

Urethrovaginal space during the third trimester of pregnancy is not related to vaginal orgasm

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Summary. *Introduction:* Sexologists have described the urethrovaginal space (UVS) as a region of the body involved in the female orgasm. Recently certain authors have described the UVS via ultrasound (US). Pregnancy is associated with a myriad of physiological, anatomical and biochemical changes. To measure the UVS thickness in the third trimester of pregnancy and to investigate the relationship between the UVS thickness and the presence of vaginal orgasm. *Material and Methods:* Sexually active pregnant patients in the third trimester were included. We measured the UVS via US. Each patient compiled a modified female sexual function index (FSFI) questionnaire and was categorized in group with or without vaginal orgasm. Association between vaginal orgasm and UVS thickness was evaluated via t-test and ROC curve analysis. *Results:* UVS thickness resulted greater than 15 mm (average) in the third trimester, and was not related to the presence of vaginal orgasm ($p>0.05$). *Conclusion:* UVS thickness is high in the third trimester of pregnancy but it is not related to the presence of vaginal orgasm. (www.actabiomedica.it)

Key words: G spot, pregnancy, orgasm, urethrovaginal space

Introduction

Since the 1950s (1) sexologists have described the urethrovaginal space (UVS) as a region of the body involved in the female orgasm. In non pregnant women UVS has been described via 2-D Ultrasound (US) and in greater detail via 3-D US. In both cases an association between UVS thickness and the presence of vaginal orgasm (2, 3) was found.

Controversy still exists about the independence of the UVS (therefore vaginal orgasm) from the more classical clitoral orgasm. Recently certain authors have inserted the UVS in a wider anatomophysiological structure called the “clitoris-urethra-vagina (CUV) complex” (4-6). Within this complex vaginal orgasm

is caused by contact of the internal clitoris and the anterior vaginal wall.

Unfortunately pregnancy has often been a period of the women’s life neglected by medical literature in regard to sexual health (7). Given this paucity of information found in literature, it is not surprisingly that many physicians confess to lacking specific knowledge and communication skills to deal with their patients’ sexual dysfunction (8). Therefore, there are many misconceptions among women regarding sexual activities and sexual satisfaction during pregnancy (9). Not long ago some physicians prohibit vaginal intercourse during pregnancy (10). Recent scientific evidence of the relative safe nature (11, 12) of sexual activity during all trimesters of pregnancy has lead to changes in

counseling. However, patient's fear of fetal harm remains in a considerable percentage of patients (13).

Pregnancy is associated with a myriad of physiological, anatomical and biochemical changes and though poorly understood the majority of them seem to be regulated by changes in hormone levels. Pregnancy is characterized by elevation levels of circulating estrogens, progesterones and androgens, all of which increase with advancing gestational age (14, 15). Intra and extracellular water retention, tissue hypertrophy and hyperplasia lead to several anatomical changes during normal pregnancy (1). Almost all maternal tissues and organs are invested by this "hormonal storm". These physiological hormonal changes during pregnancy also provide an opportunity to examine the UVS. Studies have demonstrated that a reduction in estrogen secretion, due to menopause, can lead to decreasing UVS thickness and suggest a hormonal influence of this structure (16).

In light of the current evidence in the literature supporting increased vaginal orgasm with increased UVS, we decided to examine this anatomical structure during the third trimester of pregnancy where available evidence is lacking. Given the demonstrated change of UVS thickness with hormonal changes we chose the third trimester of pregnancy because of the height of increased hormonal secretion. We hypothesize that in the third trimester of pregnancy, when the estrogen and androgen peak is highest, the UVS thickness will be greater. Furthermore, we investigated the relationship between the UVS thickness and the presence of vaginal orgasm.

Materials and methods

A cohort of volunteers was recruited from the population of women who underwent routine clinical examination, at Careggi University Hospital, during pregnancy. Approval for this study was obtained from the Internal Ethical Committee. All the patients provided informed consent.

Inclusion criteria were singleton pregnancy in the third trimester (from 24th to 40th weeks of gestation), absence of any illness arising before or during pregnancy, and sexual activity at least twice a week during

the month before the interview. All women underwent a clinical interview at our pregnancy outpatient clinic. For this purpose, a modified female sexual function index (FSFI-6) was used, assessing sexual function (SF) in the last 4 weeks (17). A total score of less than 19 was considered suggestive of female sexual dysfunction (SD). All women with SD were excluded from the study.

Vaginal orgasm was ascertained by the following question: "Have you experienced a vaginal orgasm in the last month?". Responses were categorized as "yes" or "no".

US was performed with a Voluson model 730 Expert, 8 MHz (General Electric Medical Systems, Milwaukee, WI, USA) using a transvaginal probe. There are 2 different US methods to obtain UVS visualization: the introital and the translabial approach. We decided to use the former because the trans-vaginal probe is easily available in almost every ambulatory outpatient clinic. The superiority of the translabial approach over the introital has not been uniformly demonstrated. Transvaginal probe is a well validated instrument for urodynamic studies (18, 19). The procedure was performed following the indications appearing in the academic literature (3). Investigators were blinded to the patient FSFI-6 results. All procedures were performed with patients in a modified Trendelenburg position and with a full bladder filled to a volume of 300 mL.

The ultrasound evaluation was obtained by an introital approach with the transducer placed over the external urethral orifice and the transducer axis corresponding to the body axis.

Total urethral length and vaginal lumen were visualized in the midsagittal plane. One investigator measured the thickness of the urethrovaginal space obtained from the ultrasound images.

The anatomical border between the inner smooth muscle and mucosa submucosa layer of the urethral wall can be distinguished by US, as can the border between the vaginal wall and its lumen, seen as a strip of low echogenicity (Fig. 1). All the measurements were made in millimeters, using a line from the boundary of the smooth muscle and mucosa-submucosa layer of the urethral wall and the border of the vaginal wall and its lumen (Fig. 2). Measurements were taken at

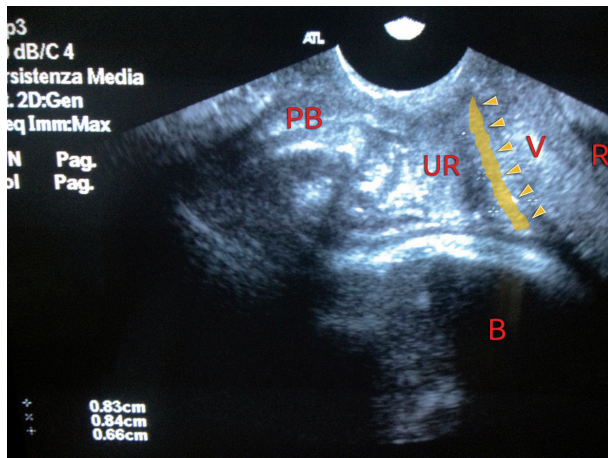


Figure 1.

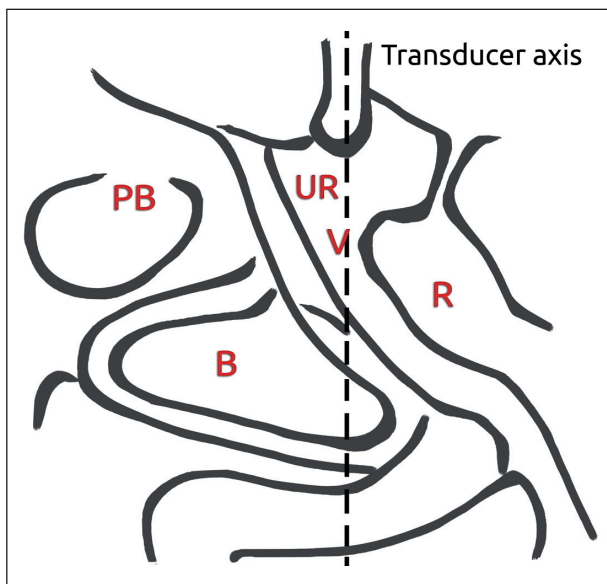


Figure 2.

various percentiles of the urethra length. The internal urethral meatus was considered as the zero point and the external meatus as the 100th percentile (Fig. 3). In the midsagittal plane, we measured the thickness of the UVS at the 10th (proximal segment), 50th (middle segment), and 90th percentile (distal segment) of the urethra (Fig. 3). The thickness was measured three times at each location and the median value was considered for statistical purposes.

We kept a distance of at least 5 cm between the internal uterine orifice (IUO) and the presenting part.

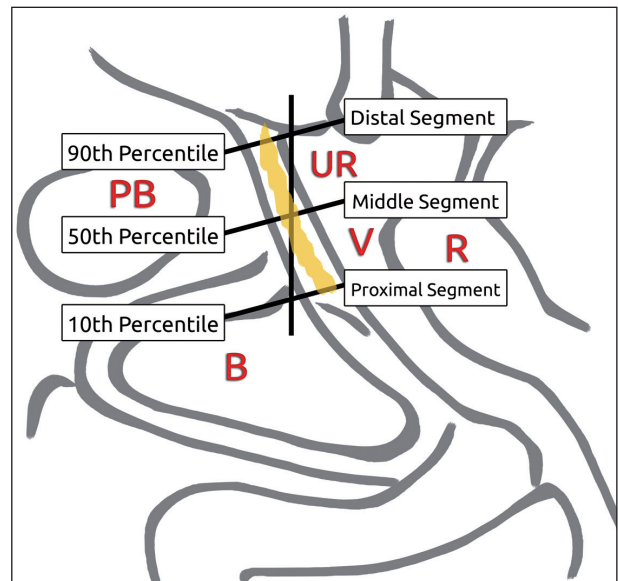


Figure 3.

The subjects were divided into 2 groups according to the presence of vaginal orgasm.

Statistical analysis

Statistical analysis was performed using SPSS 21.0 (SPSS Inc., Chicago, IL, USA) software. All *P* values less than 0.05 were considered to indicate significance. Normal distribution of the variables was checked with Shapiro-Wilk test. Normally distributed variables were presented as average ± SD and were analyzed with *t* test. The chi-square test was used to analyze categorical variables.

Based on available literature (2), a target sample size of 13 patients in each group was estimated to allow us to detect a minimum difference with a power of 80% using $\alpha=0.05$.

Results

A cohort of 26 consecutive volunteers who met the inclusion criteria was recruited.

Demographic and obstetrical data are shown in table 1.

Table 1. Demographic and obstetrical data

	All the patients	Group 1 (with vaginal orgasm) n=12	Group 2 (without Vaginal 4 orgasm) n=1	p value
Age (years)	31.7±4.7	31.3±5.7	32±3.4	0.7375*
BMI (kg/m ²)	20.9±1.96	20.9±2.2	20.93±1.7	0.9964 *
Race	Caucasian (100%)	Caucasian (100%)	Caucasian (100%)	1
Smoking	0	0	0	1
Gestational Age (weeks±days)	36.56±0.36	36.53±0.24	36.59±0.44	0.7078*
Para ≥1	13 (50%)	7	6	0.6951 **
FSFI-6	21.8±2.1	21.3±2.0	22.2±2.2	0.3039*

*t test; **Fisher exact test

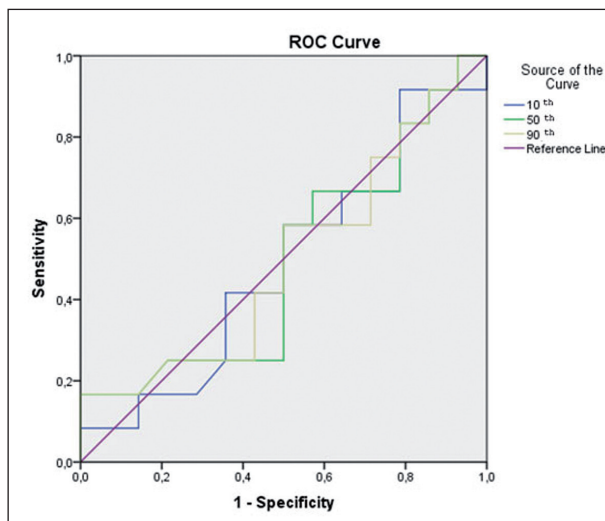
None of the patients smoked, all the patients were of Caucasian race (tab. 1). The mean age was 31.7±4.7 years. Twelve patients experienced at least one vaginal orgasm in last month and were considered group 1 and the other 14 patients group 2.

All the demographic and obstetrical data analyzed (tab. 1) were similar in the two groups ($p>0.05$).

FSFI did not differ between the two groups (tab. 1).

Mean UVS thickness was 18.4±6.7 at 10th centile, 17.7±6.6 at 50th centile, 18.8±7.8 at 90th centile.

We found no statistically significant regarding UVS thickness difference between the group 1 and 2. UVS thickness was similar in all the 3 segments. ROC curve analysis (Fig. 4) did not find a cut off value for each percentile ($p>0.05$), and AUC did not differ significantly between the three percentiles (AUC 0.485, 0.491, 0.497; $p>0.05$).

**Figure 4.**

Discussion

In our study we found a mean UVS thickness of more than 15 mm in all the segments considered along the anterior vaginal wall, indicating a large increase in UVS thickness as compared to other studies in fertile non-pregnant women (2, 3) and in menopausal women (20). Therefore this result confirmed our hypothesis of an increased UVS thickness during pregnancy. Other studies have demonstrated that a reduction in estrogen secretion, due to menopause, can lead to decreasing UVS thickness (16). Maternal estrogen levels rise during pregnancy up to more than 100-fold the value pre-pregnancy (1). Battaglia et al. (21) demonstrated an enlargement of UVS in hyper-androgenic women with PCOS, especially in the middle part of the urethra. Maternal androgen levels increase as early as during the conception cycle and remain elevated throughout pregnancy (22, 23). There is an increment of androgen levels during the three trimesters (24, 25).

It is plausible that UVS enlargement is a consequence of the complex hormonal balance in women, dominated by estrogens and androgens in the third trimester (1, 26). As with other anatomical modification during pregnancy, the modification of the UVS is probably due to a mix of water retention, cellular hyperplasia and hypertrophy.

In our study, UVS was not significantly different between patients with or without vaginal orgasm during third trimester of pregnancy. This is not in accordance with the previous studies of the UVS in non-pregnant women (2, 3). This could be explained by rejecting the hypothesis of localizing the UVS in the anterior wall of the vagina previously reported by other studies outside pregnancy (2, 3). It is also possible that

the UVS does not function independently but instead as part of the CUV complex, as outlined by certain authors (4, 5). Even admitting the independence of the vaginal orgasm from the clitoral orgasm, some authors highlighted the importance of taking into account the response by other part of the vaginal cavity (27). In fact penile length has been independently associated with the achievement of vaginal orgasm (28), through the stimulation of deep vaginal region and cervical site. However these studies did not visualize via US the deeper vaginal or cervical zone, but relied upon a questionnaire (27, 28). We did not analyze the clitoral response and neither the incidence of the penile length to the achievement of vaginal orgasm, and these could be considered limitations of the study.

One may argue that the UVS is not properly functional during pregnancy, especially in the third trimester. Many studies have found a decline in SF, sexual arousal and frequency of orgasm in the third trimester (29). The reasons for this decline are not yet fully understood, though some authors (30) have suggested patient concerns such as exhaustion, fatigue, fear of harming the fetus, changes in body image (31) or sexual hormonal levels (26). While the majority of hormonal and physiological changes take place during the first trimester, the increase in body weight and body habitus is more prone to occur during the second and third trimesters.

Alternatively there could be a histological explanation. If the number of relevant nerve endings is proportional to the tissue mass, which could be the basis for the correlation in non-pregnant women, and if the tissue enlarges due to hormonal changes of pregnancy, this might not increase the numbers of relevant nerve endings and actually reduce the density of relevant nerve endings, and thereby reduce the correlation with vaginal orgasm. One may even speculate that the transformation of the UVS itself influences the decline of SF during the third trimester, but we consider this hypothesis less probable.

The limitation of our study was the absence of longitudinal multiple observations before the pregnancy and during all the three pregnancy trimesters and the inclusion of a control group of non-pregnant women.

Conclusions

This is the first study that analyses SF during pregnancy with the support of the ultrasound and not solely a questionnaire or blood hormonal levels. We failed to find an association between the UVS thickness and the achievement of vaginal orgasm or SF. Further studies are needed to assess whether this lack of correlation is merely casual or it is somewhat connected with the decline of SF in the third trimester with a cause-effect relationship.

Furthermore, we confirmed that in women this anatomical space is easily measurable with minimal discomfort to the patient. Whether the UVS thickness is related any adverse outcomes in pregnancy warrants further study. Further studies are needed to assess longitudinally the modification of UVS during each pregnancy trimester and post-partum, making a comparison with pre-pregnancy status in the same patients.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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