

Transperineal Ultrasound Station:

Bridging Conventional Digital Examination and Sonographic Assessment of Fetal Head Descent

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INTRODUCTION

Transperineal ultrasound provides objective assessment of labor progression, with the angle of progression (AoP) being the most established parameter. However, AoP may be influenced by maternal pelvic anatomy, particularly with fetal head descent.

To address this limitation, we developed the *transperineal ultrasound (TUS) station*¹⁻³, a reproducible parameter designed to correspond more directly to conventional digital assessment of fetal head station.

This study aimed to evaluate the utility of TUS station for assessing labor progression by comparing it with AoP.

METHOD

Study design: Prospective observational study

Setting: A tertiary perinatal center in Tokyo, Japan.

Population: Consecutive women with term, singleton and cephalic pregnancies, undergoing vaginal delivery from Jul 2022 to Aug 2025

Methods: Digital vaginal examination was performed by experienced obstetricians, followed by transperineal ultrasound.

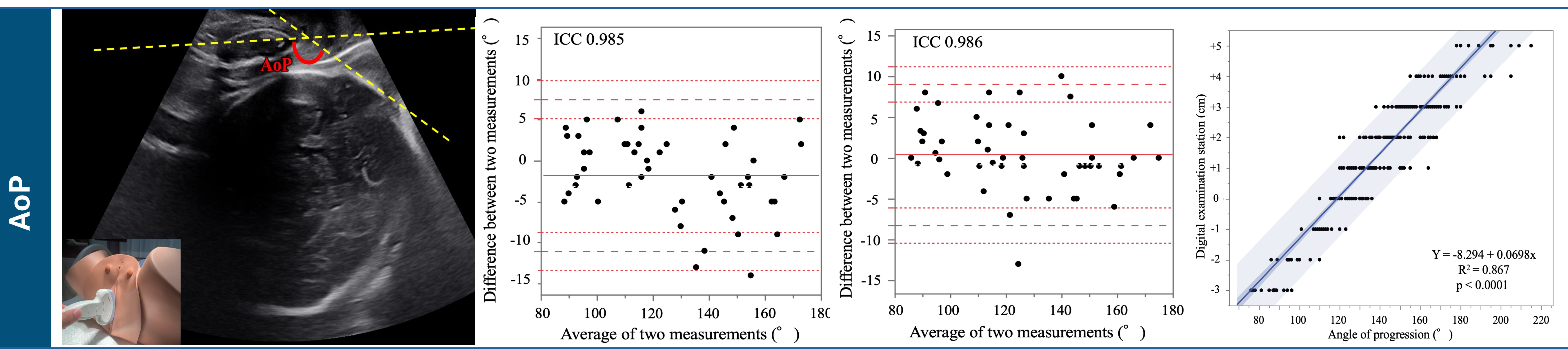
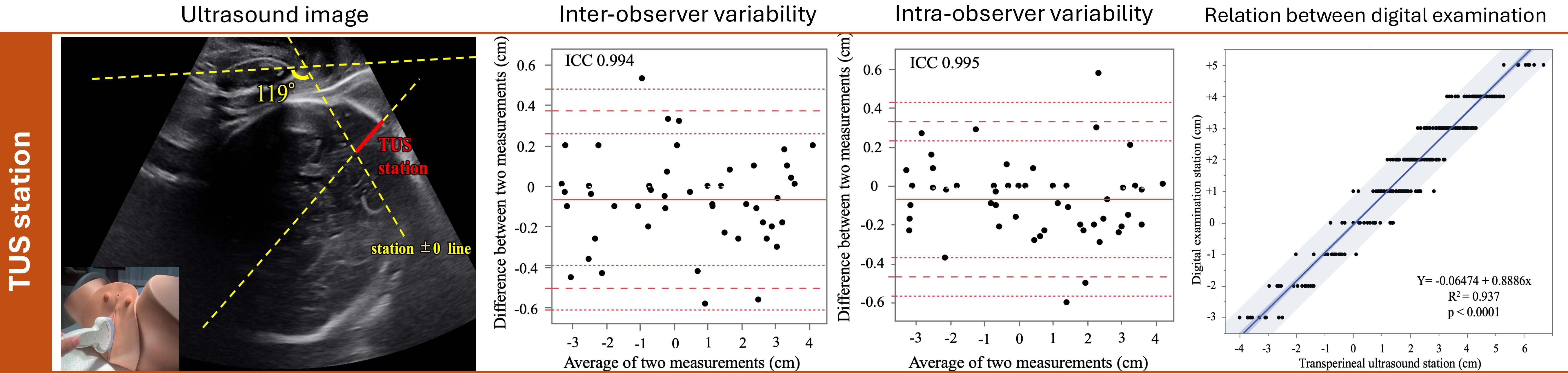
TUS station was defined as a distance from a 119° reference line from the pubic symphysis corresponding to station ± 0 to the leading part of the fetal head measured along the head direction.^{1,2} AoP was measured using standard techniques.⁷

Agreement with digital examination and reproducibility were assessed using regression analysis, intraclass correlation coefficients (ICC), and Bland–Altman analysis.

Main Outcome Measures: Correlation with digital examination and inter-/intra-observer reproducibility.

RESULTS

A total of 164 women underwent 372 paired assessments. Background characteristics are as follows; mean maternal age 35 years (IQR 31; 38), maternal height 158.5 cm (IQR 155; 163), BMI 20.5 kg/m² (IQR 18.9; 22.2), nulliparous women 134 (82.2%) and labor analgesia 102 (85.7%).



Association between the fetal head station assessed by digital examination and transperineal ultrasound

TUS-station (corresponding fetal head station)	Number of cases	Overestimation of ultrasound		Agreement with digital examination	Underestimation of ultrasound	
		By 2 cm	By 1 cm		By 1 cm	By 2 cm
< -2.0 (-3 or higher)	20			15 (75%)	4 (20%)	1 (5%)
-2 ~ -1.01 (-2)	11			10 (91%)	1 (9%)	
-1 ~ -0.01 (-1)	15			12 (80%)	3 (20%)	
0 ~ 0.99 (0)	41		1 (2%)	31 (75%)	9 (21%)	
1 ~ 1.99 (+1)	68		4 (5%)	36 (53%)	28 (41%)	
2 ~ 2.99 (+2)	87		7 (8%)	63 (72%)	18 (20%)	
3 ~ 3.99 (+3)	73		5 (6%)	61 (83%)	7 (9%)	
4 ~ 4.99 (+4)	44		9 (21%)	35 (79%)		
5 ≤ (+5 or lower)	14		5 (35%)	9 (65%)		

AoP (corresponding fetal head station)	Number of cases	Overestimation of ultrasound		Agreement with digital examination	Underestimation of ultrasound	
		By 2 cm	By 1 cm		By 1 cm	By 2 cm
< 95 (-3 or higher)	17			12 (70%)	5 (30%)	
95 ~ 105 (-2)	9		1 (11%)	7 (77%)	1 (11%)	
106 ~ 115 (-1)	16		3 (18%)	11 (68%)	2 (12%)	
116 ~ 126 (0)	44		3 (6%)	28 (63%)	11(25%)	2 (4%)
127 ~ 137 (+1)	40		9 (23%)	20 (50%)	11(27%)	
138 ~ 147 (+2)	70		15(21%)	51 (72%)	4 (5%)	
148 ~ 158 (+3)	70	4 (5%)	20(28%)	44 (62%)	2 (2%)	
159 ~ 169 (+4)	57	11(19%)	23(40%)	13 (22%)		
170 ≤ (+5 or lower)	49	8 (16%)	32(65%)	9 (18%)		

DISCUSSION

The principal finding of this study was that TUS station showed closer agreement with fetal head station assessed by digital examination than did AoP, with excellent reproducibility.

Although digital examination provides qualitative information that cannot be entirely replaced by ultrasound, ultrasound parameters that correspond intuitively to established clinical findings may facilitate their adoption in practice. Our findings suggest that TUS station is well suited to this purpose.

AoP is derived from the angle between the long axis of the pubis and a tangent to the fetal head and therefore does not directly assess the leading part of the head. As labor progresses, AoP may increasingly deviate from actual descent, particularly below +1 station.

In contrast, TUS station provides an anatomically intuitive estimate of fetal head station, maintaining closer agreement with digital examination and being less likely to overestimate descent. This may be particularly important when assessing fetal head descent before operative delivery.

CONCLUSION

The TUS station is a practical, intuitive, and highly reproducible transperineal ultrasound parameter that objectively reflects conventional digital assessment of fetal head station.

TUS station may serve as a reliable tool for intrapartum assessment, enabling objective evaluation of fetal head descent while preserving established clinical workflows.

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