

A Study of Adolescent Female Genitalia: What is Normal?



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ABSTRACT

Study Objective: Female adolescents often present to health care providers with concerns about the appearance of their external genitalia. These patients might experience significant distress about their genital appearance and might request surgery to correct a perceived abnormality. Accurate descriptions of normal adolescent female genital anatomy are lacking in the literature. The purpose of this study was to examine a small sample of normal female adolescents to obtain measurements and descriptors of the external genital structures, with a focus on the size and morphology of the labia minora.

Design, Setting, Participants, Interventions, and Main Outcome Measures: Participants were female adolescent patients, ages 10-19 years, who underwent routine surgical procedures in the operating room.

Results: Forty-four patients were examined. The mean age was 14.4 years (range 10-19 years). Mean height was 159.6 cm and mean weight was 60.8 kg. Most were non-Hispanic ethnicity (n = 32/44; 72%) and were Caucasian race (n = 38/44; 86%). Right and left labia minora lengths were different in n = 19/44 patients (43%). Right and left labia minora widths also differed, in stretched (n = 20/33; 61%) and unstretched (n = 24/44; 55%) labia, with a difference ranging from 1 to 22 mm. There was no correlation between size and shape of labia minora and patient age, height, weight, or race.

Conclusion: Wide variability exists in female adolescent genital anatomy with no established normal range. This study provides a resource for physicians who care for adolescent girls, who need normative data to describe female genital anatomy. We propose that the role of labiaplasty in adolescents should be considered with extreme caution because of the wide range in size and morphology and paucity of data in this population.

Key Words: Adolescent, Female, Pediatric, Genitalia, Labia, Labiaplasty, Clitoris

Introduction

Female adolescent patients often present to primary or secondary care providers with concerns about the appearance of their external genitalia. These patients might experience significant distress about their genital appearance and might request surgery to correct a perceived abnormality. In recent years, the prevalence of labiaplasty is increasing in women of all ages.¹⁻³ Driving factors for this increased concern about genital appearance are not fully understood but might stem from trends in tight-fitting clothing, genital grooming, and the availability of vulvar images on the internet.⁴ Accurate descriptions of normal female adolescent genital anatomy are lacking in the current literature, although some reports exist in the younger pediatric female and adult female populations.⁵⁻⁷ Furthermore, advertisements promoting female genital cosmetic surgery are widespread on the internet, contributing to adolescent perceptions of what is normal vulvar anatomy.⁸ The purpose of this study was to examine a small sample of normal female adolescents to obtain measurements and descriptors of the

external genital structures, with a particular focus on the size and morphology of the labia minora.

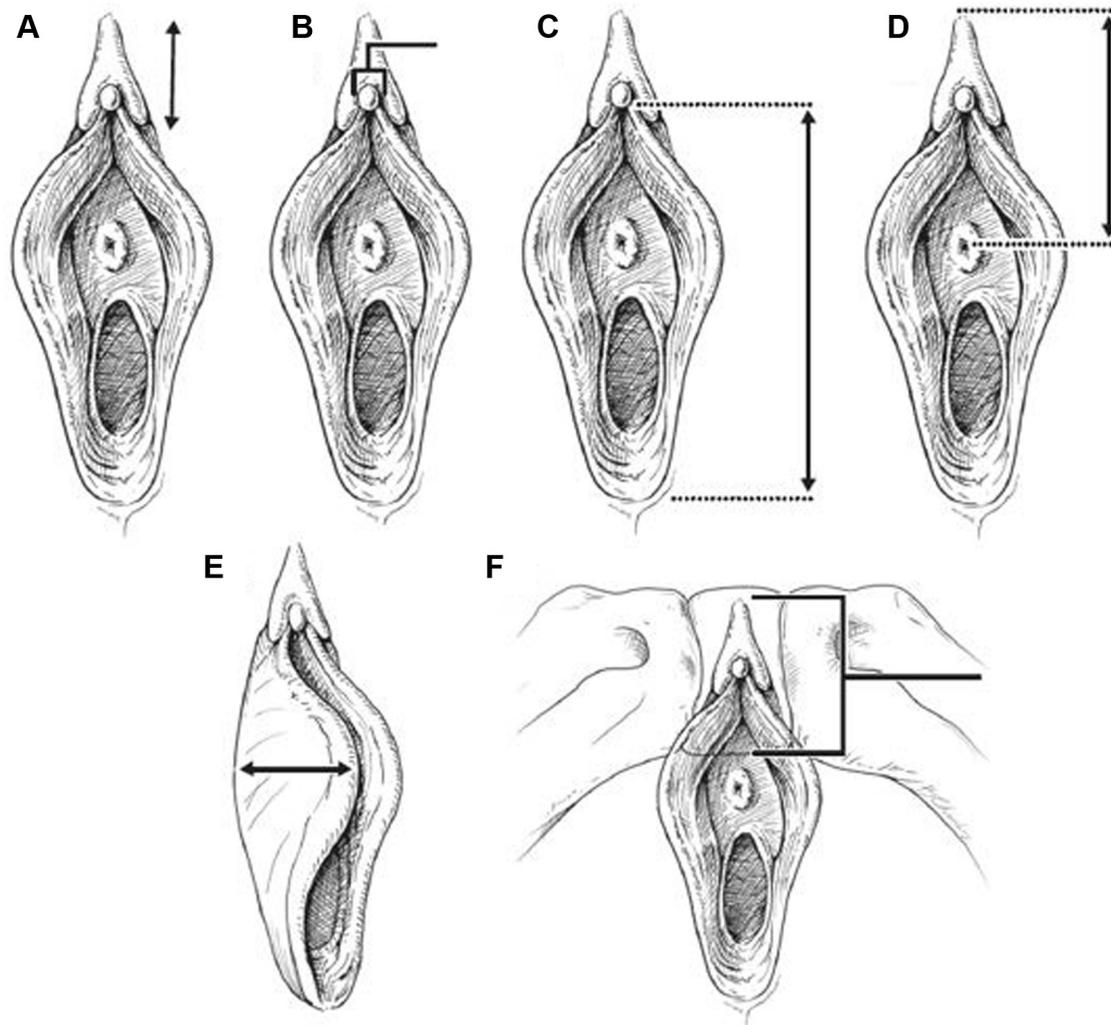
Materials and Methods

This study was conducted prospectively at a single institution and was approved by the institutional review board (09-0296) before patient recruitment. The study was conducted over a 34-month period (December 2014 to October 2017). Female adolescent patients who underwent scheduled elective procedures in the operating room were approached to participate in the study. Study personnel approached patients ages 10-18 years who presented for routine gynecology, general surgery, urology, orthopedic surgery, and gastroenterology procedures.

The medical record was reviewed to obtain demographic data, current medications, height and weight, and any medical or surgical history that would preclude them from participation in the study. Exclusion criteria included previous or currently scheduled genital surgery, history of anorectal or genital abnormality, current urethral catheterization, prepubertal patients (Tanner stages 1-2), and any endocrine disorder with effects on the genitalia. Tanner staging was assessed intraoperatively, from a genital perspective only. All parents gave full informed consent and all adolescents gave separate assent.

The authors indicate no conflicts of interest.

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- A.** clitoral hood length
- B.** clitoral diameter
- C.** length of labia minora
- D.** clitoral hood to urethral orifice
- E.** width of labia minora
- F.** clitoral hood to lower border of pubic symphysis

Fig. 1. Illustrations showing measurements collected. (A) clitoral hood length, (B) clitoral diameter, (C) length of labia minora, (D) clitoral hood to urethral orifice, (E) width of labia minora, and (F) clitoral hood to lower border of pubic symphysis.

Patients had the option to allow a photograph to be taken, and gave consent for collection and publication of any pictures collected. The patients were examined after induction of anesthesia, either in a frog-leg position or in stirrups. The examination and measurements were conducted by a small team to reduce interobserver variability (2 pediatric urology fellows and 2 adolescent gynecology attendings). Before study induction, the team met to discuss and agree upon the exact dimensions to be measured and anatomical sketches were created, showing the proposed measurements. The sketches were used at each data collection to minimize variability between patients. Measurements were obtained using a flexible, paper ruler and

recorded in millimeters. The labia majora were parted to allow visualization of the vulvar structures. The following measurements were taken: clitoral hood length, clitoral diameter, length of labia minora, clitoral hood to urethral orifice, width (protrusion) of labia minora and clitoral hood to lower border of pubic symphysis (bony landmark; Fig. 1). The labial width was measured unstretched at the point of maximal protrusion and then a gentle stretch was applied to the mid-aspect of the labia minora to record the maximal stretched length. Median and ranges were calculated for the anatomic distances measured. Data on Tanner staging of genitalia were also collected. Descriptive statistics were computed to assess the measurements. Pearson coefficient



Fig. 2. Photographs showing observed variation in labia minora morphology (color, size, and shape).

was used to identify significant correlations with genitalia measurements and age, weight, height, and Tanner stage. Statistics were computed using IBM SPSS version 24.

Results

Forty-four patients were studied. No patients in the study needed to be excluded for Tanner stage less than 3 during the examination. The median age was 14 years (range 10–19 years). Median height was 160.9 cm (range, 144.0–172.8 cm) and median weight was 57.0 kg (range, 41.6–140.0 kg). Regarding pubertal development, 4 patients (9.0%) were Tanner 3, 20 patients (45.5%) were Tanner 4, and 20 patients (45.5%) were Tanner 5. Four patients (9.0%) were taking estrogen-containing medications. The ethnic composition was: Hispanic ($n = 10$; 22.7%), non-Hispanic ($n = 32$; 72.7%), and unknown ($n = 2$; 5%). The race composition was: African-American ($n = 4$; 9.0%), white ($n = 38$; 86.4%), and other ($n = 2$).

Right and left labial lengths were different in 19/44 patients (43%, Table 1). Right and left labia minora widths also differed, in stretched ($n = 20/33$; 61%) and unstretched ($n = 24/44$; 55%) labia. When there was a difference in width between unstretched right and left labium, this exceeded 5 mm in 6/44 patients (14%), with an overall range of 1–13 mm in difference. Where there was a difference in width of stretched right and left labium, this exceeded 5 mm in 11/20 (55%), with an overall range of 1–22 mm in difference. Labial lengths were not correlated with age, weight, height, or Tanner stage.

Labia minora color was varied in $n = 33/44$ patients (75%; with variations in color being noted between the base of the minorum and the tip and also between left and right labia, Fig. 2). Labia minora texture was described as keratinized (as opposed to having a smooth, mucous membrane texture) in 31/44 patients (70%).

Discussion

The aim of this study was to record measurements and characteristics of normal adolescent female anatomy in patients with no previous concerns about their anatomy, with a particular focus on the size and morphology of the

labia minora. In our study, we observed great variability in the size, symmetry, and morphology of the vulvar structures. Labia minora measurements did not show any correlation with height, weight, age, or race. Patients taking estrogen-containing medications did not exhibit any noticeable difference in size of their genital structures compared with the rest of the sample population. The variation in genital anatomy that we observed within this adolescent population is consistent with previous studies in adults and younger prepubescent children.^{5–7}

Labiaplasty is defined as a procedure that reduces and makes the labia minora symmetrical.⁹ This procedure is associated with a number of risks including bleeding, wound dehiscence, pain, infection, scarring of the labial edges, introital narrowing, and overhanging of the clitoral hood.^{10,11} The number of adult patients who seek labial reduction surgery has shown a huge increase over the past 10–15 years.^{1–3} Less is known about the prevalence of this procedure in adolescents. The British Society for Paediatric and Adolescent Gynaecology published figures stating that between 2008 and 2012, 266 labial reduction procedures were performed on girls younger than the age of 14 years.¹²

Hypertrophy of the labia minora is described as protrusion of the labia minora that extends beyond the labia

Table 1
Mean Genital Anatomy Measurements

	All patients (N = 44)	Tanner 3 (n = 4; 9.0%)	Tanner 4 (n = 20; 45.5%)	Tanner 5 (n = 20; 45.5%)
Clitoral diameter, mm	3.0 (1–8)	3.5 (2–4)	3.0 (1–6)	3.0 (1.5–8)
Clitoral hood length, mm	15.0 (3–31)	21.0 (10–28)	17.5 (4–31)	15.0 (3–30)
Labia minora length, mm	31.0 (10–90)	35.0 (27–90)	34.0 (10–70)	30.0 (10–80)
Labia width (unstretched), mm	10.0 (3–70)	11.0 (5–30)	10.5 (3–50)	10.0 (3–70)
Labia width (stretched), mm	20.5 (5–62)	20.5 (18–62)	26.5 (7–55)	19.0 (5–51)
Change in width of labia with stretch, mm	10.0 (2–35)	11.0 (3–27)	10.5 (2–35)	8.0 (2–30)

Data are presented as median (range).

majora.¹³ There are no standard diagnostic criteria for the diagnosis of labial hypertrophy. In early descriptions of the condition, Friedrich concluded that labial hypertrophy is present when the maximal width between the midline and the lateral free edge of a labium is greater than 5 cm.¹⁴ However, other colleagues have suggested that the normal width of the labia minora should be less than 3–4 cm,^{15,16} with Rouzier et al suggesting that a distance greater than 4 cm between base and edge to be hypertrophic.¹⁵ However, these varied definitions of labial hypertrophy lack any proper scientific methodology and suggests a pathology with no clinical basis. Most adult women have labia that protrude beyond the labia majora and previously stated abnormal labial widths have no validity in the scientific literature.

Labial hypertrophy can cause functional symptoms such as irritation when walking, jogging, cycling, or wearing tight-fitting clothing. It can interfere with sexual activity, by causing invagination of the protruding labia, and often interferes with routine engagement in sports.^{15,17,18} Oftentimes, these complaints exist regardless of the numerical measurement of the patient's labia, challenging the standard definition created by Friedrich and colleagues.

In addition to functional complaints, if an adolescent perceives that her appearance is not normal it might cause emotional problems including embarrassment, anxiety, and loss of self-esteem.¹⁹ Zwier reported that the most common motivation for women to seek labiaplasty was emotional discomfort.²⁰ Because emotional distress is often transient, caution should be exercised when considering a permanent surgical procedure.

Overall, the motivations behind an adolescent seeking labiaplasty are varied and understudied. Veal et al reported that 70.8% of women who seek labiaplasty cited esthetic reasons as a motivation; however, 62.5% cited functional reasons.²¹ Michala et al surveyed 16 adolescent girls who presented with labial concerns and reported that some of their sources of information on labial appearance included internet pictures, and comparison with siblings and their mother.²² Crouch et al reported that most women who seek labiaplasty have labial measurements that are within normal limits.¹ Because of the multiple sources for adolescents to receive their information, it is imperative that we understand the motivations behind our patients pursuing labiaplasty and create standard guidelines to be able to educate our patients on what is normal.

The current adolescent literature is limited in assessment of what defines normal labial anatomy. Our study begins the process of establishing what is normal in the adolescent population. The results of our study show that there is wide variability in labial size, color, and texture and is independent of chronological age, Tanner staging, race, and exogenous estrogen exposure.

The American College of Obstetricians and Gynecologists Committee on Adolescent Healthcare opinion statement²³ notes that the first step in management of patients who seek labiaplasty should include education and reassurance. Part of the educational process involves reassuring patients on what is normal anatomy. In this study we aim to help providers establish guidelines for what is normal, and provide objective evidence regarding the variability in labia

size, color, and texture. Patients should then be offered reassurance and nonsurgical options when appropriate. They should also be screened for body dysmorphic disorder. Finally, only when patients show true functional impairment, have completed pubertal development, and show emotional maturity to make autonomous decisions that are free from peer or family pressures, should surgical correction be considered.

One of the limitations of this study was the small sample size; female adolescents approached to take part in the study were sometimes reluctant to give their consent. The research was also conducted in a single institution with a limited referral population. Our study population was not ethnically diverse, a result of the limited study population who presented for surgical care and those who agreed to participate in our study. We did not ask the study participants about their own perceptions of their genital esthetics; this was not within the confines or aims of our study. Future studies would be useful to collect information on a larger sample size, as well as to assess genital size and morphology among adolescents who present with some dissatisfaction in their genital anatomy and factors that influence their self-perception. A strength of this study is that it is one of the only studies to assess external genitalia dimensions and morphology in a select adolescent population.

Conclusions

Wide variability exists in female adolescent genital anatomy with no established “normal range.” We attempted to define what is normal in this population, and we have determined that adolescent genital anatomy is wide-ranging in its size, symmetry, and morphology. This study provides a resource for physicians who care for adolescent girls, who need normative data to describe what is “normal” anatomy to their patients, and who otherwise might only have the media and peers to turn to for information. We propose that the role of labiaplasty in adolescents should be considered with extreme caution because of the wide range in size and morphology and paucity of data. As stated by the American College of Obstetricians and Gynecologists, surgical correction in girls younger than 18 years should be considered only in those with significant congenital malformations, or persistent symptoms that the physician believes are caused directly by labial anatomy, or both.²³ Future research in this area should involve a larger, multi-center study to see if our findings are reproducible and to explore the psychosexual factors that influence these adolescents to seek a medical opinion regarding their genital esthetics.

References

1. Crouch NS, Deans R, Michala L, et al: Clinical characteristics of well women seeking labial reduction surgery: a prospective study. *BJOG* 2011; 118:1507
2. Horrocks E, Iyer J, Askern A, et al: Individual male perception of female genitalia. *Int Urogynecol J* 2016; 27:307
3. Liao LM, Creighton SM: Requests for cosmetic genitoplasty: how should healthcare providers respond? *BMJ* 2007; 334:1090
4. Bailin A, Milanaik R, Adesman A: Health implications of new age technologies for adolescents: a review of the research. *Curr Opin Pediatr* 2014; 26:605
5. Lloyd J, Crouch NS, Minto CL, et al: Female genital appearance: “normality unfolds”. *BJOG* 2005; 112:643

6. Akbiyik F, Kutlu AO: External genital proportions in prepubertal girls: a morphometric reference for female genitoplasty. *J Urol* 2010; 184:1476
7. Chalmers DJ, O'Donnell CI, Casperson KJ, et al: Normal anatomic relationships in prepubescent female external genitalia. *J Pediatr Urol* 2014; 10:1117
8. Liao LM, Taghinejadi N, Creighton SM: An analysis of the content and clinical implications of online advertisements for female genital cosmetic surgery. *BMJ Open* 2012; 2:e001908
9. Moran C, Lee C: What's normal? Influencing women's perceptions of normal genitalia: an experiment involving exposure to modified and nonmodified images. *BJOG* 2014; 121:761
10. Cain JM, Iglesia CB, Dickens B, et al: Body enhancement through female genital cosmetic surgery creates ethical and rights dilemmas. *Int J Gynaecol Obstet* 2013; 122:169
11. Runacres SA, Wood PL: Cosmetic labiaplasty in an adolescent population. *J Pediatr Adolesc Gynecol* 2016; 29:218
12. BritSPAG. British Society for Paediatric & Adolescent Gynaecology: Position Statement. Labial Reduction Surgery (Labiaplasty) on Adolescents. Available: https://www.rcog.org.uk/globalassets/documents/news/britspag_labiaplasty_positionstatement.pdf 2013; 2013.
13. Reddy J, Laufer MR: Hypertrophic labia minora. *J Pediatr Adolesc Gynecol* 2010; 23:3
14. Friedrich EG: *Vulvar Disease*. Philadelphia, W.B. Saunders, 1983
15. Rouzier R, Louis-Sylvestre C, Paneil BJ, et al: Hypertrophy of labia minora: experience with 163 reductions. *Am J Obstet Gynecol* 2000; 182:35
16. Munhoz AM, Filassi JR, Ricci MD, et al: Aesthetic labia minora reduction with inferior wedge resection and superior pedicle flap reconstruction. *Plast Reconstr Surg* 2006; 118:1237
17. Radman HM: Hypertrophy of the labia minora. *Obstet Gynecol* 1976; 48:78S
18. Lynch A, Marulaiah M, Samarakkody U: Reduction labioplasty in adolescents. *J Pediatr Adolesc Gynecol* 2008; 28:147
19. Miklos JR, Moore RD: Labiaplasty of the labia minora: patients' indications for pursuing surgery. *J Sex Med* 2008; 5:1492
20. Zwier S: "What motivates her": motivations for considering labial reduction surgery as recounted on women's online communities and surgeons' websites. *Sex Med* 2014; 2:16
21. Veale D, Eshkevari E, Ellison N, et al: Psychological characteristics and motivation of women seeking labiaplasty. *Psychol Med* 2014; 44:555
22. Michala L, Koliantzaki S, Antsaklis A: Protruding labia minora: abnormal or just uncool? *J Psychosom Obstet Gynaecol* 2011; 32:154
23. Committee on Adolescent Health Care: Committee Opinion No: 686: breast and labial surgery in adolescents. *Obstet Gynecol* 2017; 129:e17