	Intact Membranes		86 (39.5%)	8 (3.7%)	94 (43.1%)
	Ruptured Membranes	Clear	32 (14.7%)	4 (1.8%)	36 (16.5%)
		Meconium-stained	1 (0.5%)		1 (0.5%)
	Subtotal		119 (54.5%)	12 (5.5%)	131 60.1%)

Stage of Labor	Membrane Status	Fluid Color	Primigravida	Multigravida	Total
Stage Ia	Intact Membranes		47 (21.6%)	3 (1.4%)	50 (22.9%)
	Ruptured Membranes	Clear	18 (8.3%)	3 (1.4%)	21 (9.6%)
	Subtotal		65 (29.8%)	6 (2.8%)	71 (32.6%)
Stage Ib	Intact Membranes		14 (6.4%)	1 (0.5%)	15 (6.9%)
	Ruptured Membranes	Clear	1 (0.5%)		1 (0.5%)
	Subtotal		15 (6.9%)	1 (0.5%)	16 (7.3%)
Total			199 (91.3%)	19 (8.7%)	218 (100%)
Amniotic Fluid Volume	Normal		191 (87.6%)		
	Oligohydramnios		9 (4.1%)		
	Polyhydramnios		18 (8.3%)		

131 out of 218 cases (60.1%) were not in labor upon admission. 37 cases (17%) had ruptured membranes, among which 1 case (0.5%) had meconium-stained fluid. 87 out of 218 cases were in labor. Among these, there were 21 cases (9.6%) with ruptured membranes in stage Ia and 1 case (0.5%) in stage Ib. No case had meconium-stained fluid.

The amniotic fluid volume was mostly normal (87.6%), with the remainder being oligohydramnios (4.1%) and polyhydramnios (8.3%).

4. Preoperative Fetal Characteristics

Table 2. Preoperative Fetal Characteristics (n = 218)

Fetal Characteristic		n	Percentage %
Fetal Heart Rate	Normal	145	66.5
	Transient DIP I, then normal	73	33.5
Caput Succedaneum	Present	57	26.1
	Absent	161	73.9
Fetal Position	ROP (Right Occiput Posterior)	88	40.4
	LOP (Left Occiput Posterior)	13	6.0
	ROA (Right Occiput Anterior)	3	1.4
	ROT (Right Occiput Transverse)	16	7.3
	LOT (Left Occiput Transverse)	44	20.2
	LOA (Left Occiput Anterior)	47	21.6
	Not recorded in medical record	7	3.2

145 cases (66.5%) had a normal fetal heart rate, while 73 cases (33.5%) exhibited transient DIP I which then returned to normal. Caput succedaneum was present in 57 cases (26.1%). The most common fetal position was ROP (Right Occiput Posterior) in 88 cases (40.4%), followed by LOA (Left Occiput Anterior) in 21.6% and LOT (Left Occiput Transverse) in 20.2%. Other positions were less frequent (ROT 7.3%, LOP 6.0%, ROA 1.4%).

IV. DISCUSSION

The 25 - 29 age group had the highest rate of cesarean section for fetal head non-engagement at 51.4% (112/218), while the < 20 age group had the lowest rate (0.5%). The youngest parturient in the study was 19, and the oldest was 39. This is consistent with the findings of Nguyen Binh An (2020), who reported the highest rate in the 26 – 30 age group at 43,2%%.[3] This is appropriate as this is the optimal childbearing age.

Parturients in the study who conceived naturally accounted for 91.3% (199/218), while those who conceived via ART accounted for 8.8% (19 cases: 1 IUI, 18 IVF). This result reflects the clinical reality in Vietnam, where the majority of women still conceive naturally, and assisted reproductive techniques are applied only to a specific group with indications, mainly infertility. The rate of assisted reproductive technology (ART) pregnancies in our study was lower than in some other studies, such as Nguyen Binh An (2020) at Buu Dien Hospital (19%) and Le Hoai Chuong at the National Hospital of Obstetrics and Gynecology in 2017 (15.3%).[3,4]

A key finding of this study is the overwhelming proportion of primigravida parturients (91.3%) (199/218), whereas multigravida parturients accounted for only 8.7% (19/218). This result is similar to the study by Ngo Thi Bang (2023), where primigravida parturients were in the majority (66.3%).[5] The findings indicate that most cases of cesarean section for fetal head non-engagement occur in nulliparous women. This has a physiological and obstetric basis: in previous births, the parturient's pelvis has already expanded, and subsequent labors are generally smoother. Conversely, for first-time mothers, the pelvis has not yet expanded, and the muscles and ligaments are not accustomed to the birth process, which can lead to difficulty or failure of the fetal head to engage in the small pelvis, necessitating intervention by cesarean section.

The study shows that 131/218 cases (60.1%) were admitted before the onset of labor. Of these, 94 cases (43.1%) had intact membranes. There were 37 cases (17%) with ruptured membranes; regarding fluid color, only one case had meconium-stained fluid (0.5%), a suggestive sign of fetal distress. However, this case was closely monitored, the fetal heart rate remained stable, and labor monitoring was continued.

Amniotic fluid volume, estimated by ultrasound upon admission, was normal in 191/218 cases (87.6%), including those with ruptured membranes. There were 9 cases of oligohydramnios (4.1%) and 18 cases of polyhydramnios (8.3%). The timing of membrane rupture, the amount of fluid, and its color are crucial factors in predicting labor outcomes, especially for women at or past their due date.

A normal fetal heart rate was found in 145 cases (66.5%), indicating that most fetuses in this study had good vital signs before surgery. There were 73 cases (33.5%) that showed DIP I (early decelerations) followed by a return to normal. The appearance of DIP I is a deceleration of the fetal heart rate that is synchronous with

uterine contractions, often related to fetal head compression, and rarely suggests fetal hypoxia if the heart rate returns to normal immediately after the contraction. This finding is consistent with medical literature, as DIP I is often considered a physiological response of the fetus during labor, not a pathological indicator.[6]

The study's results on fetal characteristics provide insight into the mechanical factors of non-engagement. The presence of caput succedaneum in 57 cases (26.1%) is a common sign consistent with the reason for cesarean section being "fetal head non-engagement". The existence of a caput succedaneum confirms strong mechanical pressure on the fetal head during labor attempts.[7]

While amniotic fluid volume was normal in most cases (87.6%), abnormalities such as oligohydramnios or polyhydramnios, seen in a minority of cases, can be associated with conditions that contribute to malposition or ineffective labor, thus indirectly influencing engagement.

The ROP (Right Occiput Posterior) position was the most common, found in 88 cases (40.4%). The occiput posterior position is a well-established risk factor for abnormal labor. The mechanism behind this is straightforward: in an occiput posterior position, the fetal head presents a larger diameter (the occipitofrontal diameter, averaging 11.5cm) to the maternal pelvis, compared to the smaller suboccipitobregmatic diameter (averaging 9.5cm) presented in the more favorable occiput anterior position. This diameter mismatch makes it mechanically difficult for the head to navigate the pelvic inlet. Successful vaginal delivery from an OP position often requires the fetus to undergo a long internal rotation of 135 degrees to an OA position, a process that frequently fails, leading to arrest of descent and non-engagement. Although LOA (Left Occiput Anterior) is a favorable position, there were still 47 cases (21.6%) that required a cesarean section, possibly due to a large fetal head or pelvic abnormalities.

V. CONCLUSION

This study successfully describes the key clinical and subclinical characteristics of parturients undergoing cesarean section for fetal head non-engagement. The findings indicate that the risk is most concentrated among primigravida women in the primary childbearing age group. The most significant contributing factor identified is fetal malposition, specifically the right occiput posterior (ROP) position, which creates a mechanical barrier to the engagement of the fetal head. These results underscore the importance of careful intrapartum monitoring of fetal position and labor progress, especially in nulliparous women, to allow for timely and appropriate intervention.

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