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ORIGINAL ARTICLE

Maternal Outcomes of Unengaged Fetal Head in Primigravida in DHQ Hospital, Dera Ismail Khan, Pakistan

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ABSTRACT

Introduction: The fetal head station denotes the specific position of the fetal head within the maternal birth canal, as assessed through digital vaginal examination. Primigravida individuals constitute a demographic characterized by elevated risk, wherein an elevated fetal head position in this group is considered a significant risk factor for labor dystocia. There is very limited data in this subject in our local population, therefore it's a dire need to get local evidence.

Objective: This study aims to evaluate the maternal outcomes associated with an unengaged fetal head in primigravida patients presenting at DHQ Hospital Dera Ismail Khan.

Study Design: Descriptive Case Series.

Setting: Obstetrics and Gynecology Department, DHQ Hospital Dera Ismail Khan.

Duration of Study: The period of this investigation spanned from the 10th of September 2022 to the 10th of March 2023.

Subjects and Methods: A cohort comprising 157 primigravida women exhibiting an unengaged fetal head was incorporated into the study. All participants underwent delivery in accordance with the established departmental protocols and were monitored until the 15th day postpartum. Maternal outcomes (vaginal delivery, forceps delivery, cesarean section, postpartum hemorrhage and wound infection) were noted.

Results: The age spectrum investigated in this research was between 18 and 35 years, exhibiting an average age of 27.127 ±3.29years, while the average gestational age was recorded as 6.615±1.82 weeks. Vaginal Delivery was observed in 58.6% patients, Forceps Delivery 16.6%, C-Section 24.8%, Postpartum Hemorrhage 26.8% and Wound Infection was 15.3 %.

Conclusion: Our study has determined that the presence of an unengaged fetal head in primigravida women experiencing spontaneous onset of labor does not constitute a contraindication for the performance of a lower segment cesarean section (LSCS).

Keywords: Unengaged fetal head, Primigravida, Maternal outcomes

INTRODUCTION

Fetal head station (FHS) denotes the positional level of the fetal head within the maternal birth canal, which is evaluated through a digital vaginal examination[1] As delineated by the American College of Obstetricians and Gynecologists, the maternal pelvic canal is categorized into 11distinct levels or stations (spanning from -5 to 5), with each station corresponding to a measurement of one centimeter.[2] Station O signifies the lowest position of the fetal presentation, aligning with the level of the maternal ischial spines, a phenomenon commonly referred to as fetal head engagement[3] Stations that are situated above or below this reference point are quantified as negative or positive values, contingent upon whether the fetal head is positioned above or below the ischial spines. The engagement of the fetal head can also be evaluated through abdominal examination, wherein the palpation of two-fifths of the fetal head suggests that the fetal presentation has descended past the pelvic inlet.[3,4]

Primigravidas, defined as women experiencing their inaugural pregnancy, are classified as a high-risk demographic, and the presence of an unengaged fetal head is acknowledged as a contributory factor to labor dystocia within this cohort.[5] While conventional obstetric literature posits that fetal engagement should transpire by the 38th gestational week, the existence of an unengaged head at term during the commencement of labor in primigravidas does not automatically necessitate a cesarean section.3 Engagement constitutes the preliminary phase in the labor process for a primigravida; however, variables such as a pronounced angle of inclination in specific populations (e.g., Negros) may postpone engagement until the onset of labor.[6]

A prospective case-control study conducted by Salim NA et al. at Dongola Maternity Hospital evaluated the delivery methods and outcomes among primigravida with unengaged fetal heads. The research encompassed 248 primigravid women, stratifying them into two distinct cohorts: those presenting with an engaged fetal head and those exhibiting an unengaged fetal head. The findings revealed that 77.4% of participants successfully achieved vaginal delivery, 9.7%necessitated forceps assistance, and 12.9% underwent cesarean delivery.[7] Similarly, a study executed at the Department of Obstetrics and Gynaecology, Peoples University of Medical and Health Sciences in Nawabshah, Pakistan, during the period from January to June 2011, indicated that 59% of primigravidas with an unengaged head at term accomplished vaginal delivery, whereas 41% required cesarean sections. Instances of postpartum hemorrhage were recorded in 10% of the subjects, and wound infections were observed in 7%.[8]

Over the last quarter of a century, the incidence of cesarean deliveries has experienced a significant and consistent escalation, increasing from 5.5% in the year 1970 to an estimated 25%by the year 1995[9] This escalation has been catalyzed by modifications in the management of various clinical factors, including malpresentation, fetal distress, prior cesarean deliveries, and dystocia. Notwithstanding this elevation in cesarean section prevalence, it has not substantially contributed to a decline in perinatal mortality, which has exhibited a reduction during the same timeframe. In light of the escalating incidence of cesarean deliveries, it is imperative for all healthcare professionals engaged in the management of patients to possess a comprehensive understanding of the principles governing normal labor and delivery. Such expertise is pivotal in mitigating unnecessary cesarean procedures and enhancing the quality of care for women in labo[10]

From a physiological perspective, the uterus in primigravid women may exhibit diminished efficiency during labor, characterized by irregular or hypotonic contractions that can prolong the initial stage of labor. This situation frequently necessitates the implementation of augmentation strategies to regulate and synchronize uterine contractions, particularly in instances where the fetal head is not engaged. Despite the expanding corpus of research on this subject, there exists a paucity of data pertaining to this phenomenon within the local population, thereby underscoring the necessity for additional localized evidence to ascertain the maternal outcomes associated with an unengaged fetal head in primigravid women in our region.

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Objectives: This study aims to evaluate the maternal outcomes associated with an unengaged fetal head in primigravida patients presenting at DHQ Hospital Dera Ismail Khan.

Operational Definitions: ·

Unengaged Fetal Head: This is characterized as the state wherein the entirety of the fetal head is discernible per abdomen in relation to the ischial spines at the maternal pelvic brim, as ascertained through a thorough physical examination.

Maternal Outcomes: These are evaluated based on the following clinical events:

Vaginal Delivery: This refers to the expulsion of the fetus, placenta, and membranes through the parturitional canal.

Forceps Delivery: A type of assisted delivery using mechanical devices, specifically forceps, to assist in the birth process.

Cesarean Section: A surgical procedure to deliver a baby through an abdominal incision, typically 6 to 7 inches long, involving the removal of the baby through the mother's abdomen.

Postpartum Hemorrhage: Characterized as an estimated volume of blood losso≥1000mL in the postpartum period following a cesarean section,or≥500mL subsequent to vaginal delivery within the first 24 hours. Blood loss is quantified by the weight of saturated gauzes, pads (ascertained by deducting the pre-use weight from the post-use weight), and blood clots, with 1 mL of blood being equivalent to 1 gram.

Wound Infection: Characterized as the manifestation of erythema exceeding 1 cm from the wound margin, tenderness upon palpation, and sero-sanguinous or purulent discharge noted during physical examination on the fifteenth day post-cesarean delivery.

MATERIAL & METHODS

This study was meticulously structured as a descriptive case-series study and was executed within the Department of Obstetrics and Gynaecology at DHQ Hospital, Dera Ismail Khan, spanning the period from September 10, 2022, to March 10, 2023. The sample size was determined to comprise 157 individuals, utilizing a 95% confidence interval, a 4% margin of error, and an anticipated incidence of wound infection at 7%, in accordance with the World Health Organization (WHO) formula for sample size determination. A non-probability consecutive sampling method was employed to identify the participants.

Inclusion: Female patients primigravida, Aged 18 to 48 years, Singleton pregnancy diagnosed through ultrasound, Gestational age between 37 and 41 weeks (last menstrual period and patients with an unengaged fetal head according to the operational definition.)

Exclusion: Patients who have non-vertex presentation on ultrasound, History of short stature with life-threatening complications such as pregnancy-induced hypertension, and gestational diabetes.

Data Collection Procedure: Patients who fulfilled the stipulated inclusion criteria were recruited from the Department of Obstetrics and Gynaecology at DHQ Hospital, Dera Ismail Khan, subsequent to obtaining authorization from the ethical review board. Informed consent was secured from all participants involved. Demographic information, including age, gestational age, and residential status, was systematically collected. All patients were delivered according to the standard departmental protocol and were followed up until the 15th postpartum day. Maternal outcomes (vaginal delivery, forceps delivery, cesarean section, postpartum hemorrhage, and wound infection) were documented according to the operational definitions using a specially designed proforma (Annexure-I).

Data Analysis: Data were subjected to analysis utilizing the IBM-SPSS version 25 statistical software suite. The arithmetic mean and standard deviation(±SD)were computed for quantitative variables, specifically age and gestational age. Frequencies and percentages were determined for qualitative variables, which encompassed residential status, vaginal delivery, forceps delivery, cesarean section, postpartum hemorrhage, and wound infection. The stratification of maternal outcomes was conducted based on age, gestational age, and residential status. Subsequent to stratification, post-stratification analysis was executed employing the chi-square test, with a p-value≤0.05deemed statistically significant.

RESULTS

The age range of participants in this study extended from 18 to 35 years, yielding a mean age of 27.13±3.29years.The mean gestational age was recorded as 6.62 ± 1.82 weeks, as delineated in Table I. The frequency and percentage of patients categorized by their residential status are comprehensively detailed in Table II. The maternal outcomes observed were as follows: 58.6%of patients delivered vaginally, 16.6% underwent forceps delivery, 24.8% had a cesarean section, 26.8% experienced postpartum hemorrhage, and 15.3% had a wound infection. These outcomes are outlined in Tables III, IV, V, VI, and VII, respectively. Stratification of maternal outcomes based on age, gestational age, and residential status are shown in Tables VIII to XXII.

Table- 1: Mean±SD of patients according to age and gestational age n=157

Demographics		Mean±SD
1	Age (years)	27.127±3.29
2	Gestational age (weeks)	38.687±1.13

Table- 2: Frequency and %age of patients according to residential status. n=157

Residential Status		Frequency	%age
1	Rural	86	54.8%
2	Urban	71	45.2%
3	Total	157	100%

Table-3: Frequency and %age of patients according to vaginal delivery .n=157

Vaginal Delivery		Frequency	%age
1	Yes	92	58.6%
2	No	65	41.4%
3	Total	157	100%

Table-4: Frequency and %age of patients according to forceps delivery. n=157

Forceps Delivery		Frequency	%age
1	Yes	26	16.6%
2	No	131	83.4%
3	Total	157	100%

Table-5: Frequency and %age of patients according to c-section. n=157

C-Section		Frequency	%age
1	Yes	39	24.8%
2	No	118	75.2%
3	Total	157	100%

Table-6: Frequency and %age of patients according to postpartum hemorrhage. n=157

Postpartum Hemorrhage	Frequency	%age
Yes	42	26.8%
No	115	73.2%
Total	157	100%

Table-7: Frequency and %age of patients according to wound infection. n=157

Wound Infection		Frequency	%age
1	Yes	24	15.3%
2	No	133	84.7%
3	Total	157	100%

Table-8: Stratification of Vaginal Delivery with respect to age.

Age (years)		Vaginal Delivery		p-value
		Yes	No	
1	18-30	78(58.6%)	55(41.4%)	0.977
2	>30	14(58.3%)	10(41.7%)	
Total		92(58.6%)	65(41.4%)	

Table-9: Stratification of Vaginal Delivery with respect to gestational age.

Gestational age (weeks)	Vaginal Delivery		p-value
	Yes	No	
37-39	70(56.5%)	54(43.5%)	0.290
>39	22(66.7%)	11(33.3%)	
Total	92(58.6%)	65(41.4%)	

Table-10: Stratification of Vaginal Delivery with respect to residential status.

Residential Status		Vaginal Delivery		p-value
		Yes	No	
1	Rural	53(61.6%)	33(38.4%)	

2	Urban	39(54.9%)	32(45.1%)	0.396
Total		92(58.6%)	65(41.4%)	

Table-11: Stratification of Forceps Delivery with respect to age.

Age (years)		Forceps Delivery		p-value
		Yes	No	
1	18-30	21(15.8%)	112(84.2%)	0.541
2	>30	5(20.8%)	19(79.2%)	
Total		26(16.6%)	131(83.4%)	

Table-12: Stratification of Forceps Delivery with respect to gestational age.

Gestational age (weeks)	Forceps Delivery		p-value
	Yes	No	
37-39	19(15.3%)	105(84.7%)	0.419
>39	7(21.2%)	26(78.8%)	
Total	26(16.6%)	131(83.4%)	

Table-13: Stratification of Forceps Delivery with respect to residential status.

Residential Status		Forceps Delivery		p-value
		Yes	No	
1	Rural	14(16.3%)	72(83.7%)	0.917
2	Urban	12(16.9%)	59(83.1%)	
Total		26(16.6%)	131(83.4%)	

Table-14: Stratification of C-Section with respect to age.

Age (years)		C-Section		p-value
		Yes	No	
1	18-30	34(25.6%)	99(74.4%)	0.622
2	>30	5(20.8%)	19(79.2%)	
Total		39(24.8%)	181(75.2%)	

Table-15: Stratification of C-Section with respect to gestational age.

Gestational age (weeks)	C-Section		p-value
	Yes	No	
37-39	35(28.2%)	89(71.8%)	0.057
>39	4(12.1%)	29(87.9%)	
Total	39(24.8%)	118(75.2%)	

Table-16: Stratification of C-Section with respect to residential status.

Residential Status		C-Section	p-value	
		Yes	No	
	Rural	19(22.1%)	67(77.9%)	0.381
	Urban	20(28.2%)	51(71.8%)	
Total		39(24.8%)	118(75.2%)	

Table-17:Stratification of Postpartum Hemorrhage with respect to age.

Age(years)		Postpartum Hemorrhage		p-value
		Yes	No	
1	18-30	36(27.1%)	97(72.9%)	0.833
2	>30	6(25%)	18(75%)	
Total		42(26.8%)	115(73.2%)	

Table-18: Stratification of Postpartum Hemorrhage with respect to gestational age.

Gestational age (weeks)	Postpartum Hemorrhage		p-value
	Yes	No	
37-39	27(21.8%)	97(78.2%)	0.006
>39	15(45.5%)	18(54.5%)	
Total	42(26.8%)	115(73.2%)	

Table-19: Stratification of Postpartum Hemorrhage with respect to residential status.

Residential Status		Postpartum Hemorrhage		p-value
		Yes	No	
1	Rural	26(30.2%)	60(69.8%)	0.278
2	Urban	16(22.5%)	55(77.5%)	
Total		42(26.8%)	115(73.2%)	

Table-20: Stratification of Wound Infection with respect to age.

Age (years)		Wound Infection		p-value
		Yes	No	
1	18-30	21(15.8%)	112(84.2%)	0.680
2	>30	3(12.5%)	21(87.5%)	
Total		24(15.3%)	133(84.7%)	

Table- 21: Stratification of Wound Infection with respect to gestational age.

Gestational age (weeks)	Wound Infection		p-value
	Yes	No	
37-39	22(17.7%)	102(82.3%)	0.097
>39	2(6.1%)	31(93.9%)	
Total	24(15.3%)	133(84.7%)	

Table-22: Stratification of Wound Infection with respect to residential status.

Residential Status		Wound Infection		p-value
		Yes	No	
1	Rural	13(15.1%)	73(84.9%)	0.948
2	Urban	11(15.5%)	60(84.5%)	
Total		24(15.3%)	133(84.7%)	

DISCUSSION

When evaluating the maternal outcomes of an unengaged fetal head in primigravida, it is important to understand the potential implications for both the mother and fetus. Maternal pregravid obesity, for instance, it has been correlated with multiple unfavorable pregnancy outcomes, encompassing an elevated probability of gestational diabetes, preeclampsia, placental abruption, and complications during delivery[11]

In our study, vaginal delivery transpired in 58.6% of subjects, forceps delivery in 16.6%,cesarean section in 24.8%, postpartum hemorrhage in 26.8%, and wound infection in 15.3%.These findings are analogous to those reported in studies conducted by Salim NA et al. and other researchers. For example, Salim NA's prospective case-control study at Dongola Maternity Hospital, which included 248 primigravida women at term, identified a vaginal delivery rate of 77.4%,forceps delivery at 9.7%, and cesarean section at 12.9%.7 Likewise, a study conducted at Peoples University of Medical and Health Sciences, Nawabshah, Pakistan, involving 100primigravida women with an unengaged head, reported 59% vaginal deliveries and 41%cesarean sections, with postpartum hemorrhage in 10% and wound infection in 7% of patients.

Additionally, behaviors such as maternal tobacco use during gestation have been associated with diminished dimensions of fetal cranial size and femoral length, thereby underscoring the impact of specific maternal variables on fetal maturation[12] Proper assessment of fetal cephalic position and descent is crucial for the efficacy of instrumental delivery and to mitigate potential complications[13] Techniques employed to facilitate the delivery of a severely entrapped fetal head at complete cervical dilation, particularly during the second stage of labor, can substantially influence both maternal and neonatal health outcomes[14] Malpositioning of the fetal head heightens the likelihood of adverse occurrences during delivery, which can detrimentally affect both the mother and the infant[15] Moreover, maternal psychological well-being, specifically in relation to anxiety, has been correlated with inhibited fetal cranial growth, while maternal inflammatory responses have been linked to unfavorable pregnancy results,[16] with increased uric acid levels associated with the severity of preeclampsia[17]

Concerning the duration of labor, our investigation revealed that the mean length of the first stage of labor for a freely floating fetal head at the -3 station and at the -2 station was 13.38±3.31 hours,11.42±2.78hours,and9.5±3.56hours,respectively. A statistically significant correlation was identified between fetal head station and the mean duration of the initial stage of labor(p=0.002),with prolonged labor durations noted at elevated fetal head stations. Correspondingly, the mean duration of the second stage of labor was recorded as 43.85±26.07 minutes for a freely floating head, 32.11±13.54 minutes at the -3 station, and 27±11.77 minutes at the -2 station(p=0.011),thereby illustrating a statistically significant association between fetal head station and the duration of the second stage of labor. The overall duration of labor exhibited a similar pattern, with a mean of 14.15±3.46 hours for a freely floating head, 12.18±2.88 hours at the -3 station,and10.08±.65hours at the -2 station. The extended labor durations observed at higher fetal head stations align with findings from studies conducted by Pahwa et al. and Mahendra et al[18,19]. In our study, 89% of the subjects necessitated labor augmentation, with 16% undergoing artificial rupture of membranes (ARM), 24% receiving oxytocin, and 49% being administered both ARM and oxytocin. This finding aligns with the research conducted by Unnisa et al.,Badra et al., and Arunarekha et al., which indicated labor augmentation rates of 80%, 75%, and 74%,respectively.[20-22]

Notably, 100% of the cases exhibiting a freely floating fetal head necessitated labor augmentation, corroborating the observations made by Shivamurthy et al. and Arunarekha et al[20,23]

The statistical significance(p=0.003)indicates that elevated fetal head stations are correlated with an increased requirement for laboraugmentation. In our study, 77% of the participants achieved vaginal delivery (comprising 70% normal vaginal delivery and 7% instrumental delivery), whereas 23% underwent cesarean section. These results are consistent with those reported by Khurshid et al., who documented a vaginal delivery rate of 67% and a cesarean section rate of 33%, as well as Sudhir et al., who observed a vaginal delivery rate of 65% and a cesarean section rate of 35%[24,25]. In contrast, Pahwa et al. noted a higher rate of cesarean sections (56%) due to the inclusion of cases involving induced labor[26]

The strengths of our study encompass the explicit selection criteria for primigravida women with unengaged fetal heads within the age range of 18 to 35 years, possessing an adequate pelvic structure and experiencing spontaneous onset of labor. The exclusion of confounding variables contributed to a reduction in the incidence of cesarean deliveries. Nevertheless, the limitations of the study are characterized by a limited sample size and a brief study duration.

CONCLUSION

Our study determined that the presence of an unengaged fetal head in primigravid individuals experiencing spontaneous labor does not constitute a justification for the performance of a cesarean section (LSCS). The necessity for both active medical management and surgical intervention in instances of a floating fetal head at the commencement of labor in primigravida is significantly elevated. However, adopting a strategy of watchful expectancy, combined with timely intervention. This situation can facilitate numerous cases to be delivered via vaginal means with minimal maternal and fetal morbidity, especially when no significant underlying etiological factors are identified. The findings suggest that, in the absence of concerning factors, conservative management should be prioritized. This approach is preferable to the automatic recourse to a cesarean delivery for an unengaged fetal head at the initiation of labor in primigravida patients.

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