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## Intrapartum sonographic assessment of fetal head position and descent of fetal head in prediction of labor outcome

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### Abstract

**Objective:** To predict the progress and outcome of labor by assessing fetal head position and descent of fetal head by intrapartum ultrasound.

**Study design:** Prospective observational study.

**Method:** Ninety two primigravida with singleton term gestation in active labor with vertex presentation and intact membrane were recruited in the study. Intrapartum ultrasonographic evaluation was done to assess fetal head position and descent of fetal head.

**Result:** Women with occipito anterior fetal head position and angle of progression (AOP) >120 degree were more likely to have successful vaginal delivery. It was also found that larger the AOP, lesser was the mean time to delivery interval.

**Conclusion:** Intrapartum ultrasonographic assessment of fetal head position and descent of fetal head is a predictor of mode of delivery and labor out-come.

**Keywords:** Intrapartum ultrasonography, fetal head position, fetal head descent, angle of progression

### Introduction

Ultrasound is an essential tool in contemporary obstetrics. Introduction of ultrasound in obstetrics done by Ian Donald in 1950s, is now regarded as one of the major milestone of modern obstetrics.

Ultrasound has been used as an investigational tool in antenatal period for assessment of gestational age, fetal viability, detection of multiple pregnancy, placental localization, diagnosis of intrauterine growth retardation and fetal abnormalities <sup>[1]</sup>. Later, it was used for direct observation of fetal biophysical behavior and thus helped in early decision for termination of pregnancy and reduction of fetomaternal morbidity.

Intrapartum ultrasonography is a newer modality, considered as an accurate tool in assessment of different parameters of labor like fetal head position, fetal head descent and molding of head <sup>[2]</sup>. Thus helped in decision making for caesarean section and instrumental deliveries. Hence reduces the morbidity, improves safety and optimizes utilization of resources <sup>[3]</sup>. The present study is a prospective observational study conducted to predict labor outcome using Intrapartum sonography.

### Materials and Method

In this prospective observational study 92 primigravida with term singleton pregnancy in active labor with vertex presentation and intact membrane were recruited after informed consent. All recruited women were subjected to detailed history, general physical examination and per vaginal examination. Bishop scoring was done in all women.

Transabdominal ultrasound was done to assess fetal biometry, amniotic fluid index and fetal head position. The landmarks used for fetal head position were orbit for occipito posterior position, midline cerebral echo for occipito transverse position and cerebellum for occipito anterior position. Translabial ultrasound was done to assess the descent of fetal head as measured by AOP – the angle between two lines, one line placed through the midline of pubic symphysis and other line running from the inferior apex of symphysis pubis tangentially to the most anterior part of the fetal skull.

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Primary outcome of the study was mode of delivery-vaginal/operative. Secondary outcome of the study was ultrasonographic evaluation to delivery interval and neonatal outcome. Statistical analysis was done using Fischer test, ANOVA and kappa test to compare qualitative data with the help of SSPS version 20. Unpaired t-test was used to compare quantitative data.

### Result

A total of 92 primigravida with singleton term pregnancy in active labor were recruited. On analyzing the factors that might influence the primary outcome it was found that maternal age, BMI, period of gestation, estimated fetal weight and AFI had no significant effect on mode of delivery. All women enrolled in this study had favorable Bishop score (5-9). Bishop score was used to assess success of induction and outcome of labor. It was found that induced labor had more chances of operative delivery and caesarean section.

In this study, it was found that digital pelvic examination for assessment of fetal head position was less accurate. It failed to identify fetal head position in 33% and in remaining 67% of patients, only 50.7% of fetal head position matched with intrapartum ultrasonographic finding. The fetal head position as assessed in intrapartum ultrasonography was occipito anterior in 76%, occipito posterior in 21.14% and occipito transverse in 2.86% of patients.

In the present study 70.18% of patient had normal vaginal delivery, 16% had caesarean section and 13.82% had operative vaginal delivery. In patients undergoing caesarean section, fetal head position was occipito posterior in 54%, occipito transverse in 33.5% and occipito anterior in 12.5%. In patients having operative vaginal delivery, fetal head position was occipito posterior in 62.5% and occipito anterior in 37.5%.

Fetal head descent as measured by angle of progression in second stage of labor had significant effect on primary outcome. 96% of patient with AOP > 120 degree had normal vaginal delivery. 2.9% had caesarean section and 1.1% had operative vaginal delivery. It was also found that larger the AOP lesser was the mean time to delivery interval.

### Discussion

Intrapartum sonographic assessment of fetal head position and fetal head descent is a predictor of mode of delivery and mean time to delivery interval. Patient's age, BMI, period of gestation, estimated fetal weight and AFI had no significant effect on mode of delivery. The reason for this could be that most of the patients were between 18-30 years of age with BMI between 19-25 kg/m<sup>2</sup>. Also women with cephalopelvic disproportion were excluded. The results were similar to studies by Goldmen *et al.*<sup>[4]</sup> and Aaron *et al.*<sup>[5]</sup>.

The mean AFI among patients in this study was  $8.96 \pm 2.11$  cm. Hence AFI had no effect on mode of delivery. However studies by Joan *et al.*<sup>[6]</sup> found that AFI less than 5cm was associated with increased risk of caesarean delivery.

Digital pelvic examination failed to determine fetal head position in 33% of patients. This was in congruence with studies by Akmal *et al.*<sup>[7-10]</sup> and Souka *et al.*<sup>[11]</sup> who found digital pelvic examination to be less accurate over intrapartum ultrasonographic findings.

In our study 70.18% of patients had normal vaginal delivery, 16% had caesarean delivery and 13.82% had operative vaginal delivery. The main indication of operative delivery in this study was fetal head malposition. This was similar to studies by Akmal *et al.*<sup>[7-10]</sup>.

Fetal head descent as measured by AOP in second stage of labor had significant effect on mode of delivery. This was similar to studies by Barbera *et al.*<sup>[12-15]</sup> and Kalache *et al.*<sup>[16]</sup> who concluded that larger the AOP higher was the chances of normal vaginal delivery and lesser was the mean time to delivery interval.

The strength of the present study is that it is a prospective observational study. Statistically also, it is a sound study as the sample size taken is adequate.

### Conclusion

Intrapartum ultrasonographic assessment of fetal head position and angle of progression is a better predictor of mode of delivery. It may be used as an accurate tool in guiding clinicians regarding operative delivery.

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