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Fetal occiput-spine angle during the first stage of labour for predictor of progress and outcome of labour at Tanta university hospital

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Abstract
Background: Labor dystocia (LD) is defined by the slow and abnormal progress of labor. Failure to progress in labor is the leading indication for 1ry cesarean delivery approximately 80% of American women will eventually have at least one child, and the majority of these women will undergo labor. "Labor dystocia" encompasses a variety of concepts, ranging from "abnormally" slow dilation of the cervix or descent of the fetus during active labor to entrapment of the fetal shoulders after delivery of the head.
Aim and objectives: to assess the relation between the fetal occiput-spine angle measured through transabdominal ultrasound during 1st stage, progress and outcome of labor.
Subjects and methods: This cross sectional study was carried out on 150 pregnant ladies. who were recruited from the labor and delivery ward at Tanta University Hospitals and Desouq general Hospital during the period of research from August 2021 to August 2022.
Result: As regard cut off value of angle to predict complication in predicting labour outcome either NVD or CS at an angle ≤133 the sensitivity specificity, PPV, NPV of angle to predict complication were 66.67%, 56.59%, 20%, 91.2% respectively. There was significant relation between angle ≤126 or >126 regarding Cervix position, Head station, Mode of delivery, Fetal and maternal complications**.**
Conclusion: Occiput –spinal angle is a good predictor of operative delivery. Fetuses with a smaller occiput-spine angle (<126°) have a higher risk of cesarean delivery. We also found that the best OSA is 133 and below this angle the complication increased.

Keywords: Fetal occiput, spine angle, labour and Tanta university hospital

Introduction
The normal birth process is defined as the descent and eventual expulsion of the fetus with regular and painful contractions of the uterus, which occurs with the progressive dilation of the cervix. In this process, the terms "dystocia" or "non-progressive labor" are used to describe patterns of deviation from normal [1].
New opportunity to specify diagnostic criteria for labor dystocia in evidence-based, objective, prospectively useful terms is possible considering recent advances in knowledge about the progression of labor in contemporary populations. Widespread adoption of a common approach for determining labor dystocia will facilitate consistent labor progress evaluation and dystocia diagnosis, clearly indicating when intervention(s) aimed at speeding labor progress or facilitating birth may be appropriate [2].
The American College of Obstetricians and Gynecologists (ACOG) released a DVD entitled 'Assessment of fetal head descent in labor with transperineal ultrasound,' which suggested that fetal head descent could be assessed by angle measurements of progressive head deflection [3].
The first to introduce the assessment of occiput-spine angle (OSA) in literatures in 2016 3.
Other authors have consistently shown that among women with a prolonged first stage of labor, the risk of caesarean delivery is inversely related to the depth of the fetal head level in the birth canal [4].
Intrapartum ultrasound (US) is acknowledged to support clinicians dealing with prolonged labour as well as in the case of malpositions and malpresentations, thus representing a valuable support to the conventional digital examination [5].
Several US parameters measurable either on transabdominal (TA) or on transvaginal

(TV) have been suggested to potentially complement clinical practice. Among these is the occiput-spine angle (OSA), which has been described as a quantitative indicator of the degree of fetal head flection during the descent through the birth canal in the first stage of labour in fetuses lying in occiput anterior (OA) or occiput transverse (OT) position [6]. the aim of this study is to assess the relation between the fetal occiput-spine angle measured through trans abdominal ultrasound during the first stage of labor and the progress and outcome of labor.

Patients and Methods

This cross sectional study was carried out on 150 pregnant ladies who were recruited from the labor and delivery ward at Tanta University Hospitals and Desouq general Hospital during the period of research from August 2021 to August 2022.

Patients were selected according to inclusion criteria which included

(a) Age between 18 and 35 years old.
(b) Full term pregnancy (37 to 42 full menstrual weeks).
(c) Singleton pregnancy and Cephalic vertex presentation only occiput anterior or occiput transvers.
(d) All women were admitted during the active phase of labor (defined as achievement of 4 cm cervical dilatation of more in the presence of uterine contraction 156.
(e) Spontaneous or induced labor.
(f) Intact membranes.

Exclusion criteria which included

(a) Abnormal presentations and positions including occipito-posterior.
(b) Complicated pregnancies as diabetes mellitus, preeclampsia, and eclampsia, Congenital fetal malformations can leads to dystocia as hydrocephalus.
(c) Maternal spine and/or pelvic disease and/or fractures.
(d) Abnormalities of the placenta.
(e) The presence of any maternal or fetal indications of CS and BMI >30 (difficult imaging due to obesity).

Methods

The eligible subjects included in this study were subjected to the following

Ultrasonographic examination

Measurement of the fetal occiput-spine angle

A sagittal plane showing both the fetal head and spine was obtained.

The angle between two tangential lines to occipital bone and the vertebral body of the first cervical spine was measured three times and the mean was taken.

(occiput-spine angle) was performed to determine the degree of flexion of the fetal head relative to the trunk. This measurement shown in Figure 1.

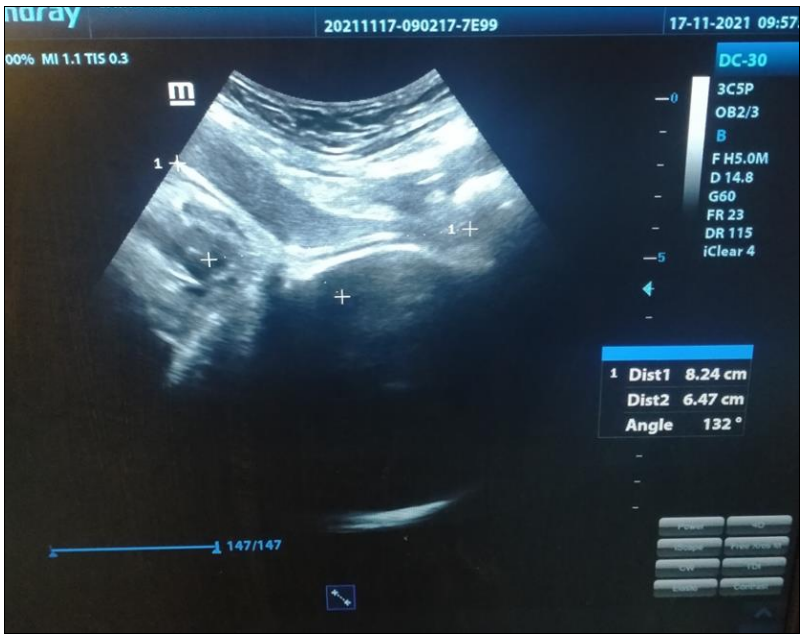

Fig 1: The ultrasonic measurement

Labor progress evaluation

Non-progress of labor was defined according to WHO modified partograph with the following criteria 158: Protracted active phase (dilatation line crossing alert line and nearing the action line), Secondary arrest of cervical dilatation, Secondary arrest of descent and Prolonged second stage

Outcome of the study

The primary outcome parameter was correlation between occiput-spine angle and success of vaginal delivery

Secondary outcomes included the mode of delivery, occurrence of maternal and fetal complications.

Statistical analysis

SPSS statistics for windows (Statistical Package for the Social Sciences) version 26 (IBM, Armonk, NY, USA) was used for statistical analysis of the collected data. Shapiro-Wilk test was used to check the normality of the data distribution. All tests were conducted with 95% confidence interval. P (probability) value < 0.05 was considered statistically significant. Quantitative variables were expressed as mean and standard deviation while categorical variables were expressed as frequency and percentage. One-way ANOVA with Bonferroni post hoc analysis and Kruskal Wallis with Dunn's post hoc analysis tests were used for inter-group comparison of parametric and non-parametric continuous data respectively. Categorical Group differences with Fisher exact and Chi square tests were used for inter-group comparison of nominal data. Bivariate Correlations were assessed using Pearson's or Spearman's correlation coefficient depending on the nature of data. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV).

Results

150 parturient women where included in this study, the demographic data of enrolled patients was demonstrated in (table 1),

As shown that 150 cases were included with mean age 30.33 and 84% of cases aged>20 years and 16.0% aged ≤20. Also, 62% of cases were multigravida 38% primigravida and with mean gravidity was 2.93, regarding parity 46% were multipara, 38% were nullipara and 16% primary para with mean parity was 1.69 Mean gestational age was 38.55 weeks

Table 1: Demographic data of the studied cases

Age (Years)	No.	%
≤20	24	16.0
>20	126	84.0
Min. - Max.	18.0-35.0	
Mean ± SD.	30.33±2.49	
Gravidity		
Primi	57	38.0
Multi	93	62.0
Min. - Max.	1.0-5.0	
Mean ± SD.	2.93±1.82	
Parity		
Null para	57	38.0
Primi	24	16.0
Multi	69	46.0
Min. - Max.	0.0-4.0	
Mean ± SD.	1.69±1.63	
Gestational age		
Min. - Max.	37.0-40.0	
Mean ± SD.	38.55±1.01	

Assessment of labor by Bishop score and Labour progress in the parturient shown in (Table 2) As regard mean cervical dilatation was 5.16 and mean effacement was 60.93 As regard cervix position 53.3% of cases were mid, 38.7% were anterior and 8% were posterior. Head station was mainly at 0 in 84% of cases 8% were -1.00 and 8.0% were 1.0

Mean fetal heart rate was 139.45 b/m, mean duration of labour was 5.86 hours. As regard mean angle was 137.29, Spontaneous labour in all cases, 8% cases delivered by CS and 92% by NVD

Table 2: Assessment of labor by Bishop Score and Labour progress

	Min. - Max.	Mean ±SD.
Cervical dilatation	4.0-7.0	5.16± 0.88
Effacement	40.0-80.0	60.93±13.23
Cervix position	No.	%
Ant	58	38.7
Post	12	8.0
Mid	80	53.3
Head station		
-1.00	12	8.0
0	126	84.0
1.00	12	8.0
FHR	110.0-160.0	139.45±4.05
Angle	105.0-150.0	137.29 ± 8.53
Labour duration (n= 138)	3.0-11.0	5.86±2.07
	No.	%
Type of Labour (Spontaneous)	150	100
Mode of delivery	No.	%
Normal Vaginal Delivery	138	92.0
Caesarean section	12	8.0

The reported complications during our study were maternal as Tear in birth canal happened in 7 (36.8%) cases and Abnormal uterine action in 12 (63.2%) cases. Also fetal complications as the weight of the newborns ranged from 2.8-3.7 kg, with a mean of 3.1±0.4 kg. The Apgar score at 1 minute ranged from 5.0-10.0, with a mean of 7.2±0.8, and at 5 minutes ranged from 7.0-10.0, with a mean of 8.1±1.4.

Regarding to occiputs- spine angle we found that cut off value of angle in predicting labour outcome either NVD or CS at an angle ≤126 the sensitivity specificity, PPV, NPV of angle to predict Cs form NVD were 100%, 95.65%,66.7%,100% respectively

As regard cut off value of angle to predict complication in predicting labour outcome either NVD or CS at an angle ≤133 the sensitivity specificity, PPV, NPV of angle to predict complication were 66.67%, 56.59%, 20%, 91.2% respectively (Table 3).

Table 3: Prognostic performance for angle to predict success of NVD and complication

	AUC	P	95% C.I	Cut off	Sensitivity	Specificity	PPV	NPV
Angle and NVD	0.976	<0.001*	0.954-0.999	≤126	100.0	95.65	66.7	100.0
Angle and Complication	0.662	0.017*	0.500-0.824	≤133	66.67	56.59	20.0	91.2

AUC: Area Under a Curve p value: Probability value
CI: Confidence Intervals
PPV: Positive predictive value NPV: Negative predictive value
*: Statistically significant at $p \leq 0.05$

Discussion

The use of transabdominal ultrasound to measure fetal occiput-spine angle during the first stage of labor can predict the progress and outcome of labor in cases of minor degrees of head deflexion [7].

The current study was in line with Ghi *et al*., who aimed to quantify the degree of fetal head deflection via the use of sonography during the first stage of labor; and to determine whether a parameter derived from ultrasound examination (the occiput-spine angle) has a relationship with the course and outcome of labor. The study enrolled 108 pregnant women. The occiput-spine angle was significantly narrower in women who underwent obstetric intervention (cesarean or vacuum delivery) due to labor arrest (121° ± 10.5° vs 127° ± 9.4°, P =.03). Multivariable logistic regression analysis showed that narrow occiput-spine angle values (OR 1.08; 95% CI 1.00−1.16; P =.04) and nulliparity (OR 16.06; 95% CI 1.71−150.65; P =.02) were independent risk factors for operative delivery [8].

The present study was supported by AbdElfattah *et al*., who aimed to measure the degree of deflection of the head of the fetus during the first labor stage by the use of ultrasound. To determine whether an ultrasound-derived parameter (the occiput-spine angle) has a relation to the course and the result of the labor. The study enrolled 200 women aged 18-35 years, the study found that the cutoff value of Occiput-spine angle for safe vaginal delivery was 126. There was highly statistically significant difference between OSA<126 and 126 or more according to labor progress [9].

Also, in agreement with the present study Maged *et al*., aimed to assess the effect of the fetal occiput-spine angle (OSA) measured through transabdominal ultrasound during the first stage of labor on the progress and outcome of labor. The study enrolled 400 women with term uncomplicated singleton pregnancy. ROC analysis of the findings detected an excellent sensitivity (82%) and a good specificity (64%) of OSA at cut off value of 126o in detection of mode of delivery [10].

As well, Mughal *et al*., aimed to determine the effect of the occipital spinal angle measured through transabdominal ultrasound during the first stage of labour on the labour outcome. The study included 380 low-risk pregnant women in the first active stage of labour. The best cut of the point is 125.5 for operative delivery where sensitivity is 92.3% and specificity 98.1% [11].

In addition, Salman *et al*., aimed to assess the accuracy of the fetal occiput-spine angle measured through transabdominal ultrasound during the first stage of labor on the prediction of progress and outcome of labor. The study enrolled 65 women. Occiput-spinal angle ≤118.0º

had high diagnostic characteristics in predicting CS delivery, sensitivity (90.9%), specificity (83.9%), positive predictive value (52.6%), and negative predictive value (97.9%). The diagnostic odds ratio was (52.22) with a confidence interval of (95%) [12].

Our results were supported by Sujatha, aimed to quantify the extent of deflexion of the fetal head by measuring the fetal occiput spine angle (OSA) through transabdominal ultrasonography in the first stage of labour and to determine whether the fetal OSA can predict the mode of delivery. The study enrolled 145 nulliparous uncomplicated singleton pregnant women. The area under the ROC curve for the prediction of vaginal delivery was 0.798 (p<0.001). A cut-off value of 121° derived from the ROC curve was tested for its ability to differentiate between vaginal delivery and cesarean delivery in nulliparous women. This value had a sensitivity of 80.5%, a specificity of 87.5%, a positive predictive value of 94.7%, and a negative predictive value of 54.53% in predicting vaginal delivery in full-term nulliparous women [13].

However, in contrast Mukdee *et al*., aimed to determine the accuracy of occiput-spine angle (OSA) measurement during the first stage of labor for predicting the course and outcome of labor. The study enrolled 330 cases, and reported that There was no significant difference in mean OSA among the vaginal delivery and cesarean section groups (110.7 ± 11.1 degrees vs 110 ± 9.1 degrees, p = 0.649). The sensitivity of an OSA ≥ 100 degrees for predicting vaginal delivery was 83.7%, but its specificity was only 17.1%.These could be explained by the possibility that the CPD in this group may not have been caused by fetal head deflexion or different criteria for CPD diagnosis. Moreover, pelvic shapes and sizes differ with ethnicity [14].

As regard prognostic performance for angle to predict complication, the present study showed that cut off value of angle to predict complication at an angle ≤133 the sensitivity specificity, PPV, NPV of angle to predict complication were 66.67%, 56.59%, 20%, 91.2% respectively [15].

This can be supported by AbdElfattah *et al*., who reported that there was highly statistically significant difference between OSA<126 and 126 or more according to fetal complications, maternal complications, Overall complications, complication Type 7 [16].

The present study showed that 62% of cases were multigravida 38% primigravida and with mean gravidity was 2.93, regarding parity 46% were multipara, 38% were nullipara and 16% primary para with mean parity was 1.69. As regard mean cervical dilatation was 5.16 and mean effacement was 60.93 [17].

There was significant relation between angle ≤126 or >126 regarding gravidity, parity and gestational age, but there was no significant relation was found as regard maternal age, cervical diltation and effacement.

There was significant relation between angle ≤126 or >126 regarding Cervix position, Head station, Mode of delivery, Fetal and maternal complications, but there was no significant relation was found as regard FHR [18].

Furthermore, Salman *et al*., reported that the gestational age and OSA had a significant correlation with the mode of delivery, as it was lower among cases who underwent cesarean delivery, the P value (0.028) and < 0.001 respectively [19].

Sujatha, showed that in terms of fetal head station, they found that the lower the fetal head station, the greater was the OSA, which meant an increased possibility of vaginal delivery [20].

in fact, a significant association was noted between the fetal head station and the OSA. This finding is consistent with those of previous studies, which indicate a risk of cesarean delivery with higher fetal station in nulliparas [21].

Conclusions

Occiput –spinal angle is a good predictor of operative delivery. Fetuses with a smaller occiput-spine angle (<126°) have a higher risk of cesarean delivery. We also found that the best OSA is 133 and below this angle there is increase the incidence of maternal and fetal complication. We recommend reporting this sonographic index at routine ultrasound bookings during labor so that patient is managed accordingly. Further, more large-scale studies are necessary to confirm our findings in order to ensure widespread applicability of our finding.

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Conflict of Interest
Nil

References

1. Bulut AN, Ceyhan V. Evaluation of the labour process with serial transperineal ultrasonography and prediction of the type of birth. Journal of Perinatal Medicine. 2021;49(1):36-42.
2. Abd Elfattah AM, Gebril MM, Taha WS. Measurement of the Fetal Occiput-Spine Angle during the First Stage of Labor as Predictor of the Outcome of Labor. Al-Azhar International Medical Journal. 2020;1(9):219-23.
3. Blasi I, D'Amico R, Fenu V, Volpe A, Fuchs I, Henrich W, *et al*. Sonographic assessment of fetal spine and head position during the first and second stages of labor for the diagnosis of persistent occiput posterior position: a pilot study. Ultrasound Obstet Gynecol. 2010;35:210–215. [PubMed] [Google Scholar]
4. Fahmy MM, Elhalaby AEF, Hamza HA, Elnasr IS, Elshaikh NMT. Role of intrapartum transperineal ultrasound in predicting mode of delivery in primigravida women. Menoufia Medical Journal. 2020;33(2):474.
5. Ghi T, Bellussi F, Azzarone C, Krsmanovic J, Franchi L, Youssef A, *et al*. The occiput–spine angle: a new sonographic index of fetal head deflexion during the first stage of labor. American journal of obstetrics and gynecology. 2016;215(1):84-e1.
6. Maged AM, Soliman EM, Abdellatif AA, Nabil M, Said OI, Mohesen MN, *et al*. Measurement of the fetal occiput-spine angle during the first stage of labor as predictor of the progress and outcome of labor. The Journal of Maternal-Fetal & Neonatal Medicine. 2019;32(14):2332-7.
7. Gardosi J, Francis A, Turner S, Williams M. Customized growth charts: rationale, validation and clinical benefits. American journal of obstetrics and gynecology. 2018;218(2):S609-S18.
8. Ghi T, Dall'Asta A, Suprani A, Aiello E, Musaro A, Bosi C, *et al*. Correlation between subpubic arch angle and mode of delivery in large-for-gestational-age fetuses. Fetal Diagnosis and Therapy. 2018;44(3):221-7.
9. Robbins J. Malpresentations and malpositions. Emergencies Around Childbirth: A Handbook for Midwives. 2011, 85.
10. Iversen JK, Jacobsen AF, Mikkelsen TF, Eggebø TM. Structured clinical examinations in labor: rekindling the craft of obstetrics. The Journal of Maternal-Fetal & Neonatal Medicine. 2021;34(12):1963-9.
11. Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS. Normal labor. In: Cunningham FG WJ, editor. William's obstetrics. 24th ed. New York, (NY): McGrawHill; c2014. p. 433-54.
12. Somu K, Sujatha BS, Hebbar S, Shyamala G, Pai MV. Sonographic assessment of fetal head deflexion using occiput: spine angle measured during first stage of labour and its role in predicting the mode of delivery among nulliparous women. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2019;8(8):3025-31.
13. Ali J, Hebbar S. Ultrasound assessment of foetal Head–Perineum distance prior to induction of labour as a predictor of successful vaginal delivery. The Journal of Obstetrics and Gynecology of India. 2019;69(2):129-35.
14. Ghi T, Maroni E, Youssef A, Cariello L, Salsi G, Arcangeli T, *et al*. Intrapartum three-dimensional ultrasonographic imaging of face presentations: report of two cases. Ultrasound in obstetrics & gynecology. 2012;40(1):117-8.
15. Akmal S, Kametas N, Tsoi E, Hargreaves C, Nicolaides KH. Comparison of transvaginal digital examination with intrapartum sonography to determine fetal head position before instrumental delivery. Ultrasound in Obstetrics and Gynecology: The Official Journal of the International Society of Ultrasound in Obstetrics and Gynecology. 2003;21(5):437-40.
16. Mughal HH, Naqvi S, Raja R, Bhatti HW, Gohar K, Ali W. Role of Occiput Spinal Angle-A Novel Sonographic Index to predict the

outcome of labour. Journal of Rawalpindi Medical College. 2021;25(3):360-5.
17. Salman MMA, Amer MIM, Almatloob HKM, Maaty AM. Measurement of the Fetal Occiput-Spine Angle during The First Stage of Labor as A Predictor of The Progress and Outcome of Labor. The Egyptian Journal of Hospital Medicine. 2022;88(1):2297-303.
18. Gamal Abd El-Nasser N, Mohamed Abd El-Azem Mira I, Sedek AE-H, El-Monsef A. Measurement of fetal occiput-spine angle during the first stage of labor in primigravida as a predictor of the mode of labor. Al-Azhar Medical Journal. 2021;50(4):2655-66.
19. Fathy HM, El-Din AMB, Mohammed HF, Helmy MMM. The 'occiput-spine angle': A new sonographic index of fetal head deflexion during first stage of labor as predictor of course of labor and outcome. QJM: An International Journal of Medicine. 2021;114(1):115-025.
20. 20.Mukdee C, Suntharasaj T, Petpichetchian C. Prediction of Successful Normal Vaginal Delivery by Ultrasonographic Measurement of Occiput-spine Angle during First Stage of Labor. Thai Journal of Obstetrics and Gynaecology; 2021. p. 288-97.
21. Kamel R, Youssef A. How reliable is fetal occiput and spine position assessment prior to induction of labor? Ultrasound in Obstetrics & Gynecology. 2019;53(4):535-40.

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