

Intrapartum Ultrasound – Our First Experience

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Introduction. Patients in active labor are clinically assessed to determine the progress of labor by regular digital vaginal examinations. Digital vaginal examinations have been deemed unreliable and subjective, are shown to be associated with infection ascending to the fetus, chorioamnionitis, endometritis and shortened time interval to delivery in preterm labor. It is extremely clinically important to detect the fetal head station before operative vaginal delivery OVD, because failed OVD associates with increased perinatal morbidity. Transperineal ultrasound has been used to detect the descent of the fetal head using head perineal distance HPD and angle of progression AOP. These parameters are objective evaluations of fetal head station and are shown to have low intra- and interoperator variability.

Aim, Materials and Methods. The aim of this study is to assess the value of HPD and AOP in predicting the mode of delivery when measured in the first stage of labor.

A prospective cohort study was performed in Riga Maternity Hospital in Latvia from May till August 2016. The study was approved by the Stradins Council of Ethics, and included only nulliparous women with singleton pregnancies, cephalic presentation and normal Body mass index (BMI). Written informed consent was obtained from all participants prior to enrolment. Transperineal ultrasound was used to measure HPD and AOP. The examination was conducted with a Philips VISIQ ultrasound system. The ultrasound transducer was covered with gel and a sterile glove, and pressed firmly to the labia majora when obtaining the measurements. The predictive values of the ultrasound measurements were derived with cross-table analysis and receiver-operating characteristic curves computing the area under the curve (AUC) as a discriminator. The AUC was considered to have discriminatory potential if the lower limit of the 95% CI interval exceeded 0.5. Fisher's exact and Mann-Whitney U tests were used to test parameters, and $p < 0.001$ was considered statistically significant. Data was analyzed with the package IBM SPSS Statistics.

Results. Of 36 women enrolled, 26 (72.2%) had a vaginal delivery (22 women spontaneously and 4 women with vacuum). 10 women had cesarean section, 2 due to fetal distress, 7 due to failure to progress and 1 due to cephalopelvic disproportion. The area under the receiver-operating characteristics (ROC) curve for the prediction of vaginal delivery was 0.865 (95% confidence interval (CI) 0.75–0.98; $p < 0.001$) using HPD as the test variable and the AUC was 0.877 (95% CI 0.77–0.99; $p < 0.001$) for AOP. The median HPD was lower in the women delivering vaginally than in the women delivering by cesarean section (Mann-Whitney $U = 35.0$; $p \leq 0.001$). HPD was ≤ 40 mm in 18 (50%) women, of whom all delivered vaginally. HPD was > 40 mm in the other 18 (50%) women, of whom 8 (22.2%) delivered vaginally, a difference of 77.8% (95% CI 66.56–86.14; $p < 0.001$). AOP was $\geq 105^\circ$ in 22 (61.1%) of the women, of which 21 (80.1%) delivered vaginally. AOP was $< 105^\circ$ in the other 14 (38.9%) women, of whom 5 (19.2%) delivered vaginally. A difference of 60.9% (95% CI 37.43–76.86; $p < 0.001$).

Conclusions.

1. Transperineal ultrasound measurements of HPD and AOP in the first stage of labor contribute clinically significant information about the chance for vaginal labor outcome in nulliparous women.
2. HPD < 40 is predictive of vaginal delivery.
3. AOP $> 120^\circ$ is predictive of vaginal delivery.