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ORIGINAL ARTICLE

Assessment of clitoral anatomy in human fetuses

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Abstract

Purpose To determine fetal clitoral dimensions in antenatal period and to provide a contribution to external genital morphology determination in premature infants.

Methods Thirty-one formalin fixed female fetuses aged between 18 and 40 weeks (17 fetuses aged 21.53 ± 1.88 weeks in the second trimester and 14 fetuses aged 31.00 ± 4.90 weeks in the third trimester) were evaluated. 20 (64.5%) fetuses were between 3 and 97% percentile range and within normal limits. Clitoris appearance (completely covered by labium majus/partially showing/prominent), length and width of clitoris, labium minus length, length, and width of labium majus were assessed.

Results Clitoris length during the second trimester was 4.84 ± 1.09 mm, whereas it was 5.43 ± 1.07 in the third trimester. Clitoris width was as 3.35 ± 0.88 mm in the second trimester and as 4.55 ± 0.96 mm in the third trimester. A statistically significant increase was seen in width of clitoris, length, and width of labium majus and length of labium minus with gestational age in the second and third trimesters ($p < 0.05$). No significant difference was found between the second and third trimesters in terms of clitoris length ($p = 0.146$). A homogenous spread in clitoris appearance was obtained between the second and third trimesters without any significant difference ($p = 0.912$). In addition, fetus percentiles showed a homogenous spread without any significant differences between completely covered, partially covered and prominent groups ($p = 0.452$).

Conclusion The anatomical data can be beneficial to the development of fetal radiological screening procedures in females and also in morphological assessment criteria in premature infants, effectively assisting in diagnosing anomalies during the early term.

Keywords Clitoris · Labium majus · Labium minus · Fetus · Premature · Clitoromegaly

Introduction

Fetal sex determination is currently a routine procedure in prenatal screening and performed on the 14–24th gestational weeks using ultrasonography [23]. Sex determination with antenatal ultrasonography is performed by visualization of fetal penis and scrotum in males and parallel two labium lines in females [5]. However, sex determination can be difficult or erroneous in some cases [7]. Especially, during antenatal assessment of external genitalia in female fetuses, differentiation of normal-abnormal external genital development such as hypospadias, cordial, and sexual development disorders can be hard to distinguish from clitoromegaly [16].

With the current technological developments, external genital assessment in antenatal period shows progress more. However, normal visualization of external genitalia especially in female fetuses is still debated [7]. External genital examination findings in female neonates are based on the clinician's subjective assessment. Clear visualization of the clitoris, especially in premature babies, can be misinterpreted by the clinicians and might cause ordering unnecessary additional tests, in addition to causing anxiety in the families [12, 13, 19, 22]. The lack of anti-Müllerian hormone and androgens leads the differentiation through female phenotype [3]. Moreover, some situations where

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clitoromegaly is normal for the age can be misjudged in detailed physical exam, yet it also prevents a wrong sex determination in female babies with advanced virilization [2, 13, 18]. Labium minus can be seen as partially developed in female babies delivered in term, yet labium majus and clitoris can be easily visualized [19, 21]. On the other hand, external genital assessment in premature female babies is still considered a difficult task with no clear consensus amongst physicians.

Although there are a number of quantitative studies on describing external genital morphology [1, 4, 12] in the literature, studies that include antenatal period are limited [17]. Those measurements are affected by ethnic differences and even by other factors such as measurement methods, reference points and variety of measurement tools [2, 11, 12, 17–20]. In this study, our main objective is to determine fetal clitoral dimensions in antenatal period and to provide a contribution to external genital morphology determination in premature infants and fetuses.

Materials and methods

Thirty-one formalin fixed female fetuses aged between 18 and 40 weeks without any deformities on lower extremity or genital area, present in the collection of Mersin University Faculty of Medicine Anatomy Department, were included in the study. Ethical approval was obtained from Mersin University Clinical Research Ethics Committee (2019/63). Fetal development of fetuses was assessed by femur length as an antenatal period percentile identifier. Femur length was specified by measuring femur diaphysis between greater trochanter distal and lateral condyle proximal [8]. Following the determination of gestational age in weeks with foot length, percentiles of fetuses were calculated by fetal biometry graph using measured femur lengths [8], (Table 1), (Fig. 1).

Fetuses were placed in a lithotomy position. Measurements were taken only from the right side. Clitoris appearance was assessed in addition to measurement of the following parameters (Fig. 2):

- Clitoral length (a): the distance from crus of clitoris insertion at pubis symphysis to the tip of the glans of clitoris.
- Clitoral width (b): the largest transverse diameter of clitoral tissue.
- Labium minus length (c): the distance from the top of the clitoris to the lower labium margin.
- Labium majus length (d): the distance between symphysis pubis to the posterior fourchette.
- Labium majus width at the point of mid-length (e): the distance between interlabial sulcus and the lateral margin of the labium majus.
- Clitoral visibility: the visibility of clitoris is classified according to the study of Agyei et al. [2] (Fig. 3). (1) Clitoris which is completely covered by labium majus, (2) Clitoris which is partially seen, and (3) Clitoris which is prominent.

Reduction of plasticity in the tissue content was reported as 0.5–1% [9, 10] and shrinkage caused by 10% formalin fixation was overlooked in the measurements. Digital calipers

Table 1 Demographic data of fetuses

Gestational age (weeks)	Number of fetuses	Foot length (mm)	Femur length (mm)	0–3 Percentile (n)	3–50 Percentile (n)	50–97 Percentile (n)
18	1	27.16	30.28	–	–	1
20	4	30.44 ± 0.64	32.48 ± 1.89	–	1	3
21	5	33.34 ± 0.73	31.33 ± 5.54	2	1	2
22	3	36.56 ± 0.85	37.90 ± 2.82	–	3	–
23	1	39.06	35.68	–	1	–
24	1	42.93	35.51	1	–	–
25	2	44.89 ± 2.48	40.70 ± 2.41	–	2	–
26	3	44.60 ± 0.60	39.78 ± 4.36	2	1	–
27	3	48.87 ± 2.05	46.48 ± 2.67	1	1	1
28	1	51.12	41.06	1	–	–
30	1	58.11	51.69	1	–	
35	3	64.10 ± 1.99	58.85 ± 3.45	2	1	–
36	2	67.75 ± 2.99	61.05 ± 2.90	1	1	–
40	1	78.19	74.02	–	–	1

mm millimeter, *n* number

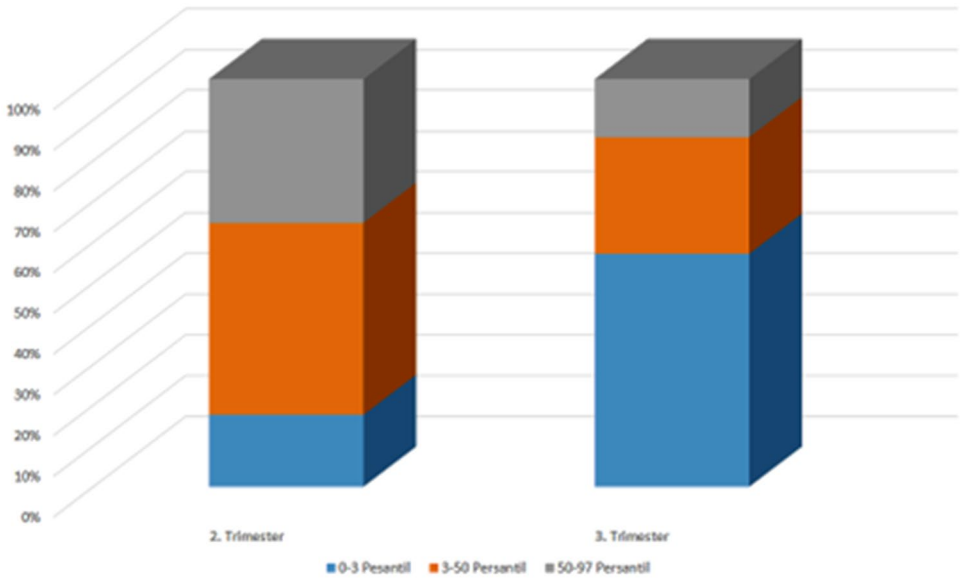

Fig. 1 Distribution of the fetuses according to trimesters

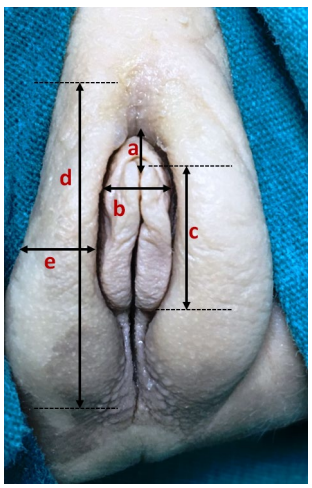

Fig. 2 Measurement parameters in 36 weeks aged fetus. **a** Clitoris length, **b** Clitoris width, **c** Labium minus length, **d** Labium majus length, **e** Labium majus mid-length

with 0.01 mm precision were used for width and length measurements. All the measurements were taken under the same environmental conditions by two researchers (Cİ as a pediatric urologist and ÖE as an anatomist).

Shapiro–Wilk test was used to normality checks. Minimum, maximum, mean values, and standard deviation were used as descriptive statistics in continuous parameters, whereas numbers and percentages were used to express categorical parameters. Student *t* test was used to check the difference between two groups and ANOVA test was used to compare more than two groups. Chi-square test was used to determine the relations between categorical parameters. In addition, intraclass correlation coefficient (ICC) and significance levels were calculated to compare the accordance of the results between the researchers. The statistical significance level was set as $p < 0.05$.

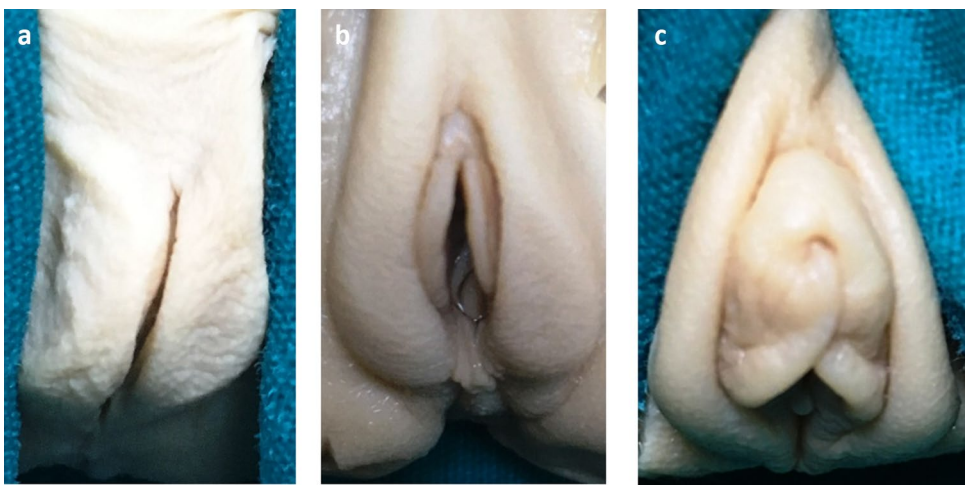

Fig. 3 Clitoris visibility **a** completely covered by labium majus in 22 weeks aged fetus, **b** partially showing in 27 weeks aged fetus, **c** prominent in 26 weeks aged fetus

Results

Mean age of fetuses in the second trimester ($n=17$) was 21.53 ± 1.88 weeks, whereas the same value for fetuses in the third trimester ($n=14$) was 31.00 ± 4.90 weeks. Following the assessment of fetal developmental percentiles, 20 (64.5%) fetuses were between 3 and 97% percentile range and within normal limits. The measurements made by the independent researchers proved that the reliability of the data was appropriate (ICC = 0.936–0.998, $p<0.001$).

Table 2 shows the spread of morphometric measurement values in fetuses during the second and third trimesters. Clitoris length during the second trimester was measured as 4.84 ± 1.09 mm, whereas it was measured as 5.43 ± 1.07 in the third trimester. Clitoris width was measured as 3.35 ± 0.88 mm in the second trimester and as 4.55 ± 0.96 mm in the third trimester. A statistically significant increase was seen in width of clitoris, length and width of labium majus, and length of labium minus with gestational age in the second and third trimesters (clitoris width $p=0.01$, others $p<0.001$). However, no significant difference was found between the second and third trimesters in terms of clitoris length ($p=0.146$).

Table 3 shows the spread of morphometric measurements in the second and third trimesters, according to clitoris appearance. The largest value for clitoris length during the second trimester was 5.26 ± 0.95 mm in prominent group and 6.56 ± 1.27 mm in completely covered group in the third trimester. The largest value for clitoris width was measured as 3.55 ± 1.02 mm in prominent group during the second trimester, whereas it was measured as 4.87 ± 0.95 mm in prominent group during the third trimester. Finally, the largest labium majus width was measured as 2.80 ± 0.90 mm in completely covered group during the second trimester and as 7.60 ± 2.18 mm in completely covered group during the third trimester.

Table 3 also shows the clitoris appearance spread during the second and third trimesters. The results showed a homogenous spread in clitoris visualization, which were determined as completely covered, partially covered and prominent, between the second and third trimesters without any significant difference ($p=0.912$).

Fetus percentiles spread according to clitoris visualization is shown in Table 4. Fetus percentiles showed a homogenous spread without any significant differences between completely covered, partially covered and prominent groups ($p=0.452$).

Discussion

The main objective of this study was to determine a growth pattern for clitoral dimensions in premature and term neonates by assessing external genital morphometry of female

Table 2 Morphometric data of fetuses according to gestational ages (mm)

Weeks	C-Length			C-Width			Lmj-Length			Lmj-Width			Lmi-Length		
	Min	Mean ± SD	Max	Min	Mean ± SD	Max	Min	Mean ± SD	Max	Min	Mean ± SD	Max	Min	Mean ± SD	Max
18–25 (n:17)	2.80	4.84 ± 1.09	6.84	2.12	3.35 ± 0.88	5.68	5.95	10.59 ± 2.77	15.91	1.10	2.64 ± 0.72	3.64	2.52	4.14 ± 1.26	6.35
26–40 (n:14)	3.76	5.43 ± 1.07	7.46	2.95	**4.55 ± 0.96**	6.35	10.89	**19.70 ± 4.96**	27.78	2.32	**5.45 ± 1.91**	9.14	3.23	**9.31 ± 3.84**	16.64
p	0.146			**0.01**			**< 0.001**			**< 0.001**			**< 0.001**		

Bold values indicate higher results in the third trimester than second trimester

Min minimum, *Max* maximum, *SD* standard deviation, *C* clitoris, *Lmj* labium majus, *Lmi* labium minus, *n* number, *p* significance level

Table 3 Distribution of vulvar measurements according to gestational age and clitoral appearance

Parameters	Completely covered (n:2)		Partially showing (n:4)		Prominent (n:11)	
	Mean	Range	Mean	Range	Mean	Range
18–25 weeks						
C-Length	4.13 ± 1.48	3.08–5.17	4.08 ± 0.95	2.80-4.83	5.26 ± 0.95	3.87-6.84
C-Width	3.39 ± 0.32	3.16–3.61	2.79 ± 0.26	2.46–3.09	3.55 ± 1.02	2.12–5.68
Lmj-Length	12.65 ± 1.96	11.27–14.03	9.20 ± 1.45	7.89–11.25	10.73 ± 3.10	5.95–15.91
Lmj-Width	2.80 ± 0.90	2.17–3.44	2.48 ± 0.42	1.85–2.73	2.67 ± 0.82	1.10–3.64
Lmi-Length	4.15 ± 1.53	3.07–5.23	3.15 ± 0.73	2.52–4.17	4.50 ± 1.28	2.98–6.35
Parameters	Completely covered (n:2)		Partially showing (n:4)		Prominent (n:8)	
	Mean	Range	Mean	Range	Mean	Range
26–40 weeks						
C-Length	6.56 ± 1.27	5.66–7.46	5.20 ± 1.33	3.76–6.78	5.27 ± 0.85	4.41–6.92
C-Width	4.52 ± 0.06	4.47–4.56	3.95 ± 1.06	2.95–5.43	4.87 ± 0.95	3.89–6.35
Lmj-Length	26.02 ± 2.49	24.26–27.28	18.49 ± 4.82	13.13–24.02	18.73 ± 4.64	10.89–24.37
Lmj-Width	7.60 ± 2.18	6.05–9.14	4.86 ± 0.62	4.14–5.60	5.02 ± 2.09	2.32–7.32
Lmi-Length	14.56 ± 0.21	14.41–14.71	8.12 ± 0.58	7.25–8.47	8.60 ± 4.25	3.23–16.64

C clitoris, *Lmj* labium majus, *Lmi* labium minus, *n* number

Table 4 Fetal percentiles according to clitoral appearance

	Percentile			
	0–3% (n)	3–50% (n)	50–97% (n)	Total
Clitoral appearance				
Completely covered	0	3	1	4
Partially showing	4	2	2	8
Prominent	7	7	5	19

n number

fetuses with set percentiles between 18 and 40 weeks of gestational age. In addition, the relationship between fetal development percentiles with clitoris and vulva morphometrics which can be used for the radiological assessment during antenatal period was studied.

Prepuce of clitoris and glans of clitoris were measured together in the present study. Excluding prepuce of clitoris in fetuses during developmental stage in antenatal period is not practical. However, there have been some studies which excluded this [2, 4, 15, 19]. Moreover, the assessment of antenatal radiological screening in which this study would like to contribute is also done without excluding prepuce of clitoris [23]. Table 5 shows the quantitative data of clitoris and vulva during postnatal period in the literature.

Antenatal term radiological screening allows the morphometric assessment of external genitalia in female fetuses using ultrasonography and is beneficial in diagnosing clitoromegaly [7]. In addition, Nemec et al. [14] conducted a study about external genital pathologies' relationship with bilabial distance measurements using ultrasonography in antenatal period. However, it must not be overlooked the fact that radiological assessment of clitoromegaly during antenatal period using ultrasonography does not have the detailed measurements which can only be obtained by morphological anatomy studies due to technical reasons [17].

Litwin et al.'s [13] study that included 30–41-week-old premature and term infants tried to standardize clitoris length according to delivery weight and gestational age. Özgüner et al. tried to correlate all clitoral dimensions with gestational age. The study results reported that clitoris length did not show a statistically significant difference between the second and third trimesters, which can be explained by a rapid clitoral enlargement during the second trimester with slowed down growth in the third trimester [17]. On the other hand, Riley and Rosenbloom [19] reported that clitoral length was 3.8 ± 0.2 mm on the 27th week of gestation and this increased up to 3.45 ± 0.09 mm during term, with no change within the first year of postnatal period. Similarly, Kutlu and Akbiyik [12] reported no correlation between gestational age and head circumference ($p > 0.05$) and a negative correlation between clitoral height and body weight ($p = 0.004$). Morphometric results obtained from our study showed no significant difference between the second and third trimesters in terms of clitoris length during antenatal period, yet there was a significant increase in clitoris width, labium majus length and width, and labium minus length with gestational age (Table 2). In terms of clitoris length, our study results were in accordance with the previous studies' findings which report no significant difference in clitoris length with gestational age.

Table 5 Literature findings of vulvar measurements (mm)

Studies	Region	Number of specimen	C-Length	C-Width	Lmj-Length	Lmj-Width	Lmi-Length
Riley and Rosenbloom [19]	United States	46 white newborns	–	3.27	–	–	–
		42 black newborns		3.66			
Oberfield et al. [15]	United States	82 newborns	4.0 ± 1.24	3.32 ± 0.78	–	–	–
Phillip et al. [18]	Israel	221 Jewish newborns	5.87 ± 1.48	–	–	–	–
		349 Bedouin newborns	6.61 ± 1.72				
Kutlu and Akbıyık [12]	Turkey	325 newborns	4.93 ± 1.61	–	–	–	–
Jarret et al. [11]	Nigeria	251 > 28 weeks aged term and preterm newborns	7.5 ± 1.8	4.4 ± 0.89	–	–	–
Agyei et al. [2]	Ghana	612 newborns	4.13 ± 1.60	4.21 ± 1.1	–	–	–
Özgüner et al. [17]	Turkey	1 trimester-24 fetuses	3.12 ± 0.76	1.94 ± 0.56	3.97 ± 0.83	0.97 ± 0.19	1.50 ± 0.41
		2 trimester-54 fetuses	4.46 ± 1.21	2.74 ± 1.03	9.55 ± 3.11	2.18 ± 0.75	4.25 ± 1.67
		3 trimester-29 fetuses	5.10 ± 1.59	4.25 ± 1.21	22.40 ± 4.34	5.41 ± 1.18	11.49 ± 1.79
		Full term-6 fetuses	6.81 ± 1.64	5.95 ± 1.54	32.43 ± 1.28	9.50 ± 0.64	16.70 ± 1.88
This study	Turkey	2 trimester-17 fetuses	4.84 ± 1.09	3.35 ± 0.88	10.59 ± 2.77	2.64 ± 0.72	4.14 ± 1.26
		3 trimester-14 fetuses	5.43 ± 1.07	4.55 ± 0.96	19.70 ± 4.96	5.45 ± 1.91	9.31 ± 3.84

The changes in clitoris width and length significantly affect the morphological view of clitoris. A clitoris length above 1 cm is defined as clitoromegaly [13]. Agyei et al.'s study on term neonates reported clitoromegaly as clitoris width above 6.2 mm and clitoris length as 7.5 mm. They detected the smallest clitoral dimensions in completely covered group, whereas the biggest clitoral dimensions were seen in prominent group [2]. In addition, Kutlu and Akbiyik's study on normal newborns reported that clitoris dimensions were significantly smaller in completely covered group (< 5 mm). They advised that clitoris lengths over 8 mm should be monitored, whereas a clitoris length over 10 mm should be deemed as pathological [12]. In our study, we determined the largest values in clitoris width on prominent clitoral visualization group in both the second and third trimester groups, yet the largest value for clitoral length in prominent group in the second trimester and completely covered in the third trimester group. In addition, the largest labium majus width was measured within completely covered group in both the second and third trimester groups. These results support our thesis that prominent clitoral visualization during antenatal period is related to labium majus developmental processes. Back to our study results, clitoris length was 4.84 ± 1.09 mm in the second and 5.43 ± 1.07 mm in third trimesters. Clitoris width was as 3.35 ± 0.88 mm in the second and 4.55 ± 0.96 mm in third trimesters. These results are in accordance with the previous results found in the literature (Table 5).

In the study, we grouped fetal term external genital structures as completely covered, partially covered and prominent using morphological variations during developmental stage. Especially, in early terms of intrauterine development processes, it is known that there is a prominent view which can be mistaken for clitoromegaly and this is a normal part of the developmental process [12]. However, we were unable to find a significant difference in terms of this morphological classification between the second and third trimesters (Table 3). It is suggested that the prominent view of clitoris should be assessed with labium majus development. As labium majus, which covers the clitoris, is not complexly developed at that stage, a prominent clitoral visualization can also be interpreted as normal dimensions during that period [19]. As also seen in our study, labium majus width was 2.64 ± 0.72 in the second trimester and 5.45 ± 1.91 mm in the third trimester. These results showed that there was a significant increase in labium majus width with advanced gestational age (Table 2). However, when fetus developmental status determinants (percentiles) spread over clitoral visualization groups were assessed, the spread was seen as homogenous without any significant difference between the groups ($p > 0.05$) (Table 4). We saw that percentile values which indicate fetal development did not have a significant relationship with morphometric assessment and measurements' spread. This contradicts the main idea that fetus development and fetal morphometric measurements was parallel to each other. This can be due to the number of the fetuses included in the study. Therefore, the limited number of fetuses for each gestational week period can be seen as an important limitation of our study.

When previous studies on standardization of female external genitalia morphometric measurements were reviewed, developmental variations of external genitalia in females aged 0–16 should not be overlooked in the assessment of differences in morphometric measurements [1, 4,

6, 12]. Clitoris dimensions are crucial in defining clitoromegaly both in fetuses during antenatal period as well as neonates. The cases where the sizes are within pathological borders should be studied for the possible reasons for virilization. For this reason, the investigation and assessment of external genital examination findings are a priority subject during antenatal period as well as in premature babies in our opinion.

Conclusion

The necessity of including vulvar developmental processes when assessing clitoral dimensions in female fetuses during antenatal period should be taken into consideration. The anatomical data obtained with our study can be beneficial to the development of fetal ultrasonographical screening procedures in females and also to morphological assessment criteria in premature infants; effectively assisting in diagnosing anomalies during the early term.

Author contributions Cİ and ÖE: project development, data collection and analysis, manuscript writing, and editing; ZÇ and GT: data collection and analysis; HT: project development and editing.

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Compliance with ethical standards

Conflict of interest All authors declare no conflict of interest.

References

1. Akbiyik F, Kutlu AO (2010) External genital proportions in prepubertal girls: a morphometric reference for female genitoplasty. J Urol 184(4):1476–1481
2. Asafo-Agyei SB, Ameyaw E, Chanoine JP, Zacharin M, Nguah SB (2017) Clitoral size in term newborns in Kumasi, Ghana. Int J Pediatr Endocrinol 2017:6
3. Bargy F, Laude F, Barbet JP, Houette A (1989) The anatomy of intersexuality. Surg Radiol Anat 11(2):103–107
4. Brodie KE, Grantham EC, Huguelet PS, Caldwell BT, Westfall NJ, Wilcox DT (2016) Study of clitoral hood anatomy in the pediatric population. J Pediatr Urol 12(3):177
5. Bronshtein M, Rottem S, Yoffe N, Blumenfeld Z, Brandes JM (1990) Early determination of fetal sex using transvaginal sonography: technique and pitfalls. J Clin Ultrasound 18(4):302–306
6. Chalmers DJ, O'Donnell CI, Casperson KJ, Berngard SC, Hou AH, Nuss GR, Cost NG, Wilcox DT (2014) Normal anatomic relationships in prepubescent female external genitalia. J Pediatr Urol 10(6):1117–1121
7. Chitayat D, Glanc P (2010) Diagnostic approach in prenatally detected genital abnormalities. Ultrasound Obstet Gynecol 35(6):637–646
8. Chitty LS, Altman DG, Henderson A, Campbell S (1994) Charts of fetal size: 4. Femur length. Br J Obstet Gynaecol 101(2):132–135
9. Cutts A (1988) Shrinkage of muscle fibres during the fixation of cadaveric tissue. J Anat 160:75–78
10. Grzonkowska M, Baumgart M, Badura M, Dombek M, Wiśniewski M, Paruszewska-Achtel M, Szpinda M (2017) Quantitative anatomy of the growing quadrates lumborum in the human foetus. Surg Radiol Anat 40(1):91–98
11. Jarrett OO, Ayoola OO, Ritzen M (2010) Clitoral and penile sizes in healthy newborn babies in Ibadan, Nigeria. Endocr Abstr 2010(24):P15
12. Kutlu A, Akbiyik F (2011) Clitoral length in female newborns: a new approach to the assessment of clitoromegaly. Turk J Med Sci 41(3):495–499
13. Litwin A, Aitkin I, Merlob P (1991) Clitoral length assessment in newborn infants of 30 to 41 weeks gestational age. Eur J Obstet Gynecol Reprod Biol 38(3):209–212
14. Nemec SF, Nemec U, Weber M, Rotmensch S, Brugger PC, Kasprıan G, Krestan CR, Rımoın DL, Graham JM, Prayer D (2011) Female external genitalia on fetal magnetic resonance imaging. Ultrasound Obstet Gynecol 38(6):695–700
15. Oberfield SE, Mondok A, Shahrivar F, Klein JF, Levine LS (1989) Clitoral size in full-term infants. Am J Perinatol 6(4):453–454
16. Odeh M, Ophir E, Bornstein J (2008) Hypospadias mimicking female genitalia on early second trimester sonographic examination. J Clin Ultrasound 36(9):581–583
17. Özgüner G, Öztürk K, Bilkay C, Dursun A, Sulak O, Koyuncu E (2017) Appearance of external genital organs and types of hymen in Turkish female foetal cdavers. J Obstet Gynaecol 37(2):215–222
18. Phillip M, De Boer C, Pilpel D, Karplus M, Sofer S (1996) Clitoral and penilesizes of full term newborns in two different ethnic groups. J Pediatr Endocrinol Metab 9(2):175–179
19. Riley WJ, Rosenbloom AC (1980) Clitoral size in infancy. J Pediatr 96(5):918–919
20. Sharony R, Bental YA, Eyal O, Biron-Shental T, Weisbrod M, Shiff Y, Weintrob N (2012) Correlation between prenatal and postnatal penile and clitoral measurements. J Clil Ultrasound 40(7):394–398
21. Standring S, Borley NR, Collins P, Crossman AR, Gatzoulis MA, Healy JC (2008) Gray's anatomy: the anatomical basis of clinical practice, 40th edn. Elsevier, Churchill Livingstone
22. Williams CE, Nakhal RS, Achermann JC, Creighton SM (2013) Persistent unexplained congenital clitoromegaly in females born extremely prematurely. J Pediatr Urol 9(6):962–965
23. Zimmer EZ, Blazer S, Blumenfeld Z, Bronshtein M (2012) Fetal transient clitoromegaly and a transient hypertrophy of the labia minora in early and mid pregnancy. J Ultrasound Med 31(3):409–415