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Original Article

Perineal Laceration in Primipara in Association with Perineal Length, Fetal Head Circumference, and Fetal Weight

Claudio Udjaja[1], Erwinanto[2], Herman Kristanto[3], Hary Tjahjanto[4], Yuli Trisetiyono[4], Arufiadi Anityo Mochtar[2]

[1]Department of Obstetric and Gynaecology, Faculty of Medicine Diponegoro University / Kariadi Hospital Semarang, Indonesia
[2]Urogynaecology Subdivision, Department of Obstetrics and Gynecology Faculty of Medicine Diponegoro University / Kariadi Hospital Semarang, Indonesia
[3]Fetal-Maternal Subdivision, Department of Obstetrics and Gynecology Faculty of Medicine Diponegoro University / Kariadi Hospital Semarang, Indonesia
[4]Fertility Subdivision, Department of Obstetrics and Gynecology Faculty of Medicine Diponegoro University / Kariadi Hospital Semarang, Indonesia

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Author Affiliation:
Department of Obstetric and Gynaecology, Faculty of Medicine Diponegoro University/ Kariadi Hospital Semarang, Indonesia

Author Correspondence:
Claudio Udjaja
Dr. Sutomo Street No.16, Semarang, Central Java 50244, Indonesia

E-mail:
dr.claudioudjaja@gmail.com

Abstract

Background : Perineal laceration is one of the risk and complication of spontaneous labour resulting intervention in short-term and long-term quality of life. Lack of research on perineal length in Indonesia, fetal birth weight and fetal head circumference and its impact on spontaneous labour and perineal laceration gave rise to the idea of research in order to minimize the occurrence of complications from perineal laceration in spontaneous labour. The aims of this study was to know find out the association between perineal length, fetal head circumference, and fetal weight with degree of perineal laceration in primiparous women.
Methods : Observational cross sectional multi-center study conducted between August 2023 until October 2023 in which all subject that delivered vaginally within inclusion criteria was measured. All data will be further analized to determine the significant predictor of perineal tear.
Results : The result of this study has indicated that there is no significant association of perineal length with the degree of spontaneous primiparous perineal laceration. While there is an association of fetal head circumference and fetal weight with the degree of spontaneous primiparous perineal laceration in aterm pregnancy. Based on further analysis, fetal head circumference greater than 325 mm increases the risk of severe perineal laceration 4.4 times (PR=4.4; 95% CI=1.4–13.9) and Fetal weight greater than 3097.5 grams increases the risk of 2.7 times (PR=2.7; 95% CI=1.1–6.4) the occurrence of severe perineal laceration.
Conclusion : There is an association of fetal head circumference and fetal weight with the degree of spontaneous primiparous perineal laceration.

Keywords : Fetal head circumference, Fetal weight, Perineal laceration, perineal length, Spontaneus labour.

INTRODUCTION

Perineal laceration is one of the risk and complication of spontaneous labour resulting intervention in short-term, i.e perineal pain; sexual dysfunction, and long-term quality of life i.e fecal incontinence, rectovaginal fistula, and psychological trauma. Based on the data from 2013 at Dr. Cipto Mangunkusumo Hospital, prevalence of perineal laceration in spontaneous labour reached 74.1% with 8.2% prevalence of anal sphincter injury.[1]

Severe perineal laceration risk factor during labour can be caused by multiple risk factors. Perineal length and elasticity, body mass index, age and number of parities may contributes due to compliance of the tissue. Fetal risk factors like head circumferences, malposition, and shoulder dystocia may disrupt the descent. Meanwhile for obstetric risk factors such as birth attendant, labour duration, instrumental delivery, and selective episiotomy may have a share in severe perineal laceration. Perineal body, head circumference and fetal weight are non modifiable factors in labour and delivery which have a great impact on perineal laceration severity. Lack of research in Indonesia gave rise to the idea of research in order to minimize the occurrence of complications from perineal laceration in spontaneous labour.[2,3]

METHODS

This study conducted between August 2023 until October 2023, consecutive nulliparous women whom underwent spontaneous labour in 5 Center Hospitals that considered eligible for the study gave a written informed consent. Inclusion criteria were : 1) All nulliparous women in labour with aterm pregnancy, 2) above 20 years old, 3) single fetus, cephalic presentation, 4) without prior vaginal and/or anal surgery was recruited. Exclusion criteria were : All delivery in which ending in caesarean section, assisted delivery with episiotomy, and instrumental delivery was excluded. Ethical Clearance obtained from each center. Characteristic of each participants were collected.

Measurement of perineal length obtained during the first stage of labour by appointed birth attendant with a POP-Q ruler. Perineal laceration severity will be classified with WHO classification by the same birth attendant. While other data such as duration of second stage of labour, fetal head circumference, fetal birth weight, and degree of laceration was obtained after the delivery of fetus.

Statistical analysis was performed with SPSS ver 24.0 with cross sectional methods. Univariate analysis used to present the characteristics, while bivariate using Chi-Square was used for correlation between each criteria. Logistic regression analysis was used to determine significant factor of perinal laceration. While ROC curve analysis was displayed to procure a cut off point.

RESULTS

During the study period, 75 out of 152 patients met the inclusion criteria; their characteristic are shown on Table 1. Among 75 spontaneous labour, 18 suffered third degree perineal laceration (24%), while the mean of perineal length is 30.81±8.39 mm, fetal head circumference 326.27±17.28 cm, and fetal weight of 3020.1±400.8 grams.

On bivariate analysis based on perineal length, fetal head circumference, fetal weight, second stage of labour duration, and IMT, there are significant correlation between fetal head circumference and fetal weight with $P<0.05$, and IMT was found as a confounding factors in determining degree of perineal laceration with $P<0.25$ (Table 2–6).

Based of logistic regression analysis, it was concluded that fetal head circumference is the most significant factor in determining the degree of perineal laceration during spontaneous labour (Table 7).

In ROC curve was analyzed for cut off point of each risk factors, in which the result can be seen in Table 8.

Based on the cut off points, on each variable was analyzed and thus determined the prevalence ratio of variables in which associated with perineal laceration severity was fetal head circumference > 325mm followed by fetal weight >3097.5 gram.

DISCUSSION

Characteristics of Research Subjects

Total of 75 subjects in this study, the age range of primiparas was 20 to 39 years old, with the largest age range being 25 to 29 years old, 34 subjects (45.3%). In spontaneous labor, the most common laceration was second degree perinal laceration involving the vaginal mucosa and perineal muscles without sphincter anal injury, was found in 47 subjects (62.7%). Obesity was found in 56 subjects (74,7%).

Relationship between Research Variables and the Degree of Laceration

The mean perineal length of primiparas in this study was 31 mm with the lowest range of 23 mm and the highest of 50 mm. This finding resembles a study in Vietnam with a mean length of 3.4 cm and previous research in Indonesia with a mean perineal length of 3.3 cm.[1,3,4] Based on statistical analysis, there was no significant association between perineal length in primiparas and the degree of perineal laceration in spontaneous labor. This is different from the results of previous studies which stated that

TABLE 1
Characteristics of the study population

Characteristics	Frequency n = 75	%	Mean ± SD	Median (min – max)
Age				
20–24	33	44.0		
25–29	34	45.3		
30–34	6	8.0		
35–39	2	2.7		
Education				
Elementary	4	5.3		
Middle School	14	18.7		
High School	36	48.0		
University	21	28.0		
Occupation				
Homemaker	52	69.3		
Enterpreneur	23	30.7		
IMT				
Underweight	2	2.7		
Normoweight	6	8.0		
Overweight	11	14.7		
Obesity	56	74.7		
Gestational Age			38.76 ± 1.26	39 (37 – 42)
Oxytocin Usage				
Yes	47	62.7		
No	28	37.3		
Second Stage of labour duration			30.81 ± 8.39	30 (5 – 100)
Perineal length			31.28 ± 5.62	30 (23 – 50)
Head Circumference			326.27 ± 17.28	330 (290 – 390)
Fetal Birth Weight			3020.1 ± 400.8	3000 (2020 – 4300)
Degree of perineal laceration				
Intact	3	4.0		
First	7	9.3		
Second	47	62.7		
Third	18	24.0		
Degree of perinal laceration				
Mild	57	76.0		
Severe	18	24.0		

TABLE 2
Differences of perineal length in each degree of perineal laceration

Degree of laceration	Perineal length		*p*
	Mean ± SD	Median (min – max)	
Mild	31.23 ± 5.52	30 (23 – 40)	0.881
Severe	31.44 ± 6.08	30 (25 – 50)	

TABLE 3
Differences of fetal head circumference in each degree of perineal laceration

Degree of laceration	Fetal Head Circumference		*p*
	Mean ± SD	Median (min – max)	
Mild	323.68 ± 17.87	320 (290 – 390)	0.009
Severe	334.44 ± 12.47	330 (310 – 360)	

TABLE 4
Differences of fetal weight in each degree of perineal laceration

Degree of laceration	Fetal Weight		*p*
	Mean ± SD	Median (min – max)	
Mild	2941.05 ± 370.11	2950 (2020 – 4050)	0.002
Severe	3270.56 ± 400.62	3200 (2655 – 4300)	

TABLE 5
Differences of second stage of labour duration

Degree of laceration	Second stage of Labour duration		*p*
	Mean ± SD	Median (min – max)	
Mild	30.05 ± 19.13	30 (5 – 100)	0.331
Severe	33.22 ± 16.08	31.5 (10 – 60)	

there was a significant difference from the length of the perineum to the degree of perineal laceration.[3,5,6] This difference can be caused by differences in research subjects, namely in this study only observing the length of the perineum of primigravida patients did not performed episiotomy nor instrumental delivery. The elasticity factor of the birth canal that can affect the labour process has not been assessed in this study. In further assessment, elasticity examination with sonoelastography may be performed to assess the elasticity of the birth canal.[6]

This study found that patients with a mean fetal weight of 2941.05 ± 370.11 grams had mild laceration and 3270.56 ± 400.62 grams had severe laceration. The findings of this study are similar to previous studies conducted in Indonesia which stated that the birth weight of babies over 3150 grams had perineal lacerations of degree III–IV.[3] The greater the fetal weight, the greater the dimensions of the fetal body size, this will be related to the head circumference, chest circumference, and fetal body length which in the process of labor will be one of the factors that determine the strain on the mother's birth canal.[7]

TABLE 6
Differences of IMT

IMT	Perineal Laceration				*p*
	Severe		Mild		
	n	%	n	%	
Underweight	1	50	1	50	0.176
Normoweight	1	16.7	5	83.3	
Overweight	0	0	11	100	0.881
Obesitas	16	28.6	40	71.4	

TABLE 7
Logistic regression analysis

Variabel	*p*	OR	95% CI
BMI	0.969	1.207	0.020 – 10.594
Head Circumference	0.007	6.400	1.667 – 24.576
Fetal Birth Weight	0.126	2.531	0.771 – 8.305

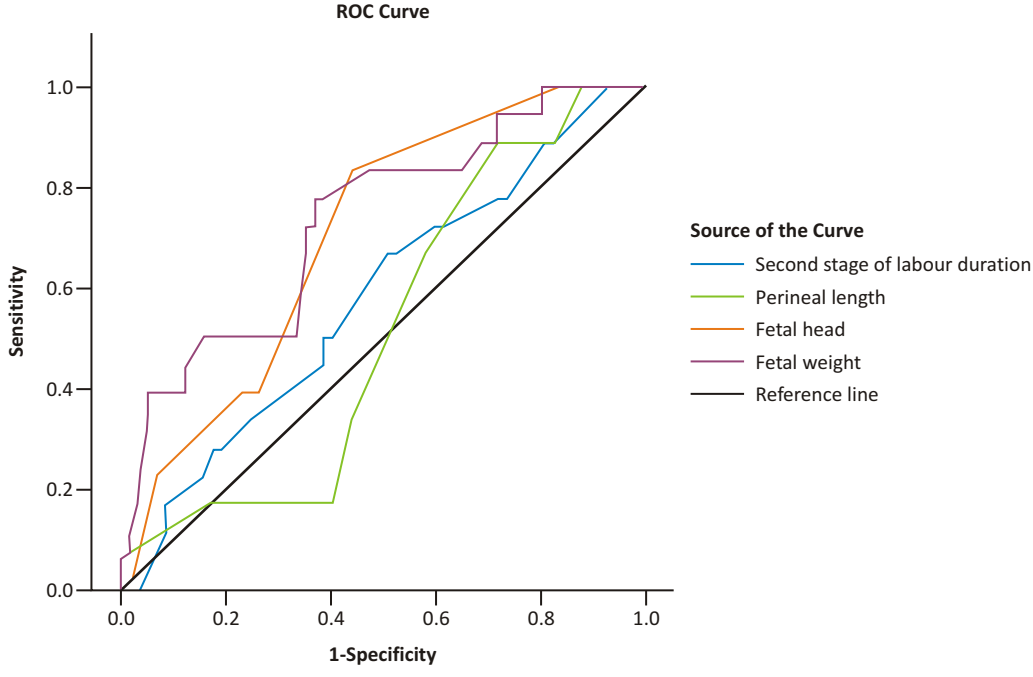

Figure 1. ROC based on variables

A fetal birth weight of more than 3000 grams results in an approximately twofold increased risk of third and fourth degree tears for every additional 500 grams, likely due to the greater increase in biomechanical stress on the vulva, due to the larger size of the newborn with a larger head circumference diameter.[8] Other studies have also shown that birth weight greater than 3500 grams has been established as a risk factor for severe lacerations. Increased infant weight is associated with a higher risk of shoulder dystocia, greater bleeding volume and perineal laceration. Macrosomia is associated with an increased risk for cesarean delivery

TABLE 8
ROC from outcome variable

Variabel	AUC	Cut of point
Second Stage of Labour duration (minutes)	0.576	31.00
Perineal Length (mm)	0.512	30.50
Fetal Head Circumference (mm)	0.701	325.00
Fetal Weight (gram)	0.731	3097.50

TABLE 9
Correlation between second stage of labour duration and degree of perineal laceration

Second stage of labout duration	Degree of laceration, n (%)		*p-value*	*Prevalence Ratio* (95% CI)
	Severe	Mild		
≥31 minutes (n=32)	9 (28.1)	23 (71.9)	0.654	1.3 (0.6 – 3.0)
<31 minutes (n=43)	9 (20.9)	34 (79.1)		

TABLE 10
Correlation between perineal length and degree of perineal laceration

Perineal length	Degree of laceration, n (%)		*p-value*	*Prevalence Ratio* (95% CI)
	Severe	Mild		
<30.5mm (n=44)	12 (27.3)	32 (72.7)	0.606	1.4 (0.3 – 1.7)
≥30.5mm (n=31)	6 (19.4)	25 (80.6)		

and birth canal trauma. Several studies have proposed that macrosomia is associated with higher rates of injury during labor. There were twice as many patients with an anal sphincter tear in the macrosomia group.[8,9]

Fetal head circumference with a value of 334.44 ± 12.47 mm was at risk for severe laceration and was the dominant factor influencing the incidence of perineal laceration. This result is in accordance with previous studies in Indonesia which stated that there was a significant difference in infant head circumference with the incidence of perineal laceration.[1,3] This is related to the stretching of the perineum and vagina during labour, where the mother's birth canal will stretch to accommodate the fetal head circumference. This head circumference is the largest hard diameter of the fetal part. In this study, it was found that there was a relationship between the baby's head circumference and the degree of perineal laceration.

The mean duration of the second stage in this study was 30.81 ± 18.39 minutes. The results of this study are still in accordance with the specified period of waiting time of the second stage in nulliparous patients which is 120 minutes. A short period of time is known to give the perineum insufficient time to stretch, resulting in prematurity in the head extension process, causing a bigger anteroposterior diameter and increasing the likelihood of obstetric trauma.[6]

In the results of the ROC table, the highest value of sensitivity is the head circumference and birth weight of the baby, so that if the head circumference was found to exceed 325 mm accompanied by the baby's birth weight above 3097.5 grams, there is a 66.7% chance that the patient can experience severe perineal laceration. From the AUC it can be concluded that with the results of 0.701 in head circumference and 0.731 in baby's birth weight, statistically, these two measuring values have a fairly good accuracy value for the risk of perineal laceration during spontaneous labor.

Strategies that can be done to minimize the occurrence of perineal laceration are identifying risk factors and modifiable actions. Modifiable factors are labor with maternal actions or positions during labor that increase the flexibility of the sacrum such as the lithotomy position. Non-modifiable risk factors include old age,

TABLE 11
Correlation between Fetal Head Circumference and degree of perineal laceration

Fetal Head Circumference	Degree of laceration, n (%)		*p-value*	*Prevalence Ratio* (95% CI)
	Severe	Mild		
≥325mm (n=40)	15 (37.5)	25 (62.5)	0.008	4.4 (1.4 – 13.9)
<325mm (n=35)	3 (8.6)	32 (91.4)		

TABLE 12
Correlation between fetal weight and degree of perineal laceration

Fetal Weight	Degree of laceration, n (%)		*p-value*	*Prevalence Ratio* (95% CI)
	Severe	Mild		
≥3097.5 gram (n=32)	12 (37.5)	20 (62.5)	0.037	2.7 (1.1 – 6.4)
<3097.5 gram (n=43)	6 (14.0)	37 (86.0)		

post-term pregnancy, infant birth weight, perianal edema, and prolonged second stage of labour.[10,11]

Based on further analysis, fetal head circumference greater than 325 mm increases the risk of severe perineal laceration 4.4 times and Fetal weight greater than 3097.5 grams increases the risk of 2.7 times the occurrence of severe perineal laceration.

From the findings of this study further research is needed regarding the elasticity of the female soft birth canal with tolerance and the occurrence of the degree of perineal laceration in spontaneous labour in primiparas and excluding the factor of external assistance on perineal stretching.

In the combination of fetal weight is more than equal to 3097.5 grams and head circumference (HC) is more than equal to 325 mm, primiparous women should consider the risk of having a severe degree perineal laceration thus deliberately considering labour and delivery in hospital with adequate resources, while the mode of delivery should be still based on obstetrics consideration and indications.

Strengths and Limitations of the Study

The strength of this study is the prospective data collection and assessment of various risk factors. This study also used a validated protocol for documentation of perineal tears to provide more comprehensive information on perineal tears as well as a more homogenous study sample.

Limitations of the application of perineal stretching assistance in Normal Labor Care such as the use of antenatal perineal massage as a protective factor was not included because these variables were not included in the study protocol.[12] Birth canal elasticity assessment was not performed due to the wider coverage of sampling in some areas that did not have adequate tools for assessing the elasticity of the perineum, so the assessment of birth canal elasticity was not included in the research protocol. In this multicenter study, diverse birth attendant could affect the outcome of the degree of perineal laceration even when Indonesia has been carried an all compassing normal labour care for midwives and general practitioner.

CONCLUSION

Based on this study there is no significant association of perineal length with the degree of spontaneous primiparous perineal laceration in aterm pregnancy. While there is an association of fetal head circumference and fetal weight with the degree of spontaneous primiparous perineal laceration in aterm pregnancy.

Further research to determine the predictive factors of estimated fetal weight and ultrasound measurement in third trimester in relation to the perineal laceration may be conducted to give a more predictive risk in spontaneous labour.

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