

# A Retrospective Study for Labia Minora Reduction by Serrated-shaped Resection

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**Background:** The demand for genital plastic surgery has increased dramatically among female patients globally. Although various labia minora reduction procedures have been applied with different indications, advantages, and disadvantages, none has been universally accepted as the best method. So, we presented an innovative strategy for this increasingly demanded reconstructive procedure.

**Methods:** In this retrospective study, we included 29 patients seen between November 2020 and May 2023 with hypertrophic labia minora. The patients with hypertrophic labia minora after serrated-shaped resection were included for analysis. Patient satisfaction and complications were evaluated through the follow-up after the operation.

**Results:** Patients with a mean age of 27.1 years (range 19–47 y) performed labia minora reduction via serrated-shaped resection. One patient experienced incision dehiscence, requiring additional surgical revision. One patient experienced post-operative cosmetic asymmetry and also performed secondary repair surgery. One patient experienced urinary retention, which was relieved after urinary catheterization. High overall patient satisfaction has been achieved after a median follow-up of 6.7 months (range 1–24 months). No flap necrosis, sexual dysfunction, or hypertrophic scarring has been reported.

**Conclusions:** Results suggested that serrated-shaped resection is a novel technique for repairing hypertrophic labia minora with high efficiency and satisfaction. The procedure could effectively improve the appearance of the labia minora and reduce complications. (*Plast Reconstr Surg Glob Open* 2024; 12:e5634; doi: 10.1097/GOX.0000000000005634; Published online 1 March 2024.)

## INTRODUCTION

Female genital and vaginal plastic surgery has dramatically increased recently.<sup>1</sup> Labia minora reduction (labiaplasty) is the most commonly performed and studied procedure. A hypertrophic labia minora can cause functional, aesthetic, and social problems. Most labia minora hypertrophy is congenital, and some are developed by chronic irritation. However, the indications for and outcomes of labiaplasty have yet to be systematically assessed, and long-term results are yet to be reported.<sup>2</sup> There are many surgical approaches for labia minora reduction, and none has been officially recognized as a definitive procedure.<sup>2</sup> Different labiaplasty approaches

were reported from edge trim, wedge resection, Z-plasty, W-plasty, de-epithelialization, butterfly-like approach, custom flask, fenestration, laser labiaplasty, and composite reduction.<sup>3,4</sup> Edge trim and wedge resection techniques are the two most predominantly used. However, the former approach removes the natural contour and color of the edge, and the latter can result in an incomplete or tight reduction.<sup>5</sup> Critical perspectives include potential scar contraction, a tightened introitus, tenderness, and dyspareunia.<sup>1</sup> As a result, controversy and challenges exist regarding the procedures of this surgery. This study describes our approach for labia minora reduction by serrated-shaped resection.

## PATIENTS AND METHODS

Ethics approval was granted from the human research ethics committee of the Fourth Affiliated Hospital of Zhejiang University School of Medicine (no.

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Related Digital Media are available in the full-text version of the article on [www.PRSGlobalOpen.com](http://www.PRSGlobalOpen.com).

**Table 1. Patient Characteristics and Results**

General Information		Total No. Patients	29
		Average Age (Range)	27.1 y (19–47 y)
		Follow-up (Range)	6.7 mo (1–24 mo)
Descriptive Statistics for the Patient Demographics	Characteristics		Patient No. (Proportion)
	Age Group	Older adolescents (15–19 y)	1 (3.4%)
		Young adults (20–25 y)	15 (51.7%)
		Adults (26–40 y)	11 (37.9%)
		Middle age adults (41–60 y)	2 (6.9%)
		Older adults (>60 y)	0
	Marriage	Married	14 (48.3%)
		Unmarried	15 (51.2%)
	Diagnose	Hypertrophic labia minora	29 (100%)
		–with clitoral skin hood hypertrophy	20 (69.0%)
–with vaginal laxity		1 (3.4%)	
Statistical Indicators		Patient No. (Proportion)	
Main Causes	Cosmetic problems (hypertrophy and/or asymmetry, etc.)		23 (79.3%)
	Functional problems (excessive friction, etc.)		4 (13.8%)
	More than one of the above symptoms		2 (6.9%)
	Others		0
Surgery	Lateral serrated-shaped resection (only)		3 (10.3%)
	Bilateral serrated-shaped resection (only)		26 (89.7%)
	–with clitoral hood reduction		20 (69.0%)
	–with vaginal tightening		1 (3.4%)
Complications	Asymmetry		1 (3.4%)
	Incision dehiscence		1 (3.4%)
	Urinary retention		1 (3.4%)
	Flap necrosis		0
	Sexual dysfunction		0
	Hypertrophic scarring		0
	Others		0
Surgical Revision		2 (6.9%)	
Outcome	Satisfied		26 (89.7%)
	Mostly satisfied		3 (10.3%)
	Unsatisfied		0

K2023075). A retrospective review of the period from November 2020 to May 2023 identified 29 cases in which serrated-shaped resection had been used for hypertrophic labia minora.

**Patients**

In this retrospective study, we included patients admitted between November 2020 and May 2023. Table 1 and Supplemental Digital Content 1 show descriptive statistics for the patients’ demographics. (See table, **Supplementary Digital Content 1**, which displays detailed characteristics and results of each patient in this study. <http://links.lww.com/PRSGO/D85>.) All of them were diagnosed with hypertrophic labia minora, and 20 had combined clitoral skin hood hypertrophy. One patient had combined clitoral skin hood hypertrophy and vaginal laxity. Fourteen of them were married, and the others were not married. Indications included dissatisfaction with the appearance of their labia and functional problems. An asymmetric

**Takeaways**

**Question:** We evaluated the effects of a new procedure for labia minora reduction through case studies.

**Findings:** This procedure could effectively improve the appearance of the labia minora and reduce complications.

**Meaning:** We presented an innovative strategy for this increasingly demanded genital plastic surgery.

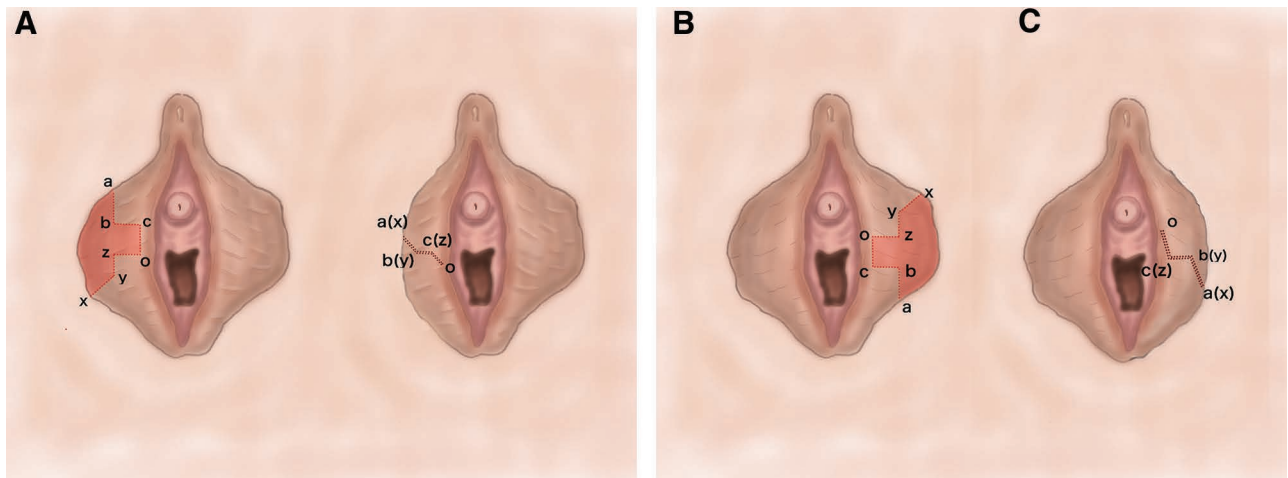
or hypertrophic labia minora causes embarrassment and a lack of confidence, making patients seek surgical improvement. Functional problems include inflammation, poor hygiene, pain and discomfort in sitting and during exercise, discomfort with tight pants, interference with sexual intercourse, etc. Written informed consent was obtained from all patients. Postoperative examinations were performed at 2 days, 2 weeks, 1, 3, 6 months, 1 year, and 2 years. Patients were examined for early postoperative complications such as incision dehiscence, infection, hematoma, and partial flap necrosis. Late complications included problems of scarring, asymmetry, and dissatisfaction with the postoperative appearance.

**Surgical Technique**

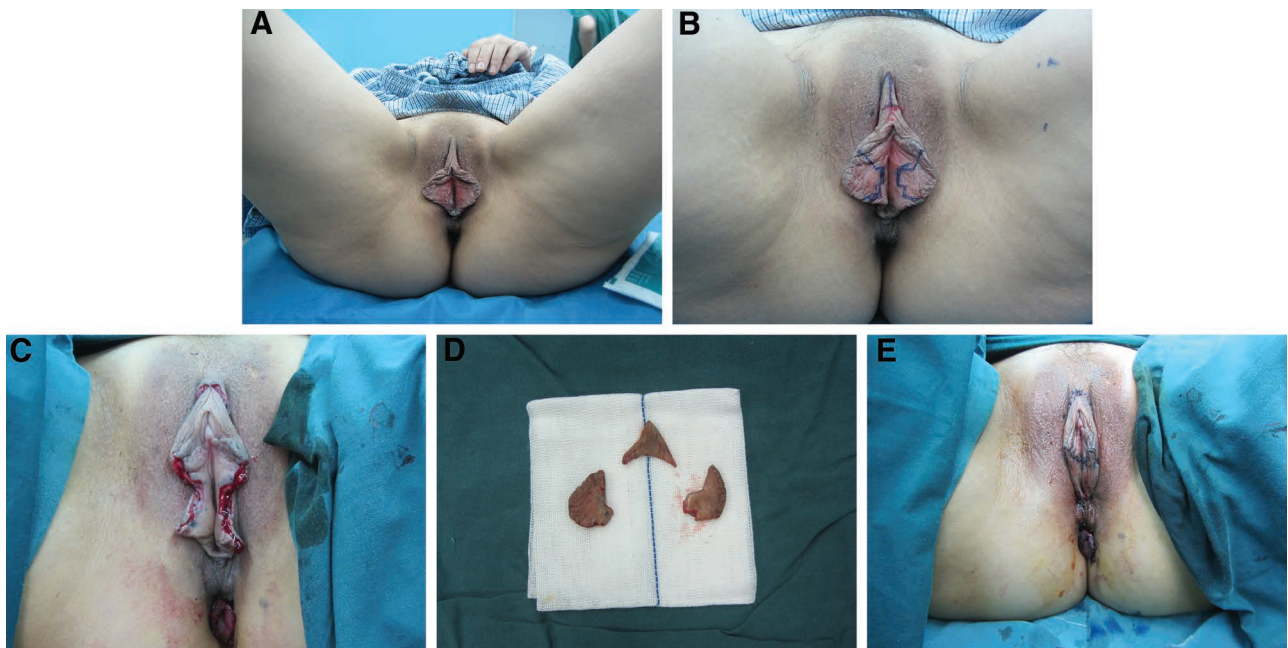
Patients were admitted on the day of the operation. Thirty minutes to 1 hour before the operation, the patient started an intravenous drip of 0.75g cefuroxime (or 0.3g clindamycin if cephalosporin allergy). Figure 1 shows the design of the procedure. The procedure was performed under local anesthesia in a lithotomy position. The first step of the procedure was designing a serrated pattern according to the shape of the labia minora and marking the removal area with methylene blue. If simultaneous clitoral plastic surgery is required, the marking of the clitoral hood has an inverted V shape. Next, lidocaine hydrochloride injection (5 mL: 0.1 g), ropivacaine hydrochloride injection (10 mL: 100 mg), combined with epinephrine hydrochloride injection (1 mL: 1 mg) 25:25:1 was injected into the surgical area. After local anesthesia, the total excised area was resected using full-thickness incisions with a no. 11 blade, and the neurovascular supply was preserved. Careful hemostasis was performed before closure. The turning points were aligned first, and the remaining parts were closed. Sutures are placed on the internal and external surfaces of both labia minora. The suture was passed sequentially through the incision on one side, the subcutaneous tissue and muscle, and the incision on the other side. They were reapproximated with 6–0 Prolene sutures. Figure 2 shows a preoperative and intraoperative image using this approach. (See **Video [online]**, which demonstrates the entire surgical procedure.)

**Postoperative Care**

For postoperative care, patients were instructed to disinfect after micturition and defecation locally. Hemostatic, antismelling medications and broad-spectrum antibiotics were prescribed for all patients



**Fig. 1.** Image showing the design of the approach. A, A serrated pattern is designed, which contains six straight lines (ba, bc, co, zy, yz, and zo). Angles b, c, o, and z are almost right angles. The angle y is an obtuse angle. This pattern and the edge of the labia minora form the surgical removal area. B, After the removal, with o as the origin, the upper and lower serrate are fitted together. Point a is aligned with point x, point b is aligned with point y, and point c is aligned with point z. C, If the edge of the upper labia minora is more beautiful and smoother with better color, the design pattern can be flipped over, and the skin flaps are butted together like before.



**Fig. 2.** Photographs of preoperative and intraoperative images. A, Hypertrophy of the labia minora. B, The design of the approach. C, After the removal of the serrated pattern. D, The cutoff parts. Above is the excised clitoral hood, and below are the excised labia minora from the right and left sides. E, The appearance after suturing.

for 5 days. Sexual intercourse was permitted 3 months postoperatively.

**Evaluation**

Patients were asked to visit the hospital for follow-up 2 weeks; 1, 3, and 6 months; 1 year; and 2 years after surgery. The patients underwent standardized videography, and the surgeons interviewed and examined the patient, which was documented in the medical record. For postoperative assessment, we referred

to the assessment methods of the Expert Consensus on Labiaplasty (2020 Edition, in Chinese),<sup>6</sup> including function and appearance evaluation. The assessment was done by three evaluators (two plastic surgeons and one plastic clinical nurse specialist). Meanwhile, complications were noted, and subjective patient satisfaction was assessed simultaneously to improve the whole evaluation system. Finally, we summarized the evaluation results. To express the outcome more concisely and intuitively, we used a representative complication rate, the rate of



secondary surgical repair, and the percentage of the patient's subjective satisfaction to present the surgery results (Table 1). (Supplementary Digital Content 1, <http://links.lww.com/PRSGO/D85>.)

#### Statistical Analysis

All data were analyzed by SPSS 26. We calculated confidence intervals (CIs) for the complication rate. We used chi-square and Fisher tests to determine the factors affecting postoperative complications. A *P* value less than 0.05 was considered a statistically significant difference.

## RESULTS

Patient characteristics and results are shown in Table 1 and Supplemental Digital Content 1 (<http://links.lww.com/PRSGO/D85>). Twenty-nine patients were treated with labia minora reduction by serrated-shaped resection. These patients were admitted to the hospital and underwent lateral (10.3%) or bilateral (89.7%) serrated-shaped resection. Included among these, 21 patients (69.0%) had clitoral hood reduction simultaneously, and one of them (3.4%) had clitoral plastic surgery and a vaginal tightening procedure simultaneously. The mean age was 27.1 years (range 19–47 years), most being young adults (20–25 years, 51.7%) and adults (26–40 years, 37.9%), and a minimal number being older adolescents (15–19 years, 3.4%) and middle age adults (41–60 years, 6.9%). The ratio of married to unmarried is almost 50:50. Fourteen patients (48.3%) were married, and 15 (51.7%) were unmarried. All of them were diagnosed with hypertrophic labia minora, and 20 (69.0%) had combined clitoral skin hood hypertrophy. One (3.4%) patient had combined clitoral skin hood hypertrophy and vaginal laxity. All patients had no underlying diseases or history of alcohol or tobacco use. Twenty-three patients (79.3%) experienced dissatisfaction with the appearance of their labia, including nine patients with bilateral asymmetry of the labia minora, 13 patients with simple hypertrophic labia minora, and one with both cosmetic problems. Four patients (13.8%) had

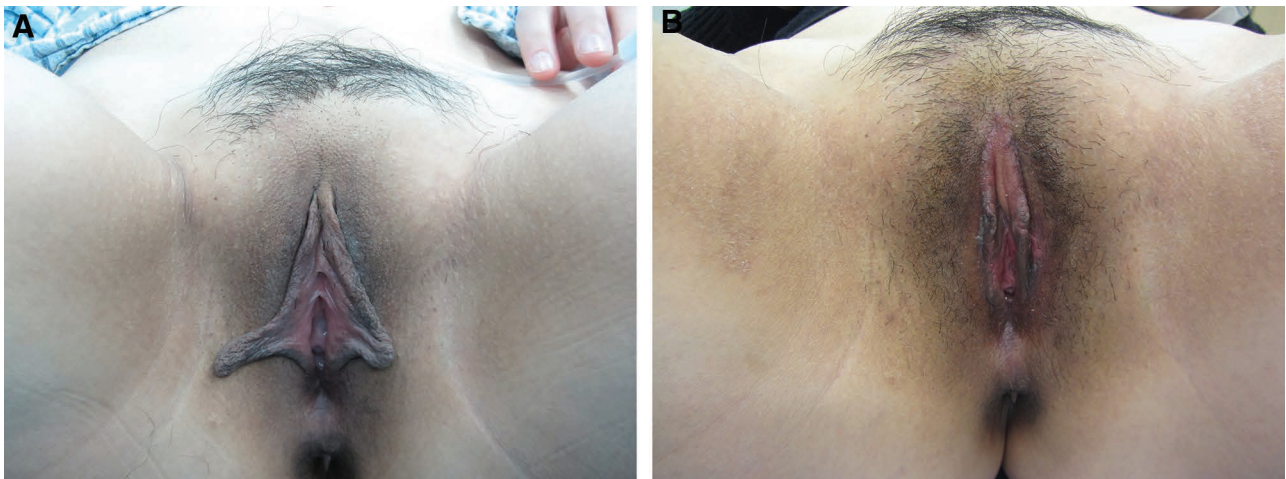
functional issues caused by excessive friction. Two patients (6.9%) had both cosmetic and functional problems.

After a median follow-up of 6.7 months (1–24 months), all patients were satisfied with the appearance, scar, and symptom relief. Twenty-six patients (69.0%) were satisfied with the surgery, and three (10.3%) were mostly satisfied. Three patients (10.3%) experienced complications; two required a second surgical revision, and one was relieved after symptomatic treatment. One patient experienced incision dehiscence and required surgical revision. One patient was found with postoperative cosmetic asymmetry and underwent secondary repair surgery. One patient experienced temporary urinary retention, which was relieved after urinary catheterization. No flap necrosis occurred. No sexual dysfunction was reported. No scar correction was required. Figures 3 and 4 show representative cases after short-term and long-term follow-ups.

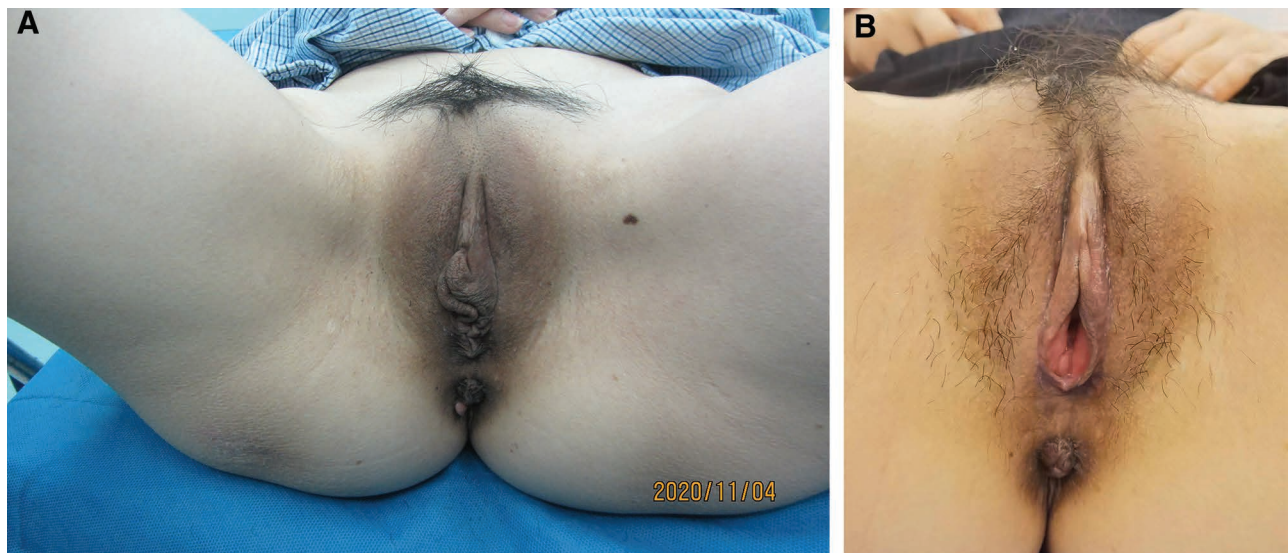
After statistical analysis by SPSS 26, the complication rate was 10.3% (CI, 95%–1.4%–22.1%). As seen in Supplemental Digital Content 2, we included age grouping, marital status, and surgical complexity as influential factors that may influence the occurrence of complications. (See table, Supplemental Digital Content 2, which displays the complication rates for different characterization subgroups. <http://links.lww.com/PRSGO/D86>.) The results showed no statistical difference in complication rates among surgical complexity, marital status or age groups.

## DISCUSSION

By using our approach of labia minora reduction using serrated-shaped resection, an acceptable cosmetic result can be achieved, as well as symptom relief. In some cases, isolated labiaplasty may produce a disproportion with the clitoris. We cut the clitoral hood skin using an inverted V shape, which is most suggested.<sup>7</sup> In our statistics, this also does not increase the complication rate. A relatively low complication rate and high overall patient satisfaction



**Fig. 3.** Photographs of short-term follow-up. A, Preoperative aspect with hypertrophic labia minora. B, The aesthetic appearance of the labia minora 2 weeks postoperatively.



**Fig. 4.** Photographs of long-term follow-up. A, Preoperative aspect with hypertrophic labia minora. B, The aesthetic appearance of the labia minora 2 years postoperatively.

were achieved in our reported cases after the final follow-up. There were no complications leading to severe consequences. One patient experienced temporary urinary retention because of postoperative swelling, which was relieved after urinary catheterization. One patient experienced incision dehiscence, and the other was dissatisfied with the postoperative symmetry. They all did secondary repair surgery and got satisfactory results. Furthermore, psychological concerns are the most crucial reason for female patients. Although many people come to the clinic because of symptoms, they are more or less unconfident and embarrassed. In all our follow-up cases, psychological problems had improved for all. No patient had postoperative frictional discomfort, and no one complained about any problem with oral sex after surgery.

Labia minora reduction is a relatively new plastic surgery technique. Alter first reported a new technique for aesthetic labia minora reduction in 1998.<sup>8</sup> The new technique is relatively simple and can significantly improve the patient's confidence. He has also summarized a series of labia minora reductions using inferior wedge resection and superior pedicle flap reconstruction.<sup>9</sup> After that, various surgical methods for labia minora hypertrophy were reported. Giraldo et al used a central wedge nymphectomy with a 90-degree Z-plasty for labia minora reduction.<sup>4</sup> Choi et al reported a new technique reducing its central width through bilateral de-epithelialization and reapproximation of the central portion with preservation of the neurovascular supply to the edge.<sup>5</sup> A technique reported by Gress creates separate labial segments, the composition of which allows for optimal shaping and reduction of the labia minora.<sup>10</sup> By using this, a reduction of the labia minora and correction of the protruding tip of the clitoris (clitoral protrusion) is achieved. Filho et al showed a butterfly-like approach in which the labia minora are attached temporarily to the internal thigh with stitches resembling an open butterfly wing.<sup>11</sup> Trump et al

introduced an integrated approach called the “butterfly technique,” which combined de-epithelialization with wedge resection.<sup>12</sup> The advantages of this approach are the preservation of neurovascular supply and a concealed scar. Gonzalez et al developed a custom flask labiaplasty to address excess labia minora tissue in all dimensions and limit scars on the normal labial edge.<sup>13</sup> Fenestration labiaplasty with inferior flap transposition, reported by Ostrzenski, was easy to execute without complications, and the method was reproducible.<sup>14</sup> Other strategies include the W-shaped resection described by Mass et al,<sup>15</sup> laser labiaplasty described by Mass et al by Pardo et al,<sup>16</sup> and so on.

Several techniques for labia minora reduction have been described, but most have deficiencies that deserve improvement. This is why new methods are constantly being proposed. Disadvantages of edge trim, the most used approach, include jagged or shell-rimmed edge deformities, color changes, and the risk of excessive excision. Wedge resection has also received some criticism. The risk of incisional dehiscence is relatively high, with the possibility of the labia majora being damaged, and the labia minora may be too short and deformed, causing difficulty in sexual intercourse. The shortcomings of de-epithelialization are a relatively noticeable scar, over-thickness of the labia, prolonged tissue edema, and limited reduction. The risk of impaired blood supply, flap necrosis, nerve damage, scar contracture, or hyperplasia increased by using other relatively complex approaches in design and operation.

We have three main reasons for recommending our approach: (1) This reduction preserves the natural contour of the labia minora edge, and the surgeon can choose to retain a better-looking edge by flipping the design pattern. (2) The postoperative color transition of labia minora is more natural, without a clear demarcation line. (3) This approach reduced friction on the wound, thus



reducing wound-healing problems and scar formation. For example, our technique is similar to the wedge technique and the design reported by Giraldo et al, but the procedure differs. More specifically, the most significant difference compared with wedge resection is that we got a polygonal line wound after suturing instead of a straight one. Straight wounds are more prone to scar contracture, resulting in a butterfly-wing look (sunken edges) of the labia minora. Our method revealed no scar contracture during follow-up, and the labia minora has a better-looking curved edge. Besides, the wedge technique can result in incomplete or tight reductions.<sup>5</sup> When overly obtuse angles are used at the ends of wedge resection, the tissue bunching leads to a “dog ear” deformity.<sup>17</sup> That is why incomplete reduction often happens in the wedge technique. In our approach, nonstraight sutures mitigate the occurrence of “dog-ear” deformities, thus removing more tissue and avoiding incomplete removal. On the contrary, removing too much tissue can lead to “tight reduction,” excessive wound tension, and edge cracking. In the wedge technique, wanting to remove enough internal tissue as possible, the incisions at the edges increase, exacerbating this phenomenon. Our serrated-shaped resection consists of multiple small serrations. The angle of each serration can be designed to suit the patient, removing more internal tissue without enlarging the gap at the edge. This is done by appropriately reducing the edge serrations’ angle and increasing the inner serrations’ angle.

Our approach is simple in design but more straightforward and effective in operation. Our goal is for patients to experience less pain and achieve better results. There are also some experiences to share. Experienced surgeons will make judgments and designs according to the actual situation. For surgeons using this approach for the first time, a geometric reduction with serrated edges and precise measurements is helpful. The mean labia minora outside width (from the interlabial sulcus to the edge of the labia minora.) was about 15–16 mm.<sup>18</sup> We recommend the following points to aid the design, referring to [Figure 1](#):

1. The labia minora outside width after surgery is the vertical distance from point o to the edge. Therefore, in a state of natural labia minora laxity, the position of the point o on the  $x$  axis should be a vertical distance of 2–3 mm from the medial border of the labia minora and the width of line bc (yz) should be around 1 cm. The widest part of the labia minora determines point o’s position on the  $y$  axis. In the case of extensive enlargement, point o should be designed to be at the midpoint of the length of the labia minora (from the clitoris to the lower margin of the labia). If the top or bottom end increases, point o’s position should be adjusted up or down accordingly.
2. The length of the oc (oz) is regulated according to the length of the labia minora. However, it is usually controlled to about 1 cm. If the longitudinal direction length is increased, the oc (oz) rises appropriately and vice versa.
3. The angles o, c, b, and c are all approximately 90 degrees so that point a’s position at the edge of the labia minora can also be determined.

4. The point x is appropriately adjusted based on the shape and tension of the labia minora after simulated suturing.

Perioperative details are also important. Applied local anesthesia is easier, safer, and cheaper, allowing for adequate intraoperative communication with the patient. Our cases were performed under local anesthesia, and no patient reported that the procedure was painful. In our experience, 6-0 Prolene is a good choice as a stitch, which helps avoid postoperative wound infections. It is also smooth and has less friction with the suture site, making it less painful than silk thread when removing the suture. Very few patients complained of pain from sutures during our follow-up. We also recommend this method with clitoral plastic surgery, ultimately achieving a better-looking vulva shape.

## CONCLUSIONS

The serrated-shaped resection is a new technique for repairing hypertrophic labia minora. The procedure is simple and effective, and could retain the natural contour and color of the labia minora edge, hide the scar, and reduce symptoms. Also, postoperative complications are relatively minor, with no severe postoperative complications. Overall, our new technique can effectively improve the appearance of the labia minora and reduce complications.

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## DISCLOSURES

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