The Relation Between Development of Vaginal and Perineal Lacerations During Delivery and Stria Gravidarum: A Cross Sectional Study

Original Article

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ABSTRACT

Objective: To evaluate the relation between the degree of the striae gravidarum (SG) and the incidence of vaginal or perineal lacerations and the consequent need for episiotomy.

Study design: This cross-sectional multicentre observational study was carried out on 466 pregnant delivered in Cairo, Ain Shams Universities and private hospitals. The striae gravidarum (SG) was assessed according to the numerical scoring system of Atwal. The primary outcome of this study was the occurrence of vaginal or perineal lacerations and the need for episiotomy in relation to the degree of the SG.

Results: The incidence of vaginal, perineal lacerations and the need for episiotomy increased significantly with higher degrees of total striae score (TSS) (6.82 ±3.77 vs. 3.27 ±2.84, $P < 0.001$, 6.1 ±3.38 vs 4.14 ±3.57, $P < 0.001$ and 4.79 ±3.73 vs. 3.96 ±3.33, $P = 0.018$ respectively) . There was a significant correlation between perineal lacerations and TTS ($P < 0.001$),lower parity ($P = 0.002$) , fetal head position (P0.002), Higher gestational age ($P= 0.015$), the need for episiotomy ($P < 0.0010$, occurrence of vaginal lacerations and its length ($P < 0.001$ and 0.002 respectively) and higher neonatal birth weight ($P = 0.002$). There was also a significant correlation between vaginal lacerations and older maternal age ($P = 0.023$), Body mass index ($P = 0.004$), TTS ($P < 0.001$),), the need for episiotomy ($P = 0.012$, occurrence of perineal lacerations and its length ($P < 0.001$) and higher neonatal birth weight ($P = 0.012$).

Conclusion: TTS of SG assessed prenatally could predict occurrence of vaginal, perineal lacerations and the need for episiotomy.

Key Words: Episiotomy; perineal lacerations; striae gravidarum; vaginal delivery; vaginal lacerations.

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INTRODUCTION

The general clinical appearance of skin is identified with pigmentation, glands, vasculature, and connective tissue. Cutaneous changes in pregnancy can be best comprehended by looking at each of these diverse parts of skin structure[1].

Pigmentation — almost every single pregnant woman builds up some level of expanded skin pigmentation. This for the most part happens in discrete, restricted areas and might be because of provincial contrasts in melanocyte thickness inside the epidermis[1]. Occasionally, generalized hyperpigmentation occurs[2].

It has been shown that the pigmentary changes occur early in pregnancy and before the elevation of plasma alpha-melanocyte stimulating hormone (MSH) levels, which occur in late gestation[3].

The most regular cutaneous pigmentary change is darkening of the linea alba, which turns into the linea nigra[4]. The expanded pigmentation may traverse from the pubic symphysis to the xiphoid process, yet for the most part returns to its typical hypopigmented state after delivery[5].

Striae distensae are a common form of dermal scarring that appear on the skin as erythematous, violaceous, or hypopigmented linear striations. Synonyms include the

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terms striae, stretch marks, and striae atrophicans. Striae gravidarum are striae dispense occurring secondary to pregnancy[6].

There are two principle types of striae distensae, striae rubra and striae alba. Striae rubra are the most punctual introduction of striae distensae and are portrayed by an erythematous to violaceous shading[7]. After some time, striae rubra advance into striae alba, which seem hypopigmented, atrophic, and scar-like. Basic areas for striae distensae are the abdomen, breasts, medial upper arms, hips, lower back, buttocks, and thighs[8].

Although typically asymptomatic, striae distensae may be disfiguring causing psychological stress to patients[9]. Different topical and procedural modalities have been introduced for the treatment of striae distensae[10].

Stretch marks are thin and disorganized all over the body; fibrils are trophoelastin-rich, which is likely due to uncoordinated synthesis[11].

Under light microscopy, there is flattening of the epidermis with atrophy and loss of rete ridges and increased glycosaminoglycans[12].

The severity and progression of affected areas varies from patient to another, which indicates a variable genetic predisposition[13]. Striae gravidarum is a sign for decreased skin elasticity which in turn makes it more vulnerable to vaginal and perineal lacerations[14].

The aim of our study is to find the correlation between the degree of the striae gravidarum (SG) reflecting the skin elasticity and the occurrence of vaginal, perineal lacerations and the consequent need for episiotomy

MATERIAL AND METHODS

This cross-sectional multicentre observational study was carried out in Egypt between January 2019 and August 2020 on 534 pregnant females, who gave birth in Cairo and Ain Shams Universities' hospitals and private hospitals. The ethical committee of Cairo University endorsed its approval before starting the study. Written consents have been signed by the patients before enrolment in the study after explanation of the purpose of the study.

Our inclusion criterion included women underwent vaginal delivery of a single, vertex, term fetus (completed 37 weeks of gestation to the end of 41 weeks) with expected fetal weight 2- 4 Kg.

Women who needed instrumental delivery or termination of the trial of vaginal delivery by Caesarean section were excluded. Those who had shoulder dystocia were also excluded.

All participating females were subjected to full history taking including demographic criteria in the form of: age, gravidity, parity, any chronic medical problems, previous deliveries, as well as measuring and recording Body mass index (BMI). Obstetric examination was performed by a senior obstetrician to confirm gestational age, fetal position and presentation, as well as to determine the presence of any of the exclusion criteria.

On admission, it is the protocol of our hospitals to perform a transabdominal sonographic (TAS) scans as many of the women included in the study never attended for any antenatal visits and did not have any antenatal notes. TAS was done to confirm the fetal number, presentation, position, amount of liquor, placental position and any abnormalities that may indicate cesarean delivery. TAS scan was performed by a senior sonographers using Voluson 730 Pro (GE, Fairfield, CT, NY, USA) machines using the abdominal probe 2 – 5 MHz

The severity scoring of striae gravidarum was observed by middle grade obstetrician and recorded using the numerical scoring system of Atwal and colleagues[15]. This scoring system provides a rank based on observation of the most commonly four areas in which the striae is observed (abdomen, hips, buttocks, and breast) the scale comprises the following criteria; (a) the number of striae gravidarum at each body site (0=no striae signs, 1=1-4 striae, 2=5-10 striae, 3=more than 10 striae) and (b) the colour of the striae gravidarum which ranges from pale to purple (0=no redness, 1=pink, 2=dark red, 3=purple). The final score for each body site, relating to number and colour, ranges from 0 to 6. Accordingly, the TSS (total striae score) for all four-body sites ranges from 0 to 24. Consequently, according to the TSS score, women were divided into 3 grades: a) mild: those with TSS score up to 12, b) moderate: with TSS score between 13-18 and c) severe: for females with TSS score more than 18.

Delivery was then performed by another obstetrician who was blinded to the striae grade. Episiotomy was done only when clinically indicated. The extent of vaginal and perineal tears, in addition to mediolateral episiotomies if needed during the delivery were also recorded.

The primary outcome parameter was the occurrence of perineal trauma (PT). Secondary outcomes included development of vaginal lacerations and the need for episiotomy.

In our study, the sample size was calculated based on comparing two proportions from independent samples in a cross sectional study using Chi test[16], the α-error level was fixed at 0.05, the power was set at 80% and the intervention groups (case: control) ratio was set at 1. The total sample that was calculated to be included in the study was 413 pregnant mothers. Sample size calculation was done using

PS Power and Sample Size Calculations software, version 3.0.11 for MS Windows (William D. Dupont and Walton D. Vanderbilt, USA).

The data were entered and analyzed using SPSS 15 (Chicago, IL). The independent variables were SG scores at each body site; TSS, BMI at labour; and neonatal birth weight (assessed as continuous variables). Data are presented as means standard Deviations. Independent sample t tests were used to compare the striae scores between women with and without PT. Pearson correlation was performed to assess the association between BMI and TSS.

RESULTS

In the present study, we initially recruited a total number of 562 pregnant women attended to the labour ward for delivery and fulfilled the inclusion criteria. Thirty-six women apologized on participating in the study, another 32 females delivered by emergency caesarean section, 2 women had shoulder dystocia and another 26 women needed instrumental delivery. Those 96 women have been excluded from the study leaving 466 females reached the final analysis.

(Figure 1) shows that the abdomen was the site with the highest score of striae, followed by the breasts, buttocks and hips respectively.

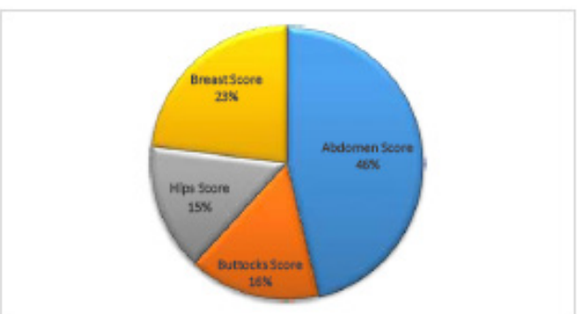

Fig.1: Percentage of striae score distributions at each body site

The participants characteristics include a mean age of 28.39 ± 6.42 years, parity of 1.11 ± 1.23, gestational age of 37.68 ± 2.31 weeks, and body mass index of 29.05 ± 4.1 Kg/m^2

(Table 1 and Figure 2), displayed the different factors that can affect the incidence of perineal lacerations. It showed that the TSS, the gestational age, EFW, fetal head position, neonatal birth weight and doing episiotomy have significant relation with the incidence of the perineal lacerations. There is also a significant relation between vaginal laceration length and the incidence of perineal lacerations (p<0.05).

(Table 1 and Figure 2) displayed the different factors that can affect the incidence of vaginal lacerations. It showed that the BMI, TSS, the gestational age, EFW, neonatal birth weight and doing episiotomy have significant relation with the incidence of the perineal lacerations. There is also a significant relation between perineal laceration length and the incidence of vaginal lacerations (p<0.05).

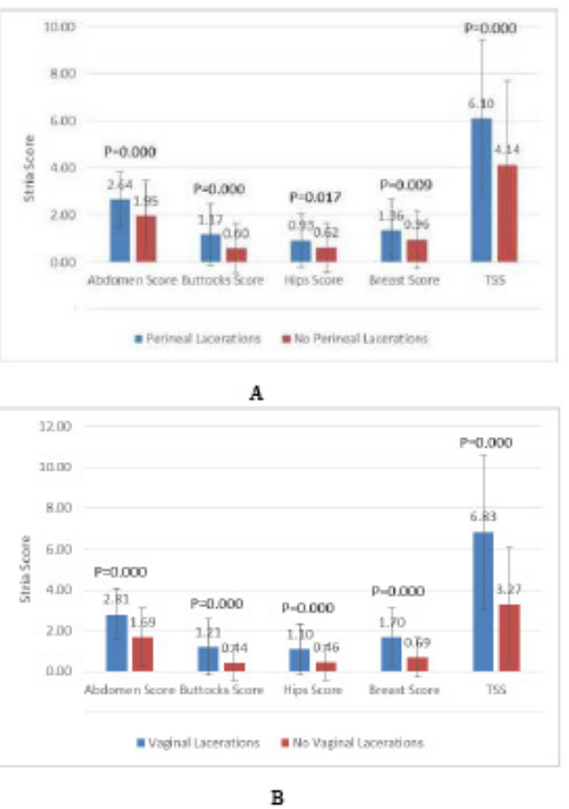

Fig. 2: Differences between striae scores in women with and without A: perineal lacerations. B vaginal lacerations

The scores of SG among women who had no perineal lacerations were compared versus those with 1st, 2nd or 3rd degree perineal lacerations. ANOVA revealed a significant increase in the degree of perineal lacerations with increased TSS (p =0.000) (Figure 3).

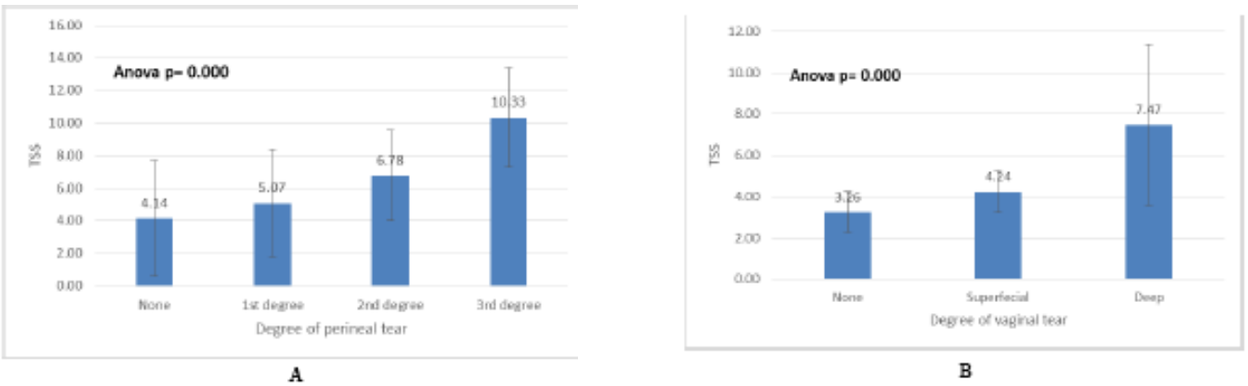

Fig. 3: Degree of lacerations in association with TSS. A: perineal lacerations. B: vaginal lacerations

The scores of SG among women who had no vaginal lacerations were compared versus those with superficial or deep vaginal lacerations. ANOVA revealed a significant increase in the degree of vaginal lacerations with increased TSS (p =0.000) (Figure 3).

Logistic regression analysis was performed to predict the risk for perineal lacerations. The results are presented in Table 2 and show that higher TSS, OP position of fetal head and absent episiotomy were significantly associated with a higher incidence of perineal lacerations.

Logistic regression analysis was also performed to predict the risk for vaginal lacerations and showed that higher TSS and absent episiotomy were significantly associated with a higher incidence of perineal lacerations (Table 2).

Table 1: Factors affecting the incidence of perineal and vaginal lacerations

Yes (n=84, 18%)		Per	ineal Lacerations		Vaginal Lacerations		
		No (n=382, 2%)	*P value*	Yes (n=160, 34.3%)	No (n=306, 65.7%)	*P value*	
Age		29.55 ±5.97	28.14 ±6.5	0.068	29.32 ±6.11	27.9 ±6.53	0.023*
Gravidity and Parity	Primparas	24, 28.6%	180, 47.1%	0.002*	76, 47.5%	128, 41.8%	0.241
	Multiparas	60, 71.4%	202, 52.9%	0.002*	84, 52.5%	178, 58.2%	0.241
Gestational age (weeks)		37.95 ±1.94	37.62 ±2.38	0.238	37.86 ±2.31	37.56 ±2.31	0.223
BMI (kg/m2)		29.79 ±4.1	28.88 ±4.08	0.068	29.74 ±3.4	28.69 ±4.38	0.004*
TSS		6.10 ±3.38	4.14 ±3.57	0.000*	6.82 ±3.77	3.27±2.84	0.000*
GA by ultrasound (weeks)		38.03 ±1.76	37.43 ±2.08	0.015*	37.85 ±1.9	37.37 ±2.1	0.013*
Expected fetal weight (g)		3199.3 ±410.6	3052.4 ±458.3	0.007*	3153.4 ±446.4	3039.9 ±452.5	0.010*
Fetal presentation	Occipitoanterior	66, 78.6%	348, 91.1%	0.001*	140, 87.5%	274, 89.5%	0.506
	Occipitoposterior	18, 21.4%	34, 8.9%	0.001*	20, 12.5%	32, 10.5%	0.506
Delivery conducted by	Senior	24, 28.6%	140, 36.6%	0.16	52, 32.5%	112, 36.6%	0.379
	Junior	60, 71.4%	242, 63.4%	0.16	108, 67.5%	194, 63.4%	0.379
Episiotomy	Yes	28, 33.3%	270, 70.7%	0.000	90, 56.2%	208, 68%	0.012*
	No	56, 66.7%	112, 29.3%	0.000	70, 43.8%	98, 32%	0.012*
Vaginal laceration	Yes	54, 64.3%	106, 27.7%	0.000*	------	--------	--------
	No	30, 35.7%	276, 72.3%	0.000*	---------	---------	--------
Perineal lacerations	Yes	------	--------	--------	54, 33.8%	30, 9.8%	0.000*
	No	---------	---------	--------	106, 66.2%	276, 90.2%	0.000*
Vaginal laceration length (cm)		1.48 ±1.21	0.65 ±1.15	0.000*	---------	----------	--------
Perineal laceration length (cm)		---------	----------	--------	0.69 ±1.03	0.15 ±0.48	0.000*
Neonatal birth weight (g)		3197.6 ±423.7	3027.8 ±447	0.002*	3130.6 ±456	3020.6 ±438.6	0.012*

Data are presented as mean ± SD or number, percent P value <0.05 showed statistical difference

Table 2: Logistic regression to predict the risk for perineal and vaginal lacerations

		Estimate	Chi-	P-Value	OR	95% C.I.	for OR
		Square			Lower	upper	
Perineal	Parity (MG)	0.353	0.124	0.725	0.883	0.442	1.764
Lacerations	TSS	0.036	27.034	0.000*	0.829	0.772	0.890
	Fetal Head (OA)	0.369	9.780	0.002*	0.315	0.153	0.650
	GA by ultrasound	0.131	0.204	0.651	0.942	0.729	1.219
	EFW	0.001	0.532	0.466	1.001	0.999	1.002
	Episiotomy (done)	0.339	27.339	0.000*	0.170	0.087	0.330
	Neonatal Birth Weight	0.001	0.804	0.370	0.999	0.998	1.001
Vaginal	Age	0.021	0.134	0.714	0.992	0.953	1.034
Lacerations	BMI	0.03	0.032	0.857	0.995	0.937	1.056
	TSS	0.04	77.538	0.000*	0.703	0.65	0.761
	GA by ultrasound	0.107	1.751	0.186	0.867	0.703	1.071
	EFW	0.001	0.1	0.752	1	0.998	1.001
	Episiotomy (done)	0.255	10.078	0.002*	0.445	0.270	0.734
	Neonatal Birth Weight	0.001	0.409	0.522	1	0.999	1.002

**P value* <0.05 showed statistical difference

DISCUSSION

The results of our observational study showed that the degree of TSS affected significantly the incidence of vaginal and perineal lacerations that may occur during delivery and the increased need for episiotomy. In other words, pregnant females with high TSS are more prone to have vaginal or perineal lacerations, in addition to the need for episiotomy. According to our knowledge and after searching in the literature, we found some studies, which have been done on the same topic. However, most of them was retrospective depending on file data. It is the first time to be observed on Egyptian females with different skin structure and appearance that may be influenced according to ethnicity.

By analysing the different variables that can play a role in developing of perineal lacerations, it was found that perineal lacerations are affected significantly by the severity of TSS in addition to parity, gestational age and expected fetal weight, fetal presentation, performing episiotomy or not, the presence of and length of vaginal lacerations, and neonatal birth weight. Although the deliveries were conducted by senior and junior staff, this did not significantly affect the incidence of perineal tears.

The relationship between the striae and the perineal trauma could be clarified; as the striae gravidarum (SG) may present as an indication of diminished skin elasticity[17,18], this can actually explains the fact that the more severe the TSS score, the increased incidence for episiotomies, vaginal and perineal lacerations.

In spite the fact that decreased skin elasticity has been proposed as a cause for perineal laceration, the relation between those two variables has not been established[19,20]. In a study conducted by Kapadia *et al*., 2014, there was significant correlation between the degree of striae gravidarum and the perineal tears[16]. In addition, another study in 2010 concluded that striae scores can be used as a predictor for perineal tears and should be included as a part of the obstetric examination[21].

Different elements were found to have marked relationship with perineal tears as primiparity, gestational age, EFW, the neonatal birth weight and also occipitoposterior position. A recent review that coordinates with our outcomes carried out a meta-analysis on the distinctive factors that may predispose to perineal tears. Perineal tears were more typical in cases with high neonatal birth weights and abnormal cephalic position as occipitoposterior[22].

Another study in 2011 correlated the incidence of severe perineal tears to primiparity, occipitoposterior and heavier birth weights, which goes with our study[23].

The strength of this study lies in being multicenter study carried in 2 of the largest universities in the middle east, and the adequate number of patients. On the other hand, the main limitation of this study was being cross-sectional observational study; performing a prospective study, in which the patients would be followed up from the beginning of the pregnancy and to be able to correlate with another different factors like the amount of weight gain during pregnancy, would have been better, but

unfortunately this is currently difficult to be performed as the patients are usually not compliant to the regular antenatal care, so follow up would be somehow difficult.

Also, observing the striae and recording the score was done subjectively by different obstetricians. In fact, it was not possible for s a single obstetrician to observe all those numbers participated in the study; especially it was done on three different sites.

CONCLUSION

In conclusion, assessing the striae degree prior to delivery may help in predicting the occurrence of vaginal and perineal lacerations and need for episiotomy, which subsequently would be beneficial in counseling the pregnant females about the risk of developing such tears during their deliveries

AUTHOR CONTRIBUTIONS

Mahmoud Soliman: Study design and manuscript writing Ahmed Maged: Data analysis, manuscript writing

Sameh Salama: Data collection, manuscript writing Marwa Sharaf : Data collection, manuscript writing Ebtihal Eltaieb: Data collection, manuscript writing Mazen Abdel Rasheed: Data analysis, manuscript writing Rehab Lotfy Data collection, manuscript writing

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. We obtained Kasr Alainy local ethical committee approval.

Informed consent: Informed consent was obtained from all individual participants included in the study

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CONFLICT OF INTERESTS

There are no conflicts of interest.

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