Ultrasound assessment of the anovaginal distance as a predictor of obstetric perineal tears

Nora Y. Elbaik*, Elham H. Madny*, Ahmed A. Aboelroose*, Omima T. Taha*
*Department of Obstetrics and Gynecology, Faculty of Medicine, Suez Canal University, EGYPT.

Abstract

Background: Vaginal delivery is an important event in women's life. It has a great impact on maternal health and efforts are directed towards safe vaginal delivery. Perineal tears cause great distress to laboring women.

Objective: to determine the role of the anovaginal distance in the prediction of perineal tears in primiparous women.

Study design: This prospective observational study was conducted at the labor and delivery ward at Suez Canal University hospital from June 2021 to December 2022. We recruited primiparous women attending for delivery at the labor ward following predetermined inclusion and exclusion criteria. At 36 weeks of gestation, the recruited women had transvaginal ultrasound for evaluation of the anovaginal distance. Intrapartum evaluation included nature of labor (spontaneous or induced), gestational age, duration of the first stage of labor, duration of the second stage of labor, state of the membranes, the number of vaginal examinations, and fetal biometry.

Results: The mean age of the studied population was 25.52 ± 3.84 years. The mean BMI was 22.95 ± 1.12. The anovaginal distance was 15.33 ± 2.45 mm. Perineal tears occurred in 39/102 (38.2%) patients. There was no significant difference in the anovaginal distance between both groups (p value 0.834). A decrease in the anovaginal distance and smaller gestational age at birth predicted the occurrence of perineal tears significantly (p value 0.037 and 0.006, respectively). ROC curve determined a cut off value of 13.1mm for the AVD, below which perineal tears would occur with a sensitivity of 25.64% and a specificity of 88.89%.

Conclusions: A short anovaginal distance predicted the occurrence of perineal tears significantly.

Keywords: vaginal delivery; perineal tears; anovaginal distance; prediction.

Corresponding author:
Omima Tharwat Taha, MD
Assistant professor of Obstetrics and Gynecology, Department of Obstetrics and Gynecology
Faculty of Medicine, Suez Canal University.
Email: omimatharwat@yahoo.com
Tel: 01223423685

Introduction

Childbirth is a great event in women's life with a series of processes that result in expulsion of the baby and its appendices from the female genital tract. This would result in tears or lacerations of the genital tract with variable extensions from the vaginal mucosa to the anal sphincter and rectum. Such tears would result in postpartum hemorrhage (PPH) which constitute about 20% of cases in addition to episiotomies (1). Transperineal ultrasound has been used in the diagnosis of pelvic floor injuries after vaginal delivery and in postpartum follow up to diagnose hidden tears that were associated with increased risk of future pelvic floor disorders (2). Intrapartum ultrasound was associated with possible artifact because of hiatal distension, suturing, and tissue edema (3). The direction should be towards early prediction to accomplish preventative measure as antenatal prediction of perineal tears was not possible (4). A previous study evaluated the perineal length among Caucasian and Asian women using a measuring tape and reported a strong associated between short perinium and 3rd degree perineal tears (5). Accordingly, this study was conducted to evaluate the role of the anovaginal distance measured by endo-vaginal ultrasound among Egyptian women in the prediction of perineal tears.

Methods

This prospective observational study was conducted at the labor and delivery ward at Suez Canal University hospital from June 2021 to December 2022. We recruited women attending for delivery at the labor ward following predetermined inclusion and exclusion criteria. Inclusion criteria: a) women aged 18 - 45 years, b) primiparous women, c) gestational age from 37-41 weeks, d) women undergoing trial of vaginal delivery after previous cesarean section (VBAC), e) singleton pregnancy, and f) cephalic presentation. Exclusion criteria: a) women refusing to participate in the study, b) planned cesarean delivery, c) emergency cesarean delivery due to intrapartum causes, and d) instrumental delivery.

Eligible women were subjected to: a) history taking for age, occupation, and level of education, b) measuring weight and height ant BMI calculation, and c) abdominal ultrasound for determination of fetal biometry -biparietal diameter (BPD), fetal weight, and presentation.

At 36 weeks of gestation, the recruited women had transvaginal ultrasound using transvaginal probe (Mindray DC- 60 machine with a transvaginal probe V 11-3B, 7 MHz) for evaluation of the anovaginal distance (AVD). The participants were asked to lie in the lithotomy position with an empty bladder. The probe was placed at the posterior fourchette and was introduced cranially gently until the internal anal sphincter and anal mucosa could be seen. The distance between the anal edge of the internal sphincter and the probe represented the AVD and was measured in mm (6).

Intrapartum evaluation included nature of labor either spontaneous or induced labor, the gestational age upon admission, the duration of the first stage of labor, duration of the second stage of labor, the state of the membranes, and the number of vaginal examinations.

Perineal tears and the need for episiotomy were recorded. Perineal tears were classified as follows: a) first degree tears where the laceration was limited to the vaginal mucosa or the superficial perineal skin, b) second degree tears where the tears extended to the superficial perineal muscles, and c) third degree tears where the laceration extended to the anal sphincter either less than 50% of the sphincter, more than the 50% of the external sphincter, or reached the internal anal sphincter (7). Lateral vaginal wall tears and paraurethral tears were recorded also.

The sample size was calculated at a significance level of 96.5 % and an error level of 4.5% with an incidence of perineal tears of 79.33 (6). A drop-out proportion of 10% was added to the raw result giving a final count of 102 women.

Ethical approval: This study was conducted after approval of the research ethics committee of faculty of medicine, Suez Canal University, in 24/5/2021 with an approval number of 4505#.

Results

The mean age of the studied population was 25.52 ± 3.84 years. The great majority was from rural areas (71.6%) and highly educated (52%). The mean BMI was 22.95 ± 1.12. The patients were recruited at 38.5 ± 1.09 weeks (Table 1).

Ultrasound measurements included the BPD (96.52 ± 0.57 mm), the EFW (3015.84 ± 229.8 gm), fetal sex (52.9% were female fetuses), and the AVD (15.33 ± 2.45 mm) (Table 2).

A great proportion of the participants labored spontaneously 88/102 (86.3%) and oxytocin augmentation was required in 9/102 (8.8%). The membranes were ruptured in 62/102 (60.8%) patients. Episiotomy was performed in 81/102 (79.4%) participants. The majority of them had no perineal tears 63/102 (61.8%). First and 2nd degree tears occurred in 30/102 (29.4%) and 9/102 (8.8%) patients respectively (Table 3).

Perineal tears occurred in 39/102 (38.2%) patients. There were significant differences between parturient who had perineal tears and those who did not in fetal sex, state of the membranes, performing episiotomy, and the presence of other perineal tears. Women who had perineal tears gave birth to male fetuses (61.5%), had ruptured membranes (46.2%), had episiotomy (64.1%), and had associated tears (15.4%). There was no significant difference in the AVG between both groups (p value 0.834) (Table 4).

Using regression analysis, a decrease in the AVD and smaller gestational age at birth predicted the occurrence of perineal tears significantly (p value 0.037 and 0.006, respectively).

ROC curve determined a cut off value of 13.1mm for the AVD, below which perineal tears would occur with a sensitivity of 25.64% and a specificity of 88.89% (Table 5).

Discussion

The AVD was 15.33 ± 2.45 mm. It was reported that the mean AVD was 11.6 mm among parturient with anal sphincter injury while it was 17.8 mm among those without injuries (6). An earlier study reported different perineal lengths for different races. It was 3.7 ± 0.09 cm in Caucasian women and 3.6 ± 0.09 cm in Asian women (5). This discrepancy would be related to different races of recruited populations and different measuring methods as the mentioned study measured the perineal length using measuring tape and the length was considered from the fourchette to the center of the anal opening (5).

Perineal tears occurred in 39/102 (38.2%) patients. Tears were mainly of 1st and 2nd degree tears with no patient reporting 3rd degree one. This agreed with previous results with different total incidence of perineal tears (7.84%) (8). An earlier study reported an incidence of 92.6% for genital tract lacerations, with only 1 (0.8%) patient having 3rd degree perineal tear (1). Different results would be rendered to different race of the recruited patients, different parity among studies as a previous scar was found to be fragile to resist distension (9).

There was no significant difference in the AVG between both groups. This was confirmed by another study as there was a week insignificant correlation between the perineal length and third-degree tears in primiparous women (5). Additional results failed to report an association between perineal length and perineal tears and this was rendered to their increased rates of episiotomy, occiput posterior position, and instrumental delivery (10, 11).

A decrease in the AVD predicted the occurrence of perineal tears significantly.

Similar results were mentioned before as there was a decrease in the incidence of perineal tears by 32% for each 1 cm increase in the perineal length, however this failed to be statistically significant. Although this study recruited women with different ethnicity (Caucasian and Asian women), they reached a conclusion that ethnicity has no impact on the degree of perineal tears (5). This contradicted others as different ethnic groups contributed to variability in the perineal length measurements leading to different perineal tear incidence (12). Another study reported that a short perineum < 4 cm was more prone to perineal tears (33 times) (1).

Surprisingly, the current study reported that smaller gestational age at delivery predicted the occurrence of perineal tears significantly. This contradicted previous results as a gestational age > 39 weeks was linked to perineal tears. This was rendered to the strong association between gestational age and fetal weight (13). However, this study reported 3rd and 4th degree perineal tears among women with multiple gestation, breech presentation, having diabetes, shoulder dystocia and with instrumental delivery which different greatly from the current one.

ROC curve determined a cut off value of 13.1 mm for the AVD, below which perineal tears would occur with a sensitivity of 25.64% and a specificity of 88.89%. Another one reported an AVD >20mm was sensitive and specific for sphincter injuries by 96% and 25% respectively, however this study evaluated the AVD after being diagnosed to have a perineal tear (6). Other studies reported a perineal body length of <2.5cm to be significantly predictive for perineal tears (11, 14).

Strength and limitations: We recruited primiparous women to avoid possible bias due to changes in the AVD in multiparous women. Single investigator evaluated the AVD by ultrasound to avoid inter-observer variability. Measurements were done at 36 weeks gestation to avoid changes in the perinium associated with different stages of labor. Obstetricians commencing delivery were blinded to the results of the AVD. We did not recruit women with multiple gestation. The studied population was of the same ethnic group.

Conclusion

short AVD predicted the occurrence of perineal tears significantly.

Conflict of interest

None.

References

1. Fouelifack F, Essiben F, Kemadjou L, Fouedjio J, Fouogue J, Mbu R. Risk Factors of Genital Tract Lacerations at Yaoundé Central Hospital-Cameroon: A Case Control Study. British Journal of Medicine and Medical Research. 2017;20(2):1-8.
2. Atan IK, Lin S, Dietz HP, Herbison P, Wilson PD. It is the first birth that does the damage: a cross-sectional study 20 years after delivery. International urogynecology journal. 2018;29(11):1637-43.
3. Blasi I, Fuchs I, D'amico R, Vinci V, La Sala GB, Mazza V, Henrich W. Intrapartum translabial three-dimensional ultrasound visualization of levator trauma. Ultrasound in obstetrics & gynecology. 2011;37(1):88-92.
4. Dietz HP. Ultrasound imaging of maternal birth trauma. International Urogynecology Journal. 2021; 32:1953-62.
5. Dua A, Whitworth M, Dugdale A, Hill S. Perineal length: norms in gravid women in the first stage of labour. International Urogynecology Journal. 2009; 20:1361-4.
6. Pihl S, Uustal E, Blomberg M. Anovaginal distance and obstetric anal sphincter injury: a prospective observational study.

International Urogynecology Journal. 2019; 30:939-44.

7. No GT. The management of third-and fourth-degree perineal tears. MIDIRS. 2015; 2:9.
8. Eko F, Vivian V, Fouelifack YF, Mbu RE. Sitz bath vs iodine antiseptic (Betadine) imbibed gauze for the management of perineal and vaginal tears. Int J Translation Community Dis. 2015;3(2):59-63.
9. Martin S, Labrecque M, Marcoux S, Bérubé S, Pinault J. The association between perineal trauma and spontaneous perineal lacerations. J Fan Pract. 2001; 50(4):333-7.
10. Nager CW, Helliwell JP. Episiotomy increases perineal laceration length in primiparous women. American journal of obstetrics and gynecology. 2001;185(2):444-50.
11. Mboua Batoum V, Ngo Um Meka E, Essiben F, Robinson ME. Perineal body length and prevention of perineal lacerations during delivery in cameroonian primigravid patients. International Journal of Gynecology & Obstetrics. 2021;154(3):481-4.
12. Hopkins LM, Caughey AB, Glidden DV, Laros Jr RK. Racial/ethnic differences in perineal, vaginal and cervical lacerations. American journal of obstetrics and gynecology. 2005;193(2):455-9.
13. Deering SH, Carlson N, Stitely M, Allaire AD, Satin AJ. Perineal body length and lacerations at delivery. The Journal of reproductive medicine. 2004;49(4):306-10.
14. Von Theobald P, Bohrer M, Lorrain S, Iacobelli S. Risk factors associated with severe perineal tears: A five-year study. Journal of Gynecology Obstetrics and Human Reproduction. 2020;49(7):101820.

Table (1): Basic characteristics of the studied females (n = 102).

Age (years) Mean ± SD		25.52 ± 3.84
Residence	**Urban**	29 (28.4%)
	Rural	73 (71.6%)
Level of education	**Illiterate**	9 (8.8%)
	Middle	40 (39.2%)
	High	53 (52%)
Weight (Kg) (Mean ± SD)		68.05 ± 3.92
Height (cm) (Mean ± SD)		164.3 ± 4.21
BMI (Mean ± SD)		22.95 ± 1.12
Gestational age (Mean ± SD)		38.5 ± 1.09

Table (2): Prenatal ultrasound findings of the studied females (n = 102):

Biparietal diameter (mm) (Mean ± SD)		96.52 ± 0.576
Estimated fetal weight (gm) (Mean ± SD)		3015.84 ± 229.8
Fetal sex	**Male**	48 (47.1%)
	Female	54 (52.9%)
Anovaginal distance (mm) (Mean ± SD)		15.33 ± 2.45

Table (3): Assessment of the studied females in labor room (n = 102):

Type of labor	**Spontaneous**	88 (86.3%)
	Induced	14 (13.7%)
Use of oxytocin	**Yes**	9 (8.8.5)
	No	93 (91.2%)
Membrane state	**Ruptured**	62 (60.8%)
	Intact	40 (39.2%)
Duration of the first stage of labor (hours) (Mean ± SD)		1.84 ± 0.84
Duration of the second stage of labor (minutes) (Mean ± SD)		24.38 ± 7.47
Number of pelvic examinations		5.44 ± 2.5
Need for episiotomy	**Yes**	81 (79.4%)
	No	21 (20.6%)
Degree of perineal tears	**No tears**	63 (61.8%)
	Garde I	30 (29.4%)
	Grade II	9 (8.8%)
Other vaginal tears	**No tears**	92 (90.2%)
	Lateral vaginal wall tears	8 (7.8%)
	Paraurethral tears	2 (2%)

Table (2): Prenatal ultrasound findings of the studied females (n = 102):

	Perineal tears		P value
	Yes (N=39)	No (N=63)	
Age (Mean ± SD)	25.85 ± 4.14563	25.32 ± 3.67	0.503
Weight	67.62 ± 4.04	68.32 ± 3.87	0.383
Height (Mean ± SD)	164.76 ± 2.54	164.09 ± 2.42	0.187
BMI Mean ± SD	22.85 ± 1.13	23.03 ± 1.13	0.445
Gestational age at delivery (weeks) Mean ± SD	38.19 ± 0.78	38.74 ± 1.21	0.084

Biparietal diameter Mean ± SD		96.56 ± 0.60	96.49 ± 0.56	0.542
Estimated fetal weight (gm) Mean ± SD		2994.97 ± 185.62	3028.76 ± 253.92	0.473
Sex	Female	15 (38.5%)	39 (61.9%)	0.021
	Male	24 (61.5%)	24 (38.1%)	
Anovaginal distance (mm) Mean ± SD		15.27 ± 2.56	15.37 ± 2.41	0.834
Type of Labor	Induced	6 (15.4%)	8 (12.7%)	0.702
	Spont	33 (84.6%)	55 (87.3%)	
Use of oxytocin	No	34 (87.2%)	59 (93.7%)	0.263
	Yes	5 (12.8%)	4 (6.3%)	
Ruptured membrane	No	21 (53.8%)	19 (30.2%)	0.017
	Yes	18 (46.2%)	44 (69.8%)	
1st Stage Mean ± SD		1.92 ± 0.65	1.84 ± 0.93	0.656
2nd Stage Mean ± SD		25.77 ± 7.91	23.52 ± 7.12	0.141
Number of pelvic examinations		5.41 ± 2.06	5.46 ± 2.87	0.925
Episiotomy	No	14 (35.9%)	7 (11.1%)	0.003
	Yes	25 (64.1%)	56 (88.9%)	
Other vaginal tears	No	33 (84.6%)	59 (93.7%)	0.004
	Lateral vaginal tears	6 (15.4%)	2 (3.2%)	
	Paraurethral tears	0 (0.0%)	2 (3.2%)	

Table (5): ROC curve for the Anovaginal distance (mm)

	Cut of point	AUC	Sensitivity	Specificity	+PV	-PV
Anovaginal distance (mm)	<=13.1 *	0.51	25.64	88.89	58.8	65.9