A Prospective Evaluation of Female External Genitalia Sensitivity to Pressure following Labia Minora Reduction and Clitoral Hood Reduction

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Background: Little research has been conducted into the effects of labiaplasty on sensitivity of external genitalia. This study aimed to determine the effect of labia minora and clitoral hood reduction using the edge resection technique on external genitalia sensitivity.

Methods: Female subjects electing to undergo labia minora and clitoral hood reduction were enrolled. Subjects underwent sensitivity testing using monofilaments at five locations (one at the clitoral hood and four labial with each labium measured 0.5 cm from the leading edge and 1.5 cm distal to the hymen) at baseline; 2 weeks; and 3, 6, and 12 months postoperatively. Self-evaluations using the Sexual Function Questionnaire were performed at baseline and 3, 6, and 12 months postoperatively.

Results: Thirty-seven subjects undergoing labia minora and clitoral hood reduction were enrolled. Subjects experienced a median increase in sensitivity at month 6 of 0.118 mN at the 0.5-cm right labial location ($p = 0.027$) and 0.059 mN at the 0.5-cm left labial location ($p = 0.046$) compared with baseline. No change in sensitivity was demonstrated at the clitoral hood or either of the 1.5-cm labial locations. At 6 months, an increase in the number of sexual relations was observed in 44.1 percent of subjects ($p = 0.011$), an improvement in orgasm frequency was exhibited by 35.3 percent of subjects ($p = 0.013$), and an increase in orgasm strength was observed in 35.3 percent of subjects ($p = 0.006$).

Conclusion: Labia minora and clitoral hood reduction as performed by the trim/edge resection method does not result in diminished sensitivity. (*Plast. Reconstr. Surg.* 136: 442e, 2015.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

One of the most common criticisms cited by both the lay public and medical professionals against labiaplasty (also referred to as labioplasty, simple partial vulvectomy, labia minora reduction, or nymphectomy) is the perceived loss of sensation (hypesthesia) and hypersensitivity along the labial edge.[1–6] Although the increase in or loss of labial sensitivity has been an argument against the procedure, there has not been a study to date to substantiate or disprove these assertions. Conversely, it has been the clinical experience of the lead author (O.J.P.), having performed over 500 labiaplasty procedures, that patients do not report long-term sensory loss or hypersensitivity. Furthermore, these patients report improved or unchanged sexual satisfaction.

Of the various labia reduction procedures performed, it is difficult to determine the frequency of the exact techniques used. Reduction by resection of the labial edge, often referred to as the trim technique or despairingly as the "amputation method," has been criticized for clinically significant nerve damage as an unavoidable consequence.[7] Despite a lack of empirical evidence supporting this, alternative approaches to performing labiaplasty that preserve the edge and the sensory nerve endings have been described, including the wedge, modified V wedge, fenestration, Z-plasty,

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and others.[8–12] However, in the lead author's opinion, these options are not capable of addressing correction of common complaints regarding the appearance of the vulva involving the clitoral hood; clitoral frenulum; the vaginal fourchette; and the hyperpigmented, hyperkeratotic, and irregular labial edge extending into the perineum.

The primary objective of the study was to evaluate vulvar tactile sensitivity using the previously validated Semmes-Weinstein monofilaments[13] before and subsequent to labiaplasty using the edge resection technique consisting of labia minora in combination with clitoral hood reduction (simply referred to as labiaplasty).

PATIENTS AND METHODS

The study adhered to the ethical principles of the Declaration of Helsinki (21 CFR Part 50) and the International Conference on Harmonisation Good Clinical Practice guideline. The protocol was approved by an institutional review board, and written informed consent was obtained from all subjects before any study-related procedures were performed.

The study enrolled female subjects at least 18 years of age. Subjects were selected from patients desiring elective labiaplasty (labia minora reduction and clitoral hood reduction) between March of 2010 and June of 2013. Because of the frequent combination of both procedures (labiaplasty and clitoral hood reduction), the investigators restricted entry to patients undergoing both procedures rather than labiaplasty alone. Subjects must have been willing to comply with the protocol requirements, including returning for scheduled follow-up visits and abstaining from all exclusionary procedures.

Reasons for excluding subjects from the study included pregnancy or breastfeeding; visible scars that might affect study assessments; medical history of any disease that inhibits touch/pressure sensation; use of estradiol cream; evidence of drug or alcohol abuse; any medical or psychiatric conditions that, in the investigator's opinion, might interfere with study results; and a planned extended absence.

Knowledge of the anatomical variability of the internal and external pudendal nerve supply to the vulva is essential.[14] The dorsal nerve of the clitoris penetrates the perineal membrane approximately 2.4 to 3.0 cm lateral to the urethral meatus and travels superficially along the membrane for 1.8 to 2.2 cm to the ischiopubic ramus and then along the anterolateral surface of the clitoral body for 2.0 to 2.5 cm. The posterior labial branches of the pudendal nerve innervate the distal vagina and labia minora skin.[15] Resection of tissue will necessarily incorporate some sensory nerve endings as shown in earlier studies.[16,17] However, it was the intention of this study to evaluate the functional significance of the tissue resection. Caution should be exercised with dissection in the depths of the interlabial sulcus when reducing the labia, and lateral to the midline and deep to Buck's fascia over the clitoral hood.

The lead author carried out initial intake clinical examinations and all labiaplasty procedures using an edge resection technique with electrocautery under local anesthesia. A labia minora reduction in combination with a clitoral hood reduction was completed in all patients. The surgeon retained a minimum residual labial length of 1.5 cm before incision. Measurements were taken from the interlabial sulcus to the most projecting portion of the proposed new labial edge (just distal to the clitoral hood) (Fig. 1, *left*). Over the clitoral hood, removal of tissue was carried out superficial to Buck's fascia to preserve the innervation to the glans clitoris. No resections of the ventral surface of the hood (hoodectomy) were performed. On the labia minora, full-thickness resection was carried out laterally along the labia minora 1.5 cm distal to the interlabial sulcus and distal to the Hart line along the medial surface. Wounds were closed with a three-layer repair for the clitoral hood and labia minora, respectively, using running 5-0 Vicryl Rapide (Ethicon, Inc., Somerville, N.J.) for the deep tissues, followed by running intracuticular 5-0 Monocryl (Ethicon), followed by a few interrupted loosely tied 5-0 Vicryl Rapide sutures. The clitoral frenulum was closed using a loosely running locking 5-0 Vicryl Rapide suture (Fig. 1, *right*).

Evaluation of sensitivity to pressure was performed by individuals other than the surgeon (registered nurse or medical assistant) using Semmes-Weinstein monofilaments (Fabrication Enterprises, Inc., Elmsford, N.Y.) at baseline; at 2 weeks; and at 3, 6, and 12 months after treatment. Baseline examinations were performed immediately before surgery and before the patients received any anesthetic-related medications. Five anatomical locations (four labial and one clitoral hood) were assessed (Fig. 2 and Table 1). Point A was measured along the clitoral hood between the lines of resection. While 1.5 cm of labium was retained, as measured along the lateral side of the labium from the depth of the interlabial sulcus, control measurements C and E for each labium were taken 1.5 cm distal to the introitus

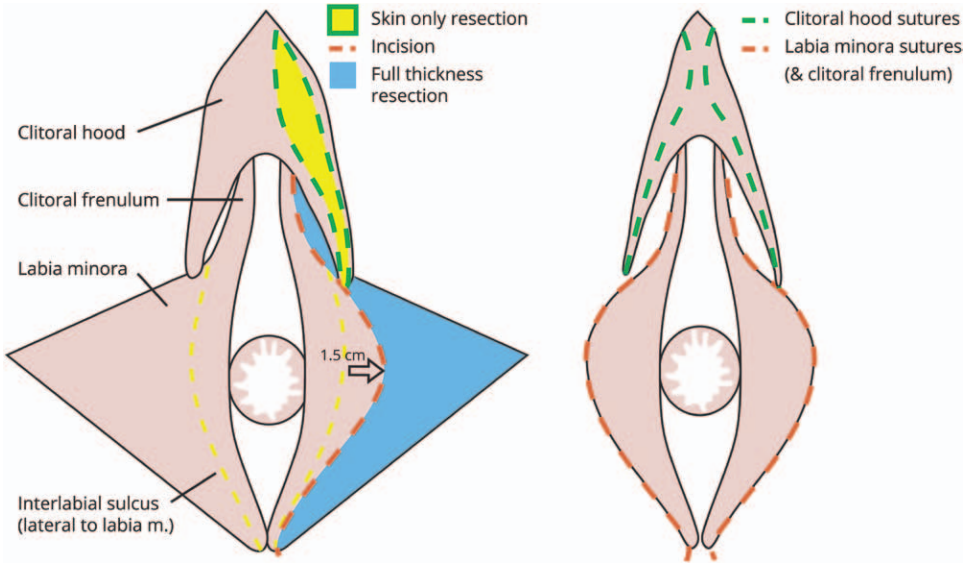

Fig. 1. Surgical markings and plan before surgery (*left*) and after surgery (*right*).

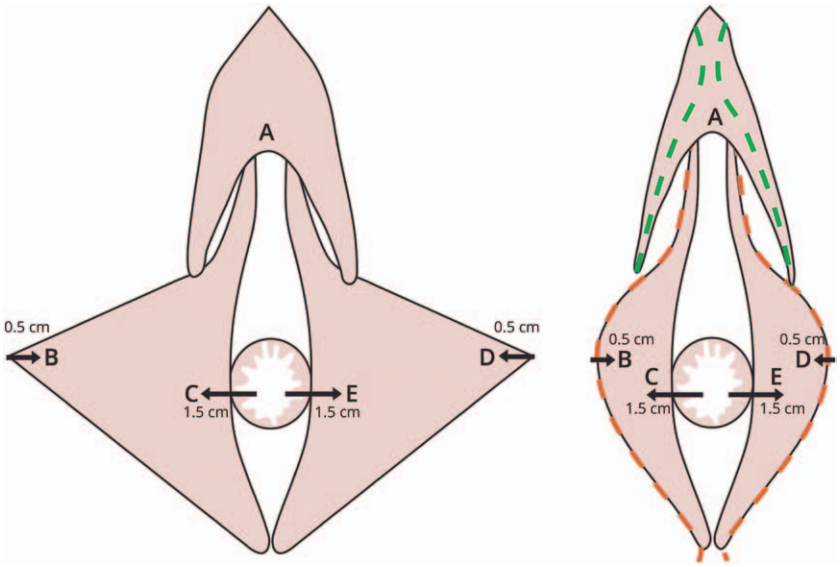

Fig. 2. Location of Semmes-Weinstein sensitivity tests before surgery (*left*) and after surgery (*right*).

Table 1. Locations Assessed for Sensitivity to Pressure

Location	Measuring Point
Clitoral	
Clitoral hood	A
Labial	
Within 0.5 cm of the leading edge of the most prominent point of the right labium minus	B
1.5 cm from the hymen toward the most prominent point on the right labium minus	C
Within 0.5 cm of the leading edge of the most prominent point of the left labium minus	D
1.5 cm from the hymen toward the most prominent point on the left labium minus	E

along the medial surface of the labium. Postoperatively, the surgical outcomes resulted in labia with a minimal length 2.5 to 3.0 cm from the introitus (1.0 to 1.5 cm from the interlabial sulcus), allowing a distinction between measuring points B versus C, and E versus D. Postoperatively, points B and D were measured within 0.5 cm of the labial edge/scar. The monofilaments were applied at a 90-degree angle to the test location to exert increasing pressure on the skin of the labia and clitoral hood. Monofilaments were applied in sequence of increasing size until there was a threshold of perception

and the subject responded to the stimulus by saying "touch" or "yes." Subjects were not told when the filaments were applied (other than the start of the examination) and were shielded from visualizing application of the filaments.

Sexual function was evaluated by subject self-evaluation using the Sexual Function Questionnaire at baseline and 3, 6, and 12 months after treatment (Fig. 3). The aspects of sexual function that were studied included frequency, dyspareunia, ability to orgasm and intensity of orgasm, vaginal dryness, and desire. This survey tool has been used in previous studies.[18]

All statistical programming was performed using Excel 2010 (Microsoft Corp., Redmond, Wash.). The primary measure of efficacy was the assessment of change in sensitivity at four labial locations and one clitoral location at 6 months

Sexual Function Questionnaire
1. In the last month, how many times have you had sexual relations?
None
1-2
3-4
≥ 5
2. In the last month, how frequently have you experienced pain during sexual relations?
All, most or a good bit of the time
Some or little of the time
None of the time
Not sexually active
3. In the last month, how frequently have you experienced orgasm during sexual relations?
All, most or a good bit of the time
Some or little of the time
None of the time
Not sexually active
4. In the last month, how strong has orgasm been for you?
Strong
Mild
No orgasms
Not sexually active
5. In the last month, how frequently have you experienced vaginal dryness?
All, most or a good bit of the time
Some or little of the time
None of the time
Not sexually active
6. In the last month, how frequently have you desired sex?
≤ 1 day per week
1-3 days per month
< 1 day per month
Not sexually active

Fig. 3. Subject self-evaluation of sexual function was performed at baseline and at 3, 6, and 12 months after treatment.

compared with baseline using a paired *t* test. Secondary efficacy measures assessing change in sensitivity at 2 weeks, 3 months, and 12 months compared with baseline were performed using paired *t* test. Sexual function at 3, 6, and 12 months was also compared with baseline values using a paired *t* test.

RESULTS

Of 120 consecutive patients queried during the enrolment period, 37 met the inclusion criteria of willingness to comply with the postoperative protocol requirements. The primary reason excluding subjects was a lack of intent to attend follow-up visits. Of the 120, only two patients were excluded because of a history of scars from tears sustained during delivery and two for intended childbearing during the testing period. The study enrolled 37 subjects who underwent labiaplasty (Table 2). The mean age ± SD of subjects was 34.1 ± 8.9 years (range, 21 to 58 years). All patients reported that they experienced menstrual cycles. The majority of subjects were Caucasian (81.1 percent) and nulliparous (78.4 percent). Thirty-four subjects (91.9 percent) completed the primary endpoint of month 6, and follow-up of at least 12 months after surgery was obtained for 28 subjects (78.5 percent).

Table 2. Baseline Characteristics of Subjects at Enrollment*

	Value
Age	
Mean ± SD	34.1 ± 8.9 yr
Median	33.1 yr
Range	18.4–51 yr
Age group, % (no.)	
18–24 yr	16.2 (6)
25–34 yr	45.9 (17)
35–44 yr	24.3 (9)
45–60 yr	13.5 (5)
Ethnicity, % (no.)	
Caucasian	81.1 (30)
Hispanic	2.7 (1)
Asian	16.2 (6)
Length of current relationship, yr	
Mean ± SD	6 ± 9.1
Median	1.9
Range	0–32
Length of longest relationship, yr	
Mean ± SD	5.6 ± 7.3
Median	5
Range	1–32
No. of children	
Median	0
Range	0–4
With children, % (no.)	21.6 (8)
No children, % (no.)	78.4 (29)
Satisfaction with sexual relationship, % (no.)	
Yes	45.9 (17)
No	10.8 (4)
N/A	43.2 (16)

*$n = 37$.

At month 6, subjects experienced a median increase in sensitivity to pressure from baseline of 0.118 ± 0.275 mN at the 0.5-cm right labial (edge) location ($p = 0.027$) and 0.059 ± 0.316 mN at the 0.5-cm left labial location ($p = 0.046$) (Table 3). No significant change in sensitivity was demonstrated at the clitoral or either of the 1.5 cm labial (base) locations. At month 12, increased sensitivity of 0.118 ± 0.246 mN was demonstrated at the 0.5 cm right labial location ($p = 0.008$). The sensitivity response for each location at baseline and all follow-up visits is presented in Table 4 and Figure 4.

Changes in Sexual Function Questionnaire response compared with baseline are presented in Table 5. At month 6, 44.1 percent of subjects had an increase in the number of sexual relations in the past month ($p = 0.011$). An improvement in orgasm frequency during sexual relations compared with baseline was exhibited by 33.3 percent of subjects at 3 months ($p = 0.008$) and 35.3 percent of subjects at 6 months ($p = 0.013$). An increase in orgasm strength was observed in 36.4 percent of subjects at 3 months ($p = 0.006$) and in 35.3 percent of subjects at 6 months ($p = 0.006$). There was no statistically significant change in frequency of pain during sexual relations, vaginal dryness, or sexual desire compared with baseline at any of the follow-up visits. The tabulations of the individual responses to the Sexual Function Questionnaire are listed in Table 6.

DISCUSSION

Increased media attention on the female genitalia may be either reflective or directive of observed increased trends of female genital plastic surgery, namely, labiaplasty.[19] Although previous studies have delineated some of the complications and sexual function aspects of labiaplasty using either the edge or the wedge technique, none has measured the sensitivity of the labia subsequent to surgical intervention.[20–22]

The results of this study support the original clinical impression that although there may a brief 2-week period of diminished response, the long-term sensitivity of the labia or clitoral hood was not significantly altered following a labiaplasty procedure performed using the edge resection technique. Furthermore, the sexual function survey demonstrated an increase in sexual relations, with stronger and more frequent orgasms without pain and no exacerbations of vaginal dryness.

Table 3. Sensitivity Change from Baseline

	14 Days (n = 36)	3 Mo (n = 34)	6 Mo (n = 34)	12 Mo (n = 28)
A. Clitoral hood				
Median, mN	0	0	0	0
Range, mN	−0.49–0.49	−0.314–0.608	−0.608–0.608	−0.608–0.49
Increased, % (no.)	44.4 (16)	32.4 (11)	29.4 (10)	32.1 (9)
No change, % (no.)	36.1 (13)	41.2 (14)	50.0 (17)	28.6 (8)
Decreased, % (no.)	19.4 (7)	26.5 (9)	20.6 (7)	39.3 (11)
p	0.070	0.987	0.595	0.620
B. Right labia minora (0.5 cm)				
Median, mN	0	−0.118	−0.118	−0.118
Range, mN	−0.608–3.53	−0.608–0.49	−0.608–0.608	−0.608–0.314
Increased, % (no.)	41.7 (15)	67.6 (23)	58.8 (20)	57.1 (16)
No change, % (no.)	25.0 (9)	20.6 (7)	17.6 (6)	21.4 (6)
Decreased, % (no.)	33.3 (12)	11.8 (4)	23.5 (8)	21.4 (6)
p	0.226	0.001	0.027	0.008
C. Right labia minora (1.5 cm)*				
Median, mN	0	0.059	0	0.157
Range, mN	−3.726–3.844	−3.236–3.726	−3.844–0.608	−3.844–1.373
Increased, % (no.)	22.9 (8)	35.3 (12)	32.4 (11)	25.0 (7)
No change, % (no.)	37.1 (13)	14.7 (5)	29.4 (10)	14.3 (4)
Decreased, % (no.)	40.0 (14)	50.0 (17)	38.2 (13)	60.7 (17)
p	0.513	0.287	0.743	0.636
D. Left labia minora (0.5 cm)				
Median, mN	0	0	-0.059	0
Range, mN	−1.373–3.726	−1.373–0.608	−1.373–0.314	−1.491–0.608
Increased, % (no.)	30.6 (11)	41.2 (14)	50.0 (17)	39.3 (11)
No change, % (no.)	27.8 (10)	32.4 (11)	17.6 (6)	21.4 (6)
Decreased, % (no.)	41.7 (15)	26.5 (9)	32.4 (11)	39.3 (11)
p	0.132	0.349	0.046	0.569
E. Left labia minora (1.5 cm)				
Median, mN	0	0.118	0	
Range, mN	−3.236–3.53	−3.53–1.491	−3.844–1.373	−3.844–1.491
Increased, % (no.)	16.7 (6)	23.5 (8)	38.2 (13)	35.7 (10)
No change, % (no.)	41.7 (15)	14.7 (5)	20.6 (7)	10.7 (3)
Decreased, % (no.)	41.7 (15)	61.8 (21)	41.2 (14)	53.6 (15)
p	0.544	0.498	0.700	0.950

*One subject not recorded at 14 days.

Although the mean force required to elicit a response differed from those presented by Romanzi et al.,[13] this study enrolled a younger subject population [mean (SD) of 34.1 years (8.9 years) compared with 48.7 years (13.8 years)], thereby, possibly accounting for the lower sensitivity threshold observed in this study.

Although the sensitivity of the clitoral hood remained remarkably stable, sensitivity of the reference area (far from the surgical incisions) just distal to the introitus demonstrated slight but nonsignificant decreases in pressure threshold appreciation, whereas the area in close proximity to the incisions demonstrated a trace but significant decrease in the pressure measurements. This was consistent with heightened sensitivity at the 6- and 12-month marks. One could postulate this was secondary to resection of desensitized tissues subsequent to constant irritation and inflammation and with patient complaints. However, this remains to be evaluated in subsequent research. This effectively dispels the long-held notion that the resection of labial tissues will cause clinically or functionally significant loss of vulvar sensitivity. The anticipated findings are not dissimilar from comparable ideas on the outcome of breast reduction surgery that were disproved by Temple and Hurst supporting not only the maintenance of breast sensitivity, but actual improvement following reduction mammaplasty.[23]

The location of the measurement points was determined according to numerous factors. The delineation of 5 mm within (or along) the labial edge was selected in light of 5-mm two-point discrimination being consistent with normal levels of fine sensitivity. This also accommodated mild variations in testing along the scar from one session to the next. Although testing of the glans had been performed in previous studies, the use of the clitoral hood was deemed more appropriate, as this was being reduced and any retraction of the hood before or subsequent to surgery could potentially alert the patient as to impending filament approximation. The additional use of the base of the labia minora, as a reference area measured 1.5 cm distal to the vaginal introitus, was

Table 4. Sensitivity Response

	Baseline (n = 37)	14 Days (n = 36)	3 Mo (n = 34)	6 Mo (n = 34)	12 Mo (n = 28)
A. Clitoral hood					
0.078 mN, % (no.)	43.2 (16)	58.3 (21)	41.2 (14)	35.3 (12)	35.7 (10)
0.196 mN, % (no.)	27.0 (10)	27.8 (10)	35.3 (12)	41.2 (14)	25.0 (7)
0.392 mN, % (no.)	24.3 (9)	11.1 (4)	17.6 (6)	20.6 (7)	35.7 (10)
0.686 mN, % (no.)	5.4 (2)	2.8 (1)	5.9 (2)	2.9 (1)	3.6 (1)
1.569 mN, % (no.)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
3.922 mN, % (no.)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Median, mN	0.196	0.078	0.196	0.196	0.196
Range, mN	0.078–0.686	0.078–0.686	0.078–0.686	0.078–0.686	0.078–0.686
B. Right labia minora (0.5 cm)					
0.078 mN, % (no.)	18.9 (7)	33.3 (12)	61.8 (21)	47.1 (16)	35.7 (10)
0.196 mN, % (no.)	35.1 (13)	33.3 (12)	20.6 (7)	26.5 (9)	42.9 (12)
0.392 mN, % (no.)	29.7 (11)	13.9 (5)	8.8 (3)	20.6 (7)	21.4 (6)
0.686 mN, % (no.)	16.2 (6)	5.6 (2)	8.8 (3)	5.9 (2)	0.0 (0)
1.569 mN, % (no.)	0.0 (0)	11.1 (4)	0.0 (0)	0.0 (0)	0.0 (0)
3.922 mN, % (no.)	0.0 (0)	2.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)
Median, mN	0.196	0.196	0.078	0.196	0.196
Range, mN	0.078–0.686	0.078–3.922	0.078–0.686	0.078–0.686	0.078–0.392
C. Right labia minora (1.5 cm)*					
0.078 mN, % (no.)	32.4 (12)	22.9 (8)	23.5 (8)	32.4 (11)	25.0 (7)
0.196 mN, % (no.)	51.4 (19)	34.3 (12)	29.4 (10)	29.4 (10)	21.4 (6)
0.392 mN, % (no.)	8.1 (3)	25.7 (9)	26.5 (9)	23.5 (8)	28.6 (8)
0.686 mN, % (no.)	5.4 (2)	11.4 (4)	8.8 (3)	14.7 (5)	17.9 (5)
1.569 mN, % (no.)	0.0 (0)	2.9 (1)	8.8 (3)	0.0 (0)	7.1 (2)
3.922 mN, % (no.)	2.7 (1)	2.9 (1)	2.9 (1)	0.0 (0)	0.0 (0)
Median, mN	0.196	0.196	0.196	0.196	0.392
Range, mN	0.078–3.922	0.078–3.922	0.078–3.922	0.078–0.686	(0.078–1.569
D. Left labia minora (0.5 cm)					
0.078 mN, % (no.)	29.7 (11)	33.3 (12)	35.3 (12)	41.2 (14)	28.6 (8)
0.196 mN, % (no.)	37.8 (14)	25.0 (9)	38.2 (13)	41.2 (14)	32.1 (9)
0.392 mN, % (no.)	21.6 (8)	16.7 (6)	17.6 (6)	17.6 (6)	28.6 (8)
0.686 mN, % (no.)	8.1 (3)	16.7 (6)	8.8 (3)	0.0 (0)	10.7 (3)
1.569 mN, % (no.)	2.7 (1)	2.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)
3.922 mN, % (no.)	0.0 (0)	5.6 (2)	0.0 (0)	0.0 (0)	0.0 (0)
Median, mN	0.196	0.196	0.196	0.196	0.196
Range, mN	0.078–1.569	0.078–3.922	0.078–0.686	0.078–0.392	0.078–0.686
E. Left labia minora (1.5 cm)					
0.078 mN, % (no.)	51.4 (19)	25.0 (9)	14.7 (5)	44.1 (15)	28.6 (8)
0.196 mN, % (no.)	16.2 (6)	25.0 (9)	32.4 (11)	26.5 (9)	35.7 (10)
0.392 mN, % (no.)	21.6 (8)	30.6 (11)	23.5 (8)	8.8 (3)	10.7 (3)
0.686 mN, % (no.)	8.1 (3)	16.7 (6)	23.5 (8)	17.6 (6)	17.9 (5)
1.569 mN, % (no.)	0.0 (0)	0.0 (0)	5.9 (2)	2.9 (1)	7.1 (2)
3.922 mN, % (no.)	2.7 (1)	2.8 (1)	0.0 (0)	0.0 (0)	0.0 (0)
Median, mN	0.078	0.294	0.392	0.196	0.196
Range, mN	00.078–3.922	0.078–3.922	0.078–1.569	0.078–1.569	0.078–1.569

*One subject not recorded at 14 days.

identified as an ipsilateral control. Theoretically, the base of the labia is remote from the edge resection and should not experience any change in sensitivity. This proved to provide a stable baseline for measurement. As the data revealed, surgery did not negatively affect the frequency or the intensity of orgasm.

Although other tools such as thermal or vibratory thresholds have been used to assess genital sensation,[23] the convenience, reliability, and nonintimidating nature of the monofilament application proved advantageous to patient study participation for this elective procedure. In addition, other published reports evaluating genital sensitivity have been conducted using monofilaments alone.[13,24,25] Whether pressure sensitivity is an adequate surrogate for other aspects of vulvar sensitivity is a valid concern. However, monofilaments were chosen as the accepted standard at the time of study design because other validated instruments for postsurgical sensory testing (pain, vibration, and thermal variation) were not readily available.

It could be argued that the sensitivity measurements should have been scheduled and standardized to coincide with estrus. However, although one may intuit that tactile sensitivity of the external genitalia fluctuates through the cycle or with altering hormone levels (as does mucus and lining status of the proximal vagina and uterus), this could

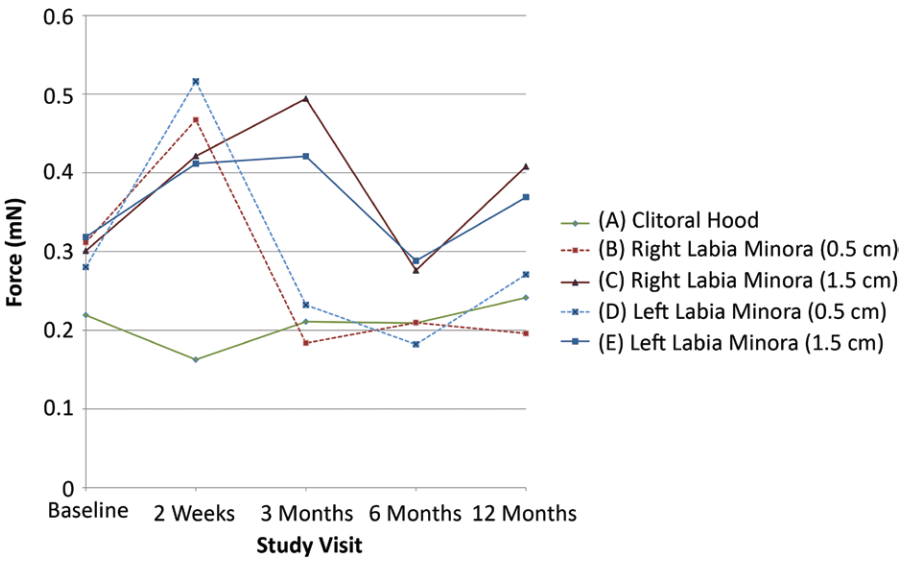

Fig. 4. Average force required to elicit a sensitivity response 12 months after surgery. Following a short period of diminished sensation at 2 weeks after surgery, the long-term sensitivity of the labia or clitoral hood was not significantly altered

not be validated. Excluding sexual desire, alterations in genital sensation with menses or endogenous hormone levels could not be confirmed following a review of the literature.[26,27] Only one study using monofilaments and improved sensation following the use of topical estradiol cream could be identified.[28] Consequently, estradiol cream was not recommended to patients in this study. Furthermore, the logistics of timing surgery and subsequent follow-up visits to the patient's menses for an elective procedure was impractical for the purposes of this study. Subsequent measurements would have needed to be made during that exact time within the cycle as the baseline measurement. This would not allow for sensitivity testing during the 2-week assessment and would have imposed extreme limitations on the planning of visits during the postoperative follow-up period. Moreover, the validated Sexual Function Questionnaire did not take menstrual cycle phase into consideration and referred only to patients who were either postmenopausal without estrogen replacement therapy, postmenopausal with estrogen replacement therapy, or premenopausal.

A fully randomized, double-blind study was not feasible in patients requesting an elective procedure. A unilateral labiaplasty was considered unethical, and subjects were visually aware of the reduction and thus no sham operation could be conceived. Moreover, standardizing hormone therapy or status was not an option, although every patient reported normal cycles. Perhaps using an age-matched control group for sensitivity measurements would be reasonable and might provide some explanation for the heightened sensitivity observed near the incision. Although the primary intent of this study was to evaluate possible hypesthesia, there are valid concerns with regard to hypersensitivity. Our results found no statistically significant new functional impairments caused by pain. Three subjects reported pain some or a little of the time during intercourse at the 12-month visit. Of these subjects, one reported pain during intercourse at baseline and one was abstinent at baseline. To counteract the lack of a control group, subjects served as their own controls by use of control locations on the labia remote from the incision line at the base of the labia minora just distal to the vaginal introitus.

Although there are other more comprehensive sexual function tools available, the six-question tool was used for its simplicity and anticipated high level of compliance. This scale was used and validated in a comparable study of 1600 patients before and after undergoing a surgical procedure (hysterectomy).[18] Furthermore, sensitivity assessment, not sexual function, was the primary endpoint of this study. The questionnaire served as a secondary source to address popular reports of dyspareunia associated with this procedure. Perhaps longer term assessments of sensitivity would clarify the slight increase in sensitivity. However, the findings remained consistent from 6 to 12 months and further evaluation was determined to be unnecessary.

Table 5. Sexual Function Questionnaire Change from Baseline

	3 Mo (n = 33)	6 Mo (n = 34)	12 Mo (n = 28)
1. In the last month, how many times have you had sexual relations?			
Median	0	0	0
Range	−2–2	−2–3	−2–3
Increased, % (no.)	30.3 (10)	44.1 (15)	32.1 (9)
No change, % (no.)	48.5 (16)	44.1 (15)	53.6 (15)
Decreased, % (no.)	21.2 (7)	11.8 (4)	14.3 (4)
p	0.488	0.011	0.187
2. In the last month, how frequently have you experienced pain during sexual relations?			
Median	0	0	0
Range	−2–1	−1–2	−2–2
Improve, % (no.)	30.3 (10)	35.3 (12)	39.3 (11)
No change, % (no.)	48.5 (16)	44.1 (15)	42.9 (12)
Worsened, % (no.)	21.2 (7)	20.6 (7)	17.9 (5)
p	1.000	0.205	0.165
3. In the last month, how frequently have you experienced orgasm during sexual relations?			
Median	0	0	0
Range	−3–1	−3–2	−3–3
Improve, % (no.)	33.3 (11)	35.3 (12)	35.7 (10)
No change, % (no.)	60.6 (20)	55.9 (19)	46.4 (13)
Worsened, % (no.)	6.1 (2)	8.8 (3)	17.9 (5)
p	0.008	0.013	0.372
4. In the last month, how strong has orgasm been for you?			
Median	0	0	0
Range	−3–1	−3–2	−3–3
Improve, % (no.)	36.4 (12)	35.3 (12)	39.3 (11)
No change, % (no.)	57.6 (19)	61.8 (21)	42.9 (12)
Worsened, % (no.)	6.1 (2)	2.9 (1)	17.9 (5)
p	0.006	0.006	0.141
5. In the last month, how frequently have you experienced vaginal dryness?			
Median	0	0	0
Range	−3–1	−2–1	−1–1
Improve, % (no.)	12.1 (4)	23.5 (8)	17.9 (5)
No change, % (no.)	78.8 (26)	55.9 (19)	64.3 (18)
Worsened, % (no.)	9.1 (3)	20.6 (7)	17.9 (5)
p	0.712	0.644	1.000
6. In the last month, how frequently have you desired sex?*			
Median	0	0	0
Range	−1–1	−2–2	−2–2
Increased, % (no.)	12.1 (4)	14.7 (5)	18.5 (5)
No change, % (no.)	66.7 (22)	73.5 (25)	70.4 (19)
Decreased, % (no.)	21.2 (7)	11.8 (4)	11.1 (3)
p	0.379	0.801	0.602

*One subject did not respond at 12 mo.

CONCLUSIONS

If edge sensation is intact following the edge resection technique used here, one could infer that sensation is preserved with less aggressive or edge-sparing labiaplasty techniques. However, the base of the wedge modifications may extend more proximally on the labia where the sensory nerves reside. The preservation of sensation following the wedge method remains unproven. The findings here cannot be applied to all edge resection or trim approaches, as some techniques are more aggressive. The present technique leaves a minimum of 1.5 cm of unresected labia minora in the relaxed state, and other methods may produce different results. Although intact sensitivity has been the general impression of the lead author (O.J.P.), this study confirms the clinical findings, and labiaplasty, as performed by the described trim/edge resection method, does not result in diminished sensitivity.

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Table 6. Sexual Function Questionnaire Response

	Baseline (n = 37), % (no.)	3 Mo (n = 33), % (no.)	6 Mo (n = 34), % (no.)	12 Mo (n = 28), % (no.)
1. In the last month, how many times have you had sexual relations?				
None	24.3 (9)	15.2 (5)	8.8 (3)	17.9 (5)
1–2	27.0 (10)	27.3 (9)	20.6 (7)	14.3 (4)
3–4	16.2 (6)	27.3 (9)	26.5 (9)	17.9 (5)
>5	32.4 (12)	30.3 (10)	44.1 (15)	50.0 (14)
2. In the last month, how frequently have you experienced pain during sexual relations?				
All, most, or a good bit of time	5.4 (2)	3.0 (1)	0.0 (0)	0.0 (0)
Some or little of the time	29.7 (11)	33.3 (11)	11.8 (4)	10.7 (3)
None of the time	40.5 (15)	48.5 (16)	79.4 (27)	71.4 (20)
Not sexually active	24.3 (9)	15.2 (5)	8.8 (3)	17.9 (5)
3. In the last month, how frequently have you experienced orgasm during sexual relations?				
All, most, or a good bit of time	43.2 (16)	60.6 (20)	61.8 (21)	57.1 (16)
Some or little of the time	13.5 (5)	15.2 (5)	17.6 (6)	14.3 (4)
None of the time	18.9 (7)	9.1 (3)	11.8 (4)	10.7 (3)
Not sexually active	24.3 (9)	15.2 (5)	8.8 (3)	17.9 (5)
4. In the last month, how strong has orgasm been for you?				
Strong	32.4 (12)	45.5 (15)	52.9 (18)	46.4 (13)
Mild	27.0 (10)	30.3 (10)	29.4 (10)	32.1 (9)
No orgasms	18.9 (7)	9.1 (3)	8.8 (3)	7.1 (2)
Not sexually active	21.6 (8)	15.2 (5)	8.8 (3)	14.3 (4)
5. In the last month, how frequently have you experienced vaginal dryness?				
All, most, or a good bit of time	2.7 (1)	6.1 (2)	5.9 (2)	7.1 (2)
Some or little of the time	32.4 (12)	30.3 (10)	20.6 (7)	21.4 (6)
None of the time	51.4 (19)	48.5 (16)	67.6 (23)	60.7 (17)
Not sexually active	13.5 (5)	15.2 (5)	5.9 (2)	10.7 (3)
6. In the last month, how frequently have you desired sex?*				
≥1 day/wk	62.2 (23)	60.6 (20)	67.6 (23)	66.7 (18)
1–3 days/mo	27.0 (10)	21.2 (7)	20.6 (7)	22.2 (6)
<1 day/mo	0.0 (0)	9.1 (3)	5.9 (2)	3.7 (1)
Not sexually active	10.8 (4)	9.1 (3)	5.9 (2)	7.4 (2)

*One subject did not respond at 12 mo.

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