



Sonopartogram: evaluation of labor progress in women requiring Cesarean section following induction of labor

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Objective

Evaluation of labor progress by transperineal ultrasonographic (TPU) assessment of fetal head descent by measuring angle of progression (AOP) and head-perineum distance (HPD) has been shown to be feasible. The objectives of this study were to: (i) determine the correlation between AOP, HPD and fetal head station by vaginal examination (VE) in the first stage of labor; and (ii) compare the hourly rate of change ($\Delta 1$) in TPU parameters between women who were delivered by Cesarean section (CS) and those that delivered vaginally (VD).

Methods

This was a prospective longitudinal study performed in 249 women with singleton pregnancy undergoing induction of labor (IOL) at term in a single maternity unit in Hong Kong SAR. Almost simultaneous assessment of cervical dilatation and fetal head station by VE and TPU assessment of fetal head descent (AOP and HPD) were made serially following the commencement of IOL until full cervical dilatation, with a total of 696 examinations. The researchers were blinded to the findings of the clinical team's VE. Comparison of median values of AOP $\Delta 1$ and HPD $\Delta 1$ between CS and VD groups was done by Mann-Whitney U test. Comparison of slope regression lines of $\Delta 1$ of TPU parameters against cervical dilatation and fetal head station between CS and VD groups was performed by Covariance analysis.

Results

The prevalence of CS was 16.1% (40/249). In the total study population, AOP had a positive linear correlation with fetal head station ($r=0.68$, $p<0.001$) and the HPD had a negative linear correlation ($r=-0.56$; $p<0.001$). The median (interquartile range [IQR]) of AOP $\Delta 1$ (degree) and HPD $\Delta 1$ (cm) was significantly higher in VD group than in CS group (AOP $\Delta 1$: 1.5 (4.7) vs. 0.5 (2.8); HPD $\Delta 1$: -7.1 (3.0) vs. -1.4 (2.4); $p<0.001$ for both). Women with CS had significant lower AOP $\Delta 1$ but higher HPD $\Delta 1$ against fetal head station throughout the first stage of labor (slope of regression line for CS vs. VD groups: AOP $\Delta 1$: 0.27 vs. 1.34; $p=0.001$; HPD $\Delta 1$: -0.021 vs. -0.079; $p=0.008$). Women who had VD had a steeper AOP $\Delta 1$ against cervical dilatation than those who had CS (slope of regression line for VD vs. CS group: 0.63 vs. 0.28; $p=0.02$). This was not observed in HPD $\Delta 1$. In general, the separation of the regression lines between the VD and CS groups increased with labor progression.

Conclusion

This study indicates that the measurements of AOP and HPD by TPU reflect fetal head station throughout the first stage of labor and women requiring CS have significantly narrower AOP, higher HPD and slower hourly rate of change in both parameters than those who deliver vaginally.