ORIGINAL ARTICLE

Effect of non-engagement of the fetal head in primigravida at onset of labour on the course and success of vaginal delivery

Saged M. M. Elmazzaly, Mohamed M. Mohamed, Ahmed M. H. El-Damanhoury *

Department of Obstetrics and Gynecology, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

Abstract

Background: ***Labour is the process of delivering the fetus and placenta through regular, painful uterine contractions, causing cervical dilatation and fetal descent until delivery. Changes in the cervix and fetal position indicate labour progress.***

Aim: ***To assess the influence of non-engagement of the fetal head in primigravida at the start of labour on the course and success of vaginal delivery.***

Patients and methods: ***A cross-sectional analytical study has been carried out in the Obstetrics and Gynecology Department at El Hussein University Hospital, Al Azhar University, throughout the duration from September 2023 to July 2024. The study included 114 primigravida women at full-term gestation, who were separated into two groups: Group A (57 women) with unengaged fetal heads and Group B (57 women) with engaged fetal heads.***

Results: ***A statistically insignificant distinction was found among the studied cases concerning the first stage of labor, shape of the pelvis, mode of delivery, fetal weight, and NICU admission. However, a statistically significant difference was observed in pelvic outlet and oxytocin augmentation. Additionally, there was a greatly significant variance in Apgar 1 scores and a significant variance in Apgar 5 scores among the groups.***

Conclusion: ***With good induction of Labor there were no variance in delivery mode and result in primigravida with nonengaged fetal head. However, further studies must be performed on a large scale of cases in various races and countries.***

Keywords: Labour; Fetal head engagement; Primigravida; Vaginal delivery

1. Introduction

Labour now is easily described as the act of expulsion of the placenta and fetus to the outside world by the vagina.[1] Depending on recent knowledge, labour is marked by the beginning of regular, painful, and palpable uterine contractions that progressively elevate in intensity and frequency. This process is related to the gradual dilation of the internal cervical os and descent of the presenting part until complete dilation and vaginal delivery of the placenta and fetus with minimal bleeding and risks to both baby and mother.[2]

Alterations in cervical effacement, dilatation, consistency, position, and descent of the presenting part are essential markers for recognizing the phases of labour. As uterine contractions become more frequent, the patient may observe the fetal descent into the pelvis, a phenomenon referred to as lightening.[3]

The gradual descent of the head is evaluated abdominally through calculating the number of "fifths" of the head above the pelvic brim (Crichton). Additionally, 5/5th of the head is floating above the brim, 4/5th if the head is on the brim, and 3/5th if the head has a major part in the brim.[4]

When the widest diameter has passed the brim, the head is considered to be 2/5 palpable, indicating engagement, and both poles of the head of the fetus (i.e., occiput and sinciput) are palpable through the second pelvic grip. Internal investigations show the descent of the fetal head to the ischial spines and its positional status .[5]

In primigravidas, engagement happens in a significant number of cases about thirty-eight weeks, prior to the beginning of labour, whereas in multiparas, engagement can happen during the late 1st phase of labour with membrane rupture .[6]

Accepted 01 September 2025.
Available online 30 October 2025

* Corresponding author at: Obstetrics and Gynecology, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt.
E-mail address: ahmedeldamanhoury16@yahoo.com (A. M. H. El-Damanhoury).

https://doi.10.21608/aimj.2025.404582.2659

It is important to note that cephalopelvic disproportion must be excluded in a primigravida when the fetal head remains unengaged even during labour. Moreover, nulliparous females at term with a floating fetal head have an elevated possibility of cesarean section due to anomalous labour. Nevertheless, most cases will continue to deliver vaginally. Furthermore, primigravidas with an unengaged fetal head at term are regarded as high-risk cases .[7]

The aim of this work is to assess the influence of non-engagement of the head of the fetus in primigravida at the beginning of labour on the course and success of vaginal delivery.

2. Patients and methods

A cross-sectional analytical research has been carried out in the Obstetrics and Gynecology Department at El Hussein University Hospital, Al Azhar University, throughout the duration from September 2023 to July 2024. The study included 114 primigravida women at full-term gestation, who have been separated into 2 groups: Group A (57 women) with unengaged fetal heads and Group B (57 women) with engaged fetal heads.

Sample size: As incidence of poor APGAR score at one minute in females with unengaged Fetal Head is 25.0% and in women with engaged Fetal Head is 5.0% .[4] So, sample size is 114 (57 in each group). Sample was calculated using open epi program at CI 95w` and power 80%.

Ethical and legal consideration: Approval of the ethical committee has been attained, and written consent has been signed by all patients prior to participation in this research

Inclusion Criteria: Primigravidas at term (between thirty-seven and forty-two weeks of pregnancy) in labour, single live intrauterine pregnancy, vertex presentation, no clear cephalopelvic disproportion, and intact membrane.

Exclusion Criteria: Females with related co-morbidities such as pre-eclampsia or diabetes, those older than 35 years of age, cases with fetal anomalies, fibroids or ovarian tumors, placenta previa, preterm labor, previous uterine surgery, intrauterine growth restriction, and multiple gestation have been excluded from the research.

Methods

All patients have been subjected to detailed history taking, which included demographic data, menstrual history, parity, duration of pregnancy, history of labor pains, relevant family history, obstetric history, and past or present surgical and medical histories. Clinical investigation was performed, starting with a general investigation assessing temperature, blood pressure, respiratory rate, heart rate, cyanosis, pallor, jaundice, and lymph node enlargement. Abdominal investigation included abdominal distension, inspection for scars, striae (stretch marks), and caput medusa, followed by superficial and deep obstetric palpation, and auscultation of fetal heart sounds. Local investigation determined fetal head engagement using Crichton's method, where the fetal head has been considered unengaged if above two-fifths of the head was palpable abdominally or if both poles (occiput and sinciput) were palpable via the second pelvic grip. A per-vaginal investigation was performed to assess cervical consistency, effacement, position, dilation (in centimeters), fetal head station, and membrane status. The Muller Munro Kerr maneuver has been utilized to exclude cephalopelvic disproportion, followed by determining the diagonal conjugate. Admission cardiotocography has been recorded, and a partogram has been plotted to monitor the period and course of labor. Laboratory investigations included routine tests and ultrasound evaluation for fundal height, fetal lie, engagement, presentation, estimated fetal weight, amount of liquor, fetal heart rate, and palpable uterine contractions.

3. Results

137 patients were enrolled in our study, 23 of them were excluded (15 didn't meet our inclusion criteria and 8 declined to participate), so we were left with 114 cases involved in the research separated into 2 equal groups.

Group A: 57 primigravida with nonengaged fetal head.

Group B: 57 primigravida with engaged fetal head.

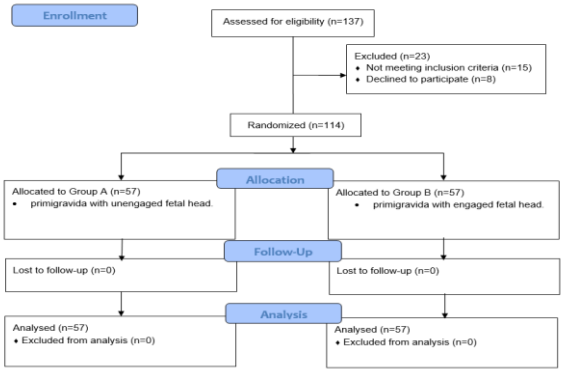

Figure 1. flowchart of the study.

A statistically insignificant distinction was found among the studied cases regarding age and gestational age, while there was a highly significant difference in BMI, as demonstrated in Table 1.

Table 1. Comparison between the examined cases based on age, BMI, and gestational age

	GROUP A (NUMBER = 57)	GROUP B (NUMBER = 57)	TEST OF SIG.	P	SIGNIFICANCE
AGE					Not significant
RANGE.	19 – 29	19 – 29	t=	0.456	
MEAN ± SD.	24 ± 2.92	23.6 ± 2.84	0.748		
BMI					Highly significant
RANGE.	24.2 – 35.6	23.7 – 31.8	t=4.198	<0.001*	
MEAN ± SD.	30.02 ± 3.26	27.82 ± 2.23			
GESTATIONAL AGE					Not significant
RANGE.	37 – 41	38 – 41	t=0.790	0.431	
MEAN ± SD.	39.37 ± 1.17	39.53 ± 0.95			

A statistically insignificant distinction was found among the examined cases regarding 1st Stage Labor as shown in Table 2.

Table 2. Comparative analysis among the examined cases based on 1st Stage Labor

	GROUP A (NUMBER = 57)		GROUP B (NUMBER = 57)		TEST OF SIG.	P	SIGNIFICANCE
1ST STAGE LABOR	No.	%	No.	%			Not significant
1-6 H	41	71.9	43	75.4	χ^2= 0.181	0.671	
6-12 H	16	28.1	14	24.6			

Data presents as frequency (%) unless otherwise mentioned.

A statistically significant distinction was found among the studied cases as regard pelvic outlet but was not statistically significant as regard shape of the pelvis as shown in Table 3.

Table 3. Comparative analysis among the examined cases based on pelvic data

	GROUP A (NUMBER = 57)		GROUP B (NUMBER = 57)		TEST OF SIG.	P	SIGNIFICANCE
SHAPE OF PELVIS	No.	%	No.	%			Not significant
ANDROID	5	8.8	2	3.5	χ^2= 1.370	0.242	
GYNECOID	52	91.2	55	96.5			
PELVIC OUTLET							Significant
ADEQUATE	47	82.5	54	94.7	χ^2= 4.254	0.039*	
BORDERLINE	10	17.5	3	5.3			

A statistically significant distinction was found among the studied cases as regard oxytocin augmentation as shown in Table 4

Table 4. Comparative analysis among the examined cases based on oxytocin augmentation.

	GROUP A (NUMBER = 57)		GROUP B (NUMBER = 57)		X^2	P	SIGNIFICANCE
	No.	%	No.	%			
OXYTOCIN AUGMENTATION	51	89.5	43	75.4	3.881	0.049*	Significant

A statistically insignificant distinction was found among the studied cases as regard mode of delivery as shown in Table 5.

Table 5. Comparison between the studied cases based on mode of delivery

MODE OF DELIVERY	GROUP A (NUMBER = 57)		GROUP B (NUMBER = 57)		X^2	P	SIGNIFICANCE
	No.	%	No.	%			
VAGINAL DELIVERY	46	80.7	51	89.5	1.728	0.189	Not significant
CESAREAN DELIVERY	11	19.3	6	10.5			
ARREST OF PROGRESS	1	9.1	2	33.3	2.404	0.301	Not significant
FETAL DISTRESS	8	72.7	4	66.7			
OBSTRUCTED LABOUR	2	18.2	0	0.0			

A statistically insignificant distinction was found among the studied cases as regard fetal weight as shown in Table 6.

Table 6: Comparative analysis among the examined cases based on fetal weight

	GROUP A (NUMBER = 57)	GROUP B (NUMBER = 57)	TEST OF SIG.	P	SIGNIFICANCE
ESTIMATED FETAL WEIGHT (KG.)					Not significant
RANGE.	2.6 – 3.5	2.7 – 3.5	t=0.578	0.564	
MEAN ± SD.	3.05 ± 0.25	3.07 ± 0.24			
ACTUAL FETAL WEIGHT (KG.)					Not significant
RANGE.	2.3 – 3.8	2.5 – 3.8	t=0.980	0.329	
MEAN ± SD.	3.12 ± 0.36	3.18 ± 0.35			

SD: Standard deviation.

A statistically highly significant distinction was found among the studied cases as regard Apgar 1 score and statistically significant as regard Apgar 5 score as shown in Table 7 .

Table 7. Comparative analysis among the examined cases based on Apgar score

	GROUP A (NUMBER = 57)	GROUP B (NUMBER = 57)	TEST OF SIG.	P	SIGNIFICANCE
APGAR 1					Highly significant
RANGE.	3 – 9	4 – 10	t= 4.377	<0.001*	
MEAN ± SD.	6.21 ± 1.81	7.68 ± 1.78			
APGAR 5					Significant
RANGE.	4 – 10	6 – 10	t= 3.015	0.003*	
MEAN ± SD.	8.12 ± 1.75	9.02 ± 1.4			

A statistically insignificant distinction was found among the studied cases as regard NICU admission as demonstrated in Table 8.

Table 8. Comparative analysis among the examined cases based on NICU admission.

NICU ADMISSION	GROUP A (NUMBER = 57)		GROUP B (NUMBER = 57)		X^2	P	SIGNIFICANCE
	No.	%	No.	%			
NO	44	77.2	51	89.5	3.095	0.079	Not significant
YES	13	22.8	6	10.5			

4. Discussion

In our study, a statistically insignificant distinction was found between age and gestational age among the examined cases.

In the study of Salim et al.,[8] 248 primigravidae have been examined, separated into control and case groups, each contain 124 primigravidae. Concerning demographic outcomes like parity, age, gestational age, there is no variances which

is like our information. However, they found significant variance in BMI.

In our study, a statistically significant distinction regarding BMI was found among the examined cases.

El-Desouky et al.[9] found the BMI of cases varied from 20.7 to 38.28 with a mean value of BMI of 27.96± 3.066. The research indicated that most females were classified as obese, with a mean BMI of 33.2± 2.38.

In our study, a statistically insignificant distinction was found among the studied cases regarding the 1st Stage of Labor.

However, Chaudhary et al.[10] found that group had significantly longer first (p-value equal to 0.0001) and second phase (p-value equal to 0.004) of labour.

In this current work, a statistically significant distinction was found among the examined cases in the pelvic outlet.

El-Desouky et al.[9] found that 88.4 percent (221/250) of the women have a gynecoid pelvis, whereas 11.6 percent (29/250) have an android pelvis. Also, 80.4 percent (201/250) of their women have a suitable pelvic outlet, whereas 19.6 percent (49/250) have a borderline pelvic outlet. A strong positive association was observed between the gynecoid pelvis and the head station and engagement. A suitable pelvic outlet is related to a lower fetal head station, whereas a borderline pelvic outlet is related to a higher fetal head station. A strong positive association was observed between the head station and engagement and a suitable pelvic outlet. Moreover, a positive association was observed between the suitability of the pelvic outlet and the rate of maternal complications concerning maternal outcomes.

In this current work, a statistically significant distinction regarding oxytocin augmentation was found among the examined cases.

Comparable outcomes have been observed in other investigations such as Iqbal et al.[11] in which 72 (seventy-two percent) cases in unengaged group needed augmentation in comparison with 33 (thirty-three percent) cases in engaged group. In the research by Shaikh et al.[12] 74 (seventy-four percent) of cases with unengaged heads needing labour augmentation.

In this current work, a statistically insignificant distinction was found among the studied cases with regard to mode of delivery.

In agreement with our study, Salim et al.[8] found there is insignificant variance in the mode of delivery; in the case group, there were 77.4 percent vaginal deliveries, 9.7 percent forceps deliveries, and 12.9 percent emergency cesarean deliveries, while the control group was 83.9 percent, 6.5 percent, and 9.7 percent correspondingly. Malik et al.[13] observed that forty-two percent of deliveries were vaginal, which is very low when compared to their research, which might be clarified through liberal utilization of oxytocin in their research.

Furthermore, among a hundred cases in the unengaged group, 53 (fifty-three percent) underwent spontaneous vaginal delivery, 10 (ten percent) had instrumental delivery, and 37 (thirty-seven percent) had lower segment cesarean section in comparison with the engaged group, 70 (seventy percent), 7 (seven percent), and 23 (twenty-three percent) correspondingly .[14] Also, Iqbal et al.[11] demonstrated that the frequency of lower segment cesarean section was 38 (thirty-eight percent) in the unengaged group in comparison with 15 (fifteen percent) in the engaged group.

In our study, a statistically insignificant distinction regarding fetal weight was found among the examined cases.

In the same context, Bhadra & Sonawane[14] reported that mean birth weight in the unengaged group was 2.86 kilograms in comparison with 2.76 kilograms in the engaged group.

In our study, a statistically significant distinction regarding the Apgar score was found among the examined cases.

Similarly, in the study of Chaudhary et al.,[10] cases with unengaged fetal head had significantly reduced APGAR scores at one (p-value below 0.002) and five minutes (0.003).

In this current work, a statistically insignificant distinction was found among the examined cases regarding NICU admission.

Similar to us, Bhadra & Sonawane[14] found a statistically insignificant distinction between the two groups regarding NICU admission, as NICU stay 11 (11%) in Unengaged and 18 (18%) in engaged group with p value 0.228.

Recommendations: Additional investigations on large geographical scale and on larger sample size and longer period of follow up to emphasize our conclusion. Further studies with a large number from different centers will be necessary aiming to assess the influence of non-engagement of the head of the fetus in primigravida at beginning of labour on the course and success of vaginal delivery.

4. Conclusion

With good induction of Labor, there were no variations in the mode of delivery, resulting in a primigravida with a nonengaged fetal head. However, further studies must be performed on a large scale of cases in various races and countries.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

Funding

No Funds : Yes

Conflicts of interest

There are no conflicts of interest.

References

1. Omar AZ, El Ashmawy AE, Nasr AA. Clinical Audit of Normal Labour at Nekhel Central Hospital of North Sinai Governorate. The Egyptian Journal of Hospital Medicine. 2021 Jul 1;84(1):2636-44.
2. Chukwudi OE, Orhue AA, Ande AB. Redefining Active Phase Labour: A Randomized Controlled Study of Nulliparae at Term. European Journal of Research in Medical Sciences Vol. 2018;6(1).
3. Agarwal P, Shetty S. Clinical study of primigravida with unengaged head in labour at term. International Journal of Women's Health and Reproduction Sciences. 2021 Apr;9(2):100-4.
4. Hussain S, Qurban S, Tahseen H, Javed K, Khurshid HN. Maternal Outcome of Primigravida Patient with Term Pregnancy with Engaged Versus Unengaged Foetal Head at Onset of Labour. Pakistan Journal of Medical & Health Sciences. 2022 Apr 27;16(03):787-.
5. Desurmont S, Houzé de l'Aulnoit A, Brabant G, Houzé de l'Aulnoit D. Assessment of fetal head engagement with transperineal ultrasound: Searching for the cutoff level. J Gynecol Obstet Hum Reprod. 2018;47(7):317-324.
6. Sinha S, Talaulikar VS, Arulkumaran S. Malpositions and malpresentations of the fetal head. Obstetrics, Gynaecology & Reproductive Medicine. 2018 Mar 1;28(3):83-91.
7. Banu DS, Sultana R, Khatun M, Khanam S, Chowdhury F, Nazneen S, et al. Maternal Outcome of among the Primigravida Women Presented with Fetal Head Engagement: Experience of 1440 Cases in Bangladesh. Journal of Science Foundation. 2018; 16(2): 34-7.
8. Salim NA, Satti I, Mahmoud AO. Unengaged head in primigravidae, mode of delivery and outcome (a case-control study) in Dongola-Sudan (2019). J Family Med Prim Care. 2021;10(3):1254-1257.
9. El-Desouky ES, Farag ES, Mohamed A. Fetal outcome and vaginal delivery rates among primigravidae with unengaged head at onset of labor. Al-Azhar Medical Journal. 2021 Jul 1;50(3):1707-22.
10. Chaudhary S, Farrukh R, Dar A, Humayun S. Outcome of labour in nullipara at term with unengaged vertex. J Ayub Med Coll Abbottabad. 2009;21(3):131-134.
11. Iqbal S, Sumaira S. Outcome of primigravidae with unengaged versus engaged fetal head at term or onset of labour. Biomedica. 2009 Jul;25(1):159-62.
12. Shaikh F, Shaikh S, Shaikh N. Outcome of primigravida with high head at term. J Pak Med Assoc. 2014;64(9):1012-1014.
13. Malik S, Asif U, Asif M. Primigravida: obstetrical outcome; with engaged versus unengaged fetal head with spontaneous onset of labour at term. The Professional Medical Journal. 2016 Feb 10;23(02):171-5.
14. Bhadra DM, Sonawane PK. Comparative study between unengaged and engaged fetal head in primigravida at term or in labour. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2018 Nov 1;7(11):4569-75.