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Intrapartum sonography to determine fetal occipital position: interobserver agreement

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KEYWORDS: fetal occipital position; labor; sonography

ABSTRACT

Objective *To investigate the interobserver agreement on the intrapartum ultrasonographic definition of the fetal occipital position.*

Methods *In 60 singleton pregnancies in labor at term the fetal occipital position was determined by transabdominal ultrasound by two appropriately trained sonographers who were not aware of each other's findings. The Bland–Altman plot was performed and the 95% limits of agreement were calculated. Logistic regression analysis was used to investigate the association between complete agreement in the fetal occipital position between the two observers and maternal and labor characteristics.*

Results *The two observers had complete agreement on the fetal occipital position in 22/60 (36.7%) cases and disagreement by 15° and 30° in 31 (51.7%) and seven (11.6%) cases, respectively. The mean of the differences between the two observers was 0.25° and the 95% limits of agreement were −28.9° (−32.2° to −25.6°) to 29.4° (26.1° to 32.7°). There were no significant associations between complete agreement and maternal and labor characteristics.*

Conclusion *The interobserver agreement on sonographically determined fetal occipital position during labor is within 15° in nearly 90% of cases and within 30° in all cases. Copyright © 2004 ISUOG. Published by John Wiley & Sons, Ltd.*

INTRODUCTION

Intrapartum clinical assessment of the fetal occipital position is an integral part of routine monitoring in labor, but recent studies on intrapartum sonography reported that such clinical assessment is often inaccurate (Table 1)[1–6]. Nevertheless, accurate determination of the fetal occipital position is important. First, there is evidence that in women undergoing induction of labor, preinduction sonographically determined occipital position, in addition to cervical length and traditional maternal characteristics, is superior to the Bishop score in the prediction of the outcome of induction[7]. Second, malposition in labor is associated with higher rates of Cesarean section and maternal and neonatal morbidity[8,9]. The risk of Cesarean section can be estimated during the early stage of active labor by the sonographically determined occipital position, in addition to traditional maternal, fetal and labor-related characteristics[10]. Third, an important determinant of successful and safe use of the vacuum and forceps is correct determination of the fetal occipital position. However, a sonographic study has demonstrated that clinical assessment during instrumental delivery fails to identify the correct occipital position in about 25% of cases, suggesting that ultrasonography should be performed routinely before instrumental delivery[6].

The aim of this study was to examine the degree of agreement between two operators in determining fetal occipital position by intrapartum sonography.

METHODS

In 60 singleton pregnancies in labor at term, with cervical dilatation of 3–10 cm, the fetal occiput position was determined sonographically by two appropriately trained sonographers (Certificate of Competence; The Fetal Medicine Foundation (http://www.fetalmedicine.com)) who were not aware of each other's findings. The two examinations were carried out within 3 min of each other. The patients provided written consent to participate in the study.

Ultrasonographic examination was performed transabdominally with the patient in a supine position[2]. The

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Table 1 Studies examining the agreement between clinically and sonographically determined fetal occiput position during labor

Study	n	*Study population*	*Agreement* (n *(%)*)
Sherer *et al.* (2002)[1]	102	First stage of labor	48 (47)
Akmal *et al.* (2002)[2]	496	First and second stages of labor	163 (33)
Souka *et al.* (2003)[3]	334	First and second stages of labor	152 (46)
Kreiser *et al.* (2001)[4]	44	Second stage of labor	31 (70)
Sherer *et al.* (2002)[5]	112	Second stage of labor	68 (61)
Akmal *et al.* (2003)[6]	64	Preinstrumental delivery	47 (73)

Agreement was considered to be present if the occiput position defined by the two methods was within ±45° of each other, except in the study of Keiser *et al.*[4] in which there was agreement on the definition of the occiput as anterior, posterior, left transverse or right transverse.

ultrasound transducer was first placed transversely in the suprapubic region of the maternal abdomen. The landmarks depicting fetal position were the fetal orbits for occipito-posterior position, the midline cerebral echo for occipito-transverse positions and cerebellum or occiput for occipito-anterior position. For the latter the fetal spine was demonstrated in its sagittal plane and traced from the fetal thorax to the occiput. The ultrasound findings of fetal occipital position were recorded on a datasheet depicting a circle, like a clock, with 24 divisions; for example, direct occiput anterior, posterior and right transverse positions were recorded as 0°, 180° and 270°, respectively. The findings of Observer A were expressed as an angle of deviation from those of Observer B.

Statistical analysis

The Bland–Altman plot (difference between the two observers in occipital position in degrees against the average between the two) was performed and the 95% limits of agreement (with their 95% CIs) was calculated[11]. Logistic regression analysis was used to investigate the association between complete agreement in the fetal occipital position between the two observers and maternal and labor characteristics. Maternal age, body mass index, birth weight, gestational age, cervical dilatation and descent of the presenting part were used as continuous numerical variables. A score was given for ethnicity (1 for Caucasian, 2 for Afro-Caribbean and 3 for Asian), parity (0 for nulliparous, 1 for parous), use of epidural anesthesia or oxytocin (0 for No, 1 for Yes), sonographically determined placental position (1 for anterior, 2 for posterior), occipital position defined by Observer A (1 for anterior, 2 for transverse, 3 for posterior) and mode of delivery (1 for spontaneous delivery, 2 for instrumental delivery, 3 for Cesarean section).

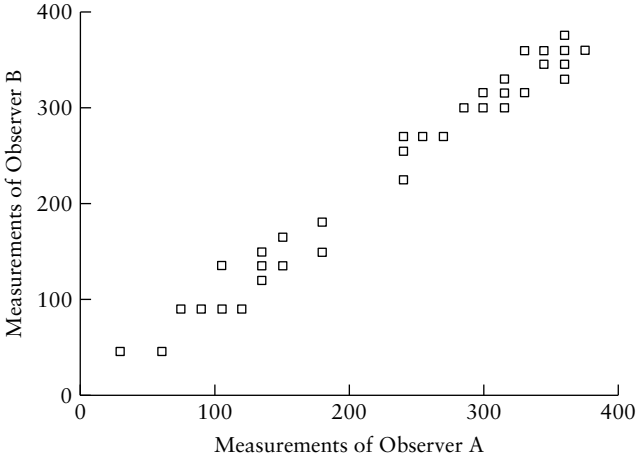

Figure 1 Bland–Altman scatter plot of occipital position (in degrees) by Observer A vs. Observer B.

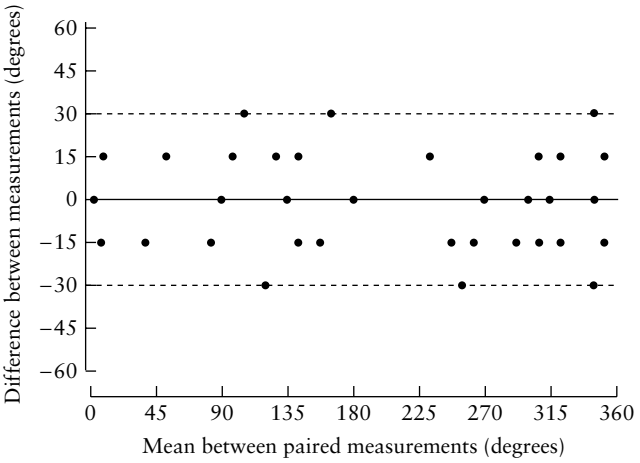

Figure 2 Bland–Altman plot of the difference against the average of the occipital position (in degrees) between Observer A and Observer B.

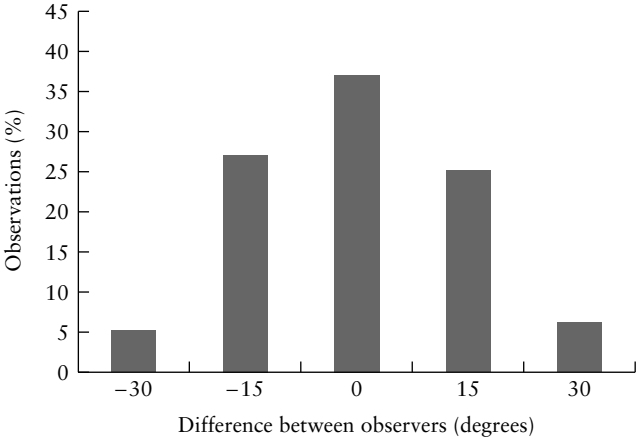

Figure 3 Bland–Altman histogram of the differences in occipital position (in degrees) between Observer A and Observer B.

RESULTS

The two operators had complete agreement on the fetal occipital position in 22/60 (36.7%) cases and

Table 2 Characteristics of the population and results of the univariate analysis on the associations with the incidence of complete agreement between the two observers on the fetal occipital position

Characteristic	n *(%) or median (range)*	*Odds ratio (95% CI)*	P
Age (years)	28 (18–40)	1.04 (0.94–1.16)	0.432
Ethnicity			0.180
Caucasian	26 (43.3%)	1	
Afro-Caribbean	8 (13.4%)	0.33 (0.06–1.97)	
Asian	26 (43.3)	0.37 (0.12–1.17)	
Body mass index	24 (18–40)	1.10 (0.98–1.24)	0.122
Parity			
Nulliparous	38 (63.3%)	1	
Parous	22 (36.7%)	0.72 (0.24–2.127)	0.554
Gestational age (weeks)	40 (37–41)	1.33 (0.82–2.14)	0.244
Use of oxytocin			
No	31 (51.7%)	1	
Yes	29 (48.3%)	0.833 (0.29–2.39)	0.734
Epidural anesthesia			
No	31 (51.7%)	1	
Yes	29 (48.3%)	0.83 (0.29–2.39)	0.734
Cervical dilatation (cm)	7 (3–10)	1.01 (0.81–1.27)	0.880
Station (cm)*		0.90 (0.56–1.47)	0.692
−2	22 (36.7%)		
−1	15 (25.0%)		
0	14 (23.3%)		
+1	9 (15.0%)		
Occipital position			0.204
Anterior	27 (45.0%)	1	
Transverse	17 (28.3%)	3.21 (0.89–11.60)	
Posterior	16 (26.7%)	1.71 (0.45–6.47)	
Placental position			0.913
Anterior	24 (40.0%)	1	
Posterior	36 (60.0%)	0.94 (0.32–2.74)	0.864
Mode of delivery			
Vaginal	42 (70%)	1	
Instrumental	9 (15%)	0.90 (0.20–4.13)	
Cesarean	9 (15%)	1.44 (0.34–6.20)	
Birth weight (kg)	3.49 (2.47–4.51)	1.00 (0.99 to 1.00)	0.400

*Distance of the presenting part from the ischial spines (−, above; +, below).

disagreement by 15° and 30° in 31 (51.7%) and seven (11.6%) cases, respectively. The mean of the differences between the two observers was 0.25° and the 95% limits of agreement were −28.9° (−32.2° to −25.6°) to 29.4° (26.1° to 32.7°) (Figures 1–3). The characteristics of the population examined and the results of the univariate analysis on the associations with the incidence of complete agreement on occipital position between the two observers are shown in Table 2. There were no significant associations.

DISCUSSION

The results of the present study demonstrate that the interobserver agreement on sonographically determined fetal occipital position during labor is within 15° in nearly 90% of cases and within 30° in all cases. Furthermore, reproducible results were obtained irrespective of the maternal and labor characteristics examined (Table 2). For sonographers with experience in obstetric scanning, determination of the fetal position, based on such landmarks as the fetal orbits, cerebellum, midline echo of the brain and occiput, is easy and highly reproducible.

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