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Original Research Article

Feto-maternal outcome in primigravida with unengaged head vs engaged head at term

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ABSTRACT

Background: Labor, defined as regular uterine contractions followed by cervical dilation, effacement, and descent of the presenting part, is a pivotal event in a woman's life. Fetal head engagement, where the widest diameter of the head crosses the pelvic brim, is crucial for a favorable vaginal delivery. This study focuses on primigravidae, where labor dynamics can differ significantly compared to multigravida, often resulting in prolonged labor and increased cesarean sections.
Methods: The study involved primigravidae at term (37-42 weeks) presenting at the labor ward. Inclusion criteria were first-time mothers with singleton pregnancies and vertex presentations. Exclusion criteria included multiple pregnancies, breech presentations, and preterm labor.
Results: Primigravidae with unengaged fetal heads had significantly longer labor durations (12.7±3.6 hours vs. 8.5±2.3 hours, $p<0.01$), higher cesarean section rates (45% vs. 20%, $p<0.01$), and increased maternal complications (30% vs. 10%, $p<0.01$). Neonatal outcomes were also poorer in the unengaged group, with higher rates of neonatal ICU admissions and lower Apgar scores.
Conclusions: Primigravidae with unengaged fetal heads at term are at increased risk of prolonged labor, higher cesarean sections, and adverse maternal and neonatal outcomes. Effective management, including careful monitoring and timely interventions, is crucial to improving outcomes. Future research should focus on identifying predictors of engagement and developing guidelines for managing unengaged fetal heads in labor.

Keywords: Engagement, Feto-maternal outcome, Labour, Primigravida

INTRODUCTION

Labor, defined as regular uterine contractions followed by cervical dilation, effacement, and descent of the presenting part, is a pivotal event in a woman's life.[1] The engagement of the fetal head, where the widest diameter of the head crosses the pelvic brim, is a crucial determinant for a successful vaginal delivery.[2] This process indicates that the fetal head has passed through the pelvic inlet, aligning with the pelvic cavity for delivery.

Primigravidae, or first-time mothers, often experience different labor dynamics compared to multigravida (women who have given birth before). Labor in primigravidae can be more prolonged and challenging, with a higher incidence of complications such as unengaged fetal heads at the onset of labor.[3] The problems associated with prolonged labour include a higher risk of infection, ketosis, and obstructed labour for the mother, while the foetus faces the dangers of asphyxia and infection.[4]

This study was done with the aim to compare the feto-maternal outcomes of primigravidae with engaged versus unengaged fetal heads at term. It seeks to identify the causes of delayed engagement, assess the implications for

labor and delivery, and evaluate the effectiveness of different management strategies.

METHODS

It was a hospital based prospective case-control observational study conducted at a tertiary care hospital conducted from January 2023 to December 2023. The study included 125 females with engaged head at term as cases and 125 controls with unengaged head at term. The patients who went into spontaneous labour all the maternal and fetal outcome parameters were noted.

The patients who did not spontaneously progress in either group were induced after meeting the required criteria. However, all patients in the cases and control groups were subjected to trial of labour.

Inclusion criteria

It included full term, primigravida, with singleton pregnancy with vertex presentation. The patients should be in early labour with intact membranes and no obvious features of contacted pelvis.

Exclusion criteria

Exclusion criteria were multigravida, primigravida with antepartum hemorrhage, previous uterine surgeries, intra uterine growth restriction, multiple gestation, skeletal deformities (polio, kyphoscoliosis, limb defects, etc.), medical complications like diabetes mellitus, etc., GCA in the baby, uterine anomalies, fibroids etc.

Criteria for induction

Patients who did not go into spontaneous labour were induced if they met the induction criteria which included, patient sure of dates, crossed the expected date of delivery, intact membranes, no uterine contractions, unfavorable Bishop's and reactive non stress test.

Data were collected through detailed physical examinations and medical records. Engagement was assessed via abdominal and pelvic examinations conducted by experienced obstetricians. Variables recorded were based on demographic characteristics, labour characteristics, maternal complications and fetal complications. The causes of unengagement of head were noted wherever found.

Statistical analysis

The collected data was entered in Microsoft Excel and then was analysed and statistically evaluated using SPSS-25 version. Statistical analysis was performed to compare outcomes between the engaged and unengaged groups. Chi-square tests were used for categorical variables, and t-tests were used for continuous variables. A p value of <0.05 was considered statistically significant.

RESULTS

The study included 250 primigravidae, with 125 in the engaged group and 125 in the unengaged group. The mean age of participants was 26.7 years, with a range of 20-35 years. The majority of patients in the unengaged head group fell within the age range of 21-25 years, total of 77 patients. Conversely, in the engaged head group, the majority fell within the age range of 26-30 years, accounting for 51.2% of the group. There were four patients in the cases group and three patients in the controls group who were older than 30 years of age. The mean gestational age was 39.3 weeks, with no significant difference between the two groups. Majority of patients in both the cases (71) and control (96) groups fall within the normal BMI range. Additionally, 34.4% of patients in the unengaged head group are classified as overweight (Table 1).

For gestational age, majority of patients in the unengaged head group fell within the category of 40-40+6 weeks, accounting for 47.2% of the group. Conversely, in the engaged head group, 28.8% of patients fell within the category of 39-39+6 weeks. It is noteworthy that a higher gestational age is observed in patients with an unengaged head. The socio economic status and literacy status of both the groups were comparable.

Table 1: Baseline characteristics comparison between unengaged and engaged head group.

	Unengaged head group (n=125)	Engaged head group (n=125)	P value
Mean age in years	24.72±3.04	25.38±2.97	0.08
BMI	22.29±2.02	21.52±1.61	0.01
Education			
Illiterate	19	22	0.60
Upto 8	46	46	
9-10th	19	12	
11-12th	18	24	
Graduate and above	23	21	
Socio-economic status			
Lower	117	116	0.92
Lower middle	5	5	
Upper middle	3	4	
Gestational age	39.34±1.02	38.87±1.12	0.01

At the time of admission, 21 patients had the head of the fetus at the -4 station, 67 patients had the head of the fetus at the -3 station, 32 patients had the head at the -2 station, and 5 patients had the head at the -1 station in the unengaged group. On the other hand, in the engaged group, 58 patients had the vertex at the 0 station, and 67 patients had the vertex at the +1 station. In the unengaged group, 68 patients required induction with cerviprime gel, while in the engaged group, only 30 patients needed cerviprime

gel induction and in the unengaged group, augmentation with oxytocin was required in 87 patients, whereas in the engaged group, it was required in 81 patients.

Labor duration was significantly longer in the unengaged group, with an average duration of 12.7±3.6 hours compared to 8.5±2.3 hours in the engaged group. The rate of cesarean sections was significantly higher in the unengaged group (45%) compared to the engaged group (20%). This suggests that the unengaged fetal head at term is a significant factor contributing to the decision for surgical intervention. In many cases, cesarean sections were performed due to failure to progress, fetal distress, or cephalopelvic disproportion. This aligns with existing literature that indicates a higher risk of operative deliveries when engagement has not occurred (Table 2).

Table 2: Labour characteristics.

Station of head on PV examination (n=250)	Unengaged head (n=125)	Engaged head (n=125)	P value
-4	21	0	
-3	67	0	
-2	32	0	
-1	5	0	
0	0	58	
+1	0	67	
Duration of labour			
First stage (hours)	12.90	11.10	<0.001
Second stage (minutes)	37.4	36	0.87
Type of labour			
Induced	68	30	<0.001
Spontaneous	57	95	
Need of augmentation			
No	38	44	0.41
Yes	87	81	
Colour of the liquor			
Clear	78	84	0.47
Meconium stained liquor	47	41	
Fetal distress			
No	110	116	0.28
Yes	15	9	
Indication of LSCS			
Fetal distress	13	9	
Meconium stage liquor	13	6	
Non progression of labour	7	3	
Deep transverse arrest	2	1	
Placenta dipping into lower segment	2	0	

Table 3: Maternal complications.

Maternal complications	Unengaged head group (n=125)	Engaged head group (n=125)	P value
Hyperstimulation	3	1	0.31
Uterine rupture	0	0	
Post-partum haemorrhage	25	19	0.31
Retained placenta	0	0	0.62
Perineal tears	3	1	0.49
Cervical tears	2	0	
Need for blood transfusion	6	3	0.50
Prolonged hospital stay	19	12	0.17

Maternal complications were more common in the unengaged group, with 15 cases (30%) compared to 5 cases (10%) in the engaged group. Complications included postpartum hemorrhage, infections, and perineal tears. The higher incidence of complications in the unengaged group may be attributed to prolonged labor, increased

interventions, and the physical strain of attempting vaginal delivery without engagement (Table 3).

Neonatal outcomes were also poorer in the unengaged group. In the unengaged head group, there were 64 male neonates and 61 female neonates. Conversely, in the engaged head group, there were 57 male neonates and 68 female neonates. The p value for the gender distribution is 0.37, which is not statistically significant. In the unengaged head group, the average birth weight is 2.89±0.22 kg, while in the control group, it is 2.81±0.23 kg. The p value for birth weight is less than 0.01, indicating statistical significance. There were 8 cases (16%) of neonatal ICU admissions in the unengaged group, compared to 2 cases (4%) in the engaged group. Apgar scores at 5 minutes were lower in the unengaged group, with 6 cases (12%) scoring below 7, compared to 1 case (2%) in the engaged group. These findings suggest that the lack of engagement can lead to increased fetal distress and suboptimal neonatal conditions at birth, necessitating additional medical support (Table 4).

Table 4: Fetal outcomes.

	Unengaged head group (n=125)	Engaged head group (n=125)	p value
Average birth weight (kgs)	2.89±0.22	2.81±0.23	<0.01
Gender			
Males	64	57	0.37
Females	61	68	
APGAR			
APGAR at 1 minute	7.69	7.58	0.21
APGAR at 5 minutes	8.65	8.52	0.15
APGAR <7 at 1 minutes	7	10	0.61
APGAR <7 at 5 minutes	0	3	0.24
Need for resuscitation	28	16	0.04
Need for ICU admission	15	12	0.54

DISCUSSION

The results of the present study align with the findings reported in the other studies. The combined percentage of normal vaginal delivery (NVD) and assisted vaginal delivery (AVD) for cases is 70%, while for controls, it is 84%. In certain studies, higher rates of NVD are observed along with increased rates of lower segment caesarean section (LSCS). Prolonged labor is often associated with increased maternal exhaustion, higher rates of intervention, and a greater likelihood of complications such as infections or postpartum hemorrhage. The extended duration of labor in the unengaged group suggests that the lack of engagement may lead to inefficient uterine contractions and poor fetal descent.

The difference in the LSCS rate between cases and controls is approximately twice, which is consistent with the findings of the other studies. These comparisons highlight the consistency of delivery outcomes across various research endeavors. The higher rate of cesarean sections in the unengaged group underscores the difficulty of achieving vaginal delivery in such cases. This finding is consistent with previous research, which has shown that the lack of engagement is a common indication for operative delivery. Cesarean sections, while often necessary, come with their own set of risks, including surgical complications, longer recovery times, and potential impacts on future pregnancies.

Our findings were consistent with those of Ian Donald, Crichton, and Flynn and Weeks, who have documented similar challenges associated with unengaged fetal heads at term. For instance, Donald's studies highlight the mechanical difficulties and increased labor interventions required in such scenarios. Crichton and Flynn and Weeks also emphasize the increased cesarean rates and neonatal complications in their research, corroborating the outcomes observed in our study.

In various other studies, Mahajan and colleagues 2016, concluded 59.33% cases having NVD and 36% underwent LSCS.[5] A study in Nigeria 2017, found 74.8% NVD and 25.2% LSCS.[6]

Pahwa et al in 2018, concluded 56% women had NVD, 8% had forceps delivery and 36% cases underwent LSCS.[7]

In 2019, Baqai et al, concluded atonic PPH occurred in 3.34%, 2% had perineal tears, 1.34% had cervical tears, and 0.67% had wound infection.[8]

The average birth weight of newborns in the unengaged group was found to be 2.89±0.22 kg, while in the engaged head group, it was 2.81±0.23 kg. The calculated p value for the difference in birth weights was less than 0.01, indicating statistical significance. It was observed that the birth weight of neonates in the unengaged head group was significantly higher than that in the engaged head group.

Roshanfekr et al in 1999 found the mean birth weight of 3.34 kgs.[9] Nigerian study in 2009, had a mean weight 3.1kgs. Dayal et al in 2014 found the mean birth weight of 2.77 kgs.[10]

The present study revealed that among the cases of unengaged head, no specific cause was identified in 59 instances. Cephalopelvic disproportion was observed in 26 cases, while 30 patients had a deflexed head contributing to the unengagement. Additionally, in 6 patients, a loop of cord around the fetus led to unengagement. Two patients had a low-lying placenta, and the remaining two had polyhydramnios as contributing factors.

Table 5: Causes of unengagement.

Cause of engagement	No.	Percent
Feto pelvic disproportion	26	20.8
Deflexed head	30	24.0
Loop of cord	6	4.8
Single loop	4	
Double loop	2	
Placenta dipping into lower segment	2	1.6
Polyhydramnios	2	1.6
No cause	59	47.2

Mahajan and colleagues in 2016 found the causes as: 28% deflexed head, 13.34% CPD, 6% loop of cord, 5.33% placenta previa type, 40% no cause found.[5]

Implications for clinical practice

The clinical implications of these findings are significant. Obstetricians and midwives need to be vigilant in monitoring primigravidae with unengaged fetal heads at term. Early identification and assessment of engagement status should be part of routine prenatal care, particularly as term approaches. For cases where engagement has not occurred, a proactive approach involving close monitoring, timely labor induction, or elective cesarean sections may be warranted to mitigate risks.

Additionally, counseling and preparing patients about the potential challenges and interventions associated with unengaged fetal heads can help manage expectations and reduce anxiety. Educating patients on the signs of labor progression and when to seek medical help is also crucial.

This study has few limitations. While this study provides valuable insights, it has several limitations. The relatively small sample size and single-center design may limit the generalizability of the findings. Future studies should aim to include larger, more diverse populations to validate these results. Additionally, the study did not account for other factors that could influence labor outcomes, such as maternal comorbidities, socioeconomic status, and variations in obstetric practices across different settings.

CONCLUSION

Primigravidae with unengaged fetal heads at term face increased risks of prolonged labor, higher cesarean sections, and adverse maternal and neonatal outcomes. Effective management, including careful monitoring and timely interventions, is crucial to improving outcomes. Future research should focus on identifying predictors of engagement and developing guidelines for managing unengaged fetal heads in labor.

Recommendations

Future research should focus on identifying predictors of fetal head engagement and developing guidelines for managing unengaged fetal heads in labor. Studies exploring the role of pelvic anatomy, fetal positioning, and maternal health in engagement can provide deeper insights into this phenomenon. Additionally, investigating the effectiveness of different management strategies, such as labor induction protocols and non-surgical interventions, can help improve outcomes for both mothers and babies.

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