



# Trilobal Methods for Composite Reduction Labiaplasty

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Received: 14 November 2021 / Accepted: 12 February 2022 / Published online: 18 March 2022  
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## Abstract

**Background** It is difficult to plan a simple and effective surgical strategy for patients with horizontal and vertical redundant tissue of the labia minora and clitoral hood redundancy. A single edge resection or wedge resection labiaplasty with clitoral hood reduction that simultaneously resolves these three issues has yet to be reported. This study investigated the clinical effects and safety of trilobal labiaplasty via a composite incision.

**Methods** The single-center, retrospective, observational study included data from patients with hypertrophy of the labia minora and clitoral hood who underwent trilobal labiaplasty.

**Results** Altogether, 136 patients (average age:  $31.6 \pm 8.82$  years; range: 21–53 years; 224 sides) sought surgery for aesthetic (39/136, 28.7%), functional (17/136, 12.5%), or both reasons (80/136, 58.8%). Overall, 134 patients (134/136, 98.5%) were followed up for 3 months. No serious complications or malformations occurred. Three patients (2.2%) underwent secondary repair surgery due to incomplete bilateral symmetry, 122 (91.0%) scored  $\geq 21$  points on the Female Genital Self-Image Scale, 107 (91.5%) were satisfied with the cosmetic outcomes, and 93 (95.9%) were satisfied with the functional improvement.

**Conclusions** Trilobal labiaplasty performed via a composite incision using edge and wedge labiaplasty to adjust horizontal and vertical hypertrophy of the labia minora and

remove lateral folds of the clitoris is a safe and effective method to improve the appearance and rearrange the position of the clitoral hood and clitoral frenulum while preserving the fine structure of the surrounding tissue. This method results in few complications and high functional and aesthetic satisfaction rates.

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**Keywords** Labia minora hypertrophy · Clitoral hood redundancy · Wedge resection · Edge resection · Labiaplasty

## Introduction

Labiaplasty, or surgical reduction of the labia minora, is becoming a more sought after procedure as the female genitalia have become the new aesthetic unit. Women are increasingly focusing on this intimate area beyond their faces and breasts. The new preferred look is nearly pre-pubescent and includes a groomed or hairless vulva, plump and tight labia majora without wrinkles, symmetrical petite labia minora, and a clitoral hood that does not visibly protrude beyond the labia majora [1].

The number of labiaplasties is increasing each year. In the USA, 14,368 labiaplasty procedures (including clitoral hood reduction) were performed in 2020, an 11.5% increase from the previous year and a 44.5% increase from 2015 [2]. It is one of the fastest-growing procedures in cosmetic surgery. The 2020 coronavirus pandemic did not stop patients from seeking a youthful appearance. In our

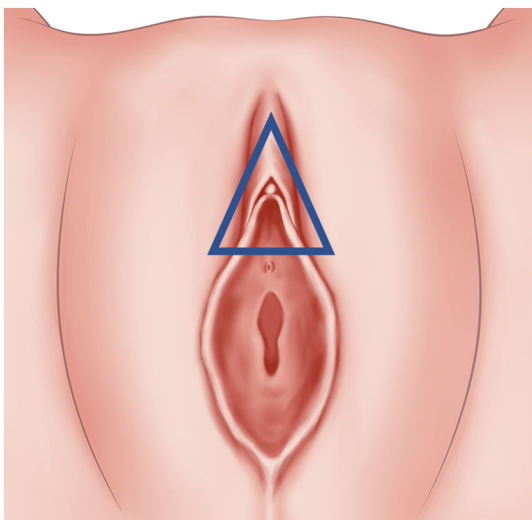
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department, the average annual growth rate is approximately 20%. The number of labiaplasty and clitoral hood reduction procedures was counted for the first time in 2020, suggesting that these procedures have been receiving increased interest in recent years.

Edge labiaplasty is mainly used to reduce horizontal tissue redundancy in the labia minora, while wedge labiaplasty is mainly used for vertical redundancy. No simple and effective method to simultaneously reduce hypertrophy of the labia minora in both directions has been reported. Clitoral hood protrusion often occurs with labia minora hypertrophy and is typically also corrected to achieve a balanced overall appearance [1]. Step-by-step methods to resolve hypertrophy of the clitoral hood and labia minora in one procedure have been reported with favorable outcomes [3–5]. However, simple procedures to solve complex problems are preferred by plastic surgeons.

The clitoral hood, clitoral glans, clitoral frenulum, and superior aspect of the labia minora form a nearly triangular structure termed the clitoral-labial triangle (Fig. 1). This triangle is an important supporting structure and a sex-sensitive unit located in the midline of the vulva and cannot be destroyed [6]. Disrupting this anatomical structure during surgery leads to severe complications of the clitoral stabilizing mechanism, including clitoral glans stability [7]. In this study, a novel trilobal labiaplasty method for the simultaneous correction of labia minora hyperplasia and lateral clitoral folds via mixed edge and wedge resection techniques is reported.



**Fig. 1** The structure in the blue triangle is the clitoral-labial triangle, which contains the clitoral hood, glans, and frenulum and the superior aspect of the labia minora

## Materials and Methods

This single-center, retrospective, observational study included data from 136 patients with hypertrophy of the labia minora and clitoral hood redundancy who underwent plastic surgery of the labia minora using trilobal reduction methods at the authors' gynecological plastic surgery department and hospital between April 2019 and July 2021.

The inclusion and exclusion criteria for selecting the study participants are shown below. Inclusion criteria: (1)  $\geq 18$  years old; (2) Unilateral or bilateral hypertrophy of the labia minora (both horizontal and vertical redundancy) and unilateral or bilateral clitoral prepuce hyperplasia; (3) Primary treatment, no history of procedures in the perineal area; (4) The aim of the procedure: was to improve the aesthetic or functional concerns regarding the labia minora. Exclusion criteria: (1)  $< 18$  years old; (2) Infectious vaginitis and sexual diseases; (3) Other diseases: coagulation dysfunctions, diabetes, or scar diathesis; (4) Body dysmorphic disorder, body image disturbance, clinical depression, or autoimmune disorders; (5) Having unrealistic expectations regarding the appearance of the vulva or attempting to use the procedure to solve other underlying relationship issues.

This study was approved by the institutional review board and conformed to the guidelines of the Declaration of Helsinki. All patients provided informed consent for the use of their clinical data and photographs of their genitals.

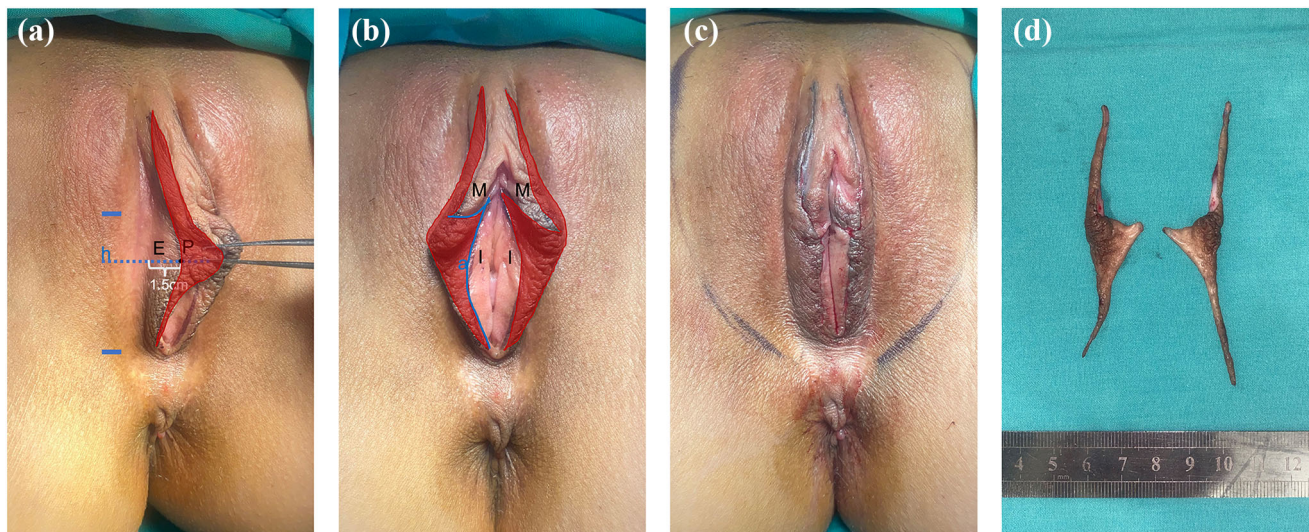
## Operative Techniques

### Incision Design

The novel trilobal method simultaneously addresses hypertrophy of the labia minora and clitoral lateral folds using edge excision labiaplasty, wedge labiaplasty, and clitoral hood reduction. This method can be used in such patients with unilateral or bilateral hypertrophy of the labia minora in both horizontal and vertical directions. Three flaps (external, middle, and internal) are created using the trilobal method (Fig. 2).

### Clitoral Hood Reduction

The midline of the clitoral prepuce and horizontal lines at the beginning of the clitoral frenulum and the posterior fourchette are marked in the labia majora area. Two curved lines are marked on the most redundant part of the lateral clitoral folds. The redundant tissue is pinched and the resectable part is evaluated. If there is tension in the incision at the time of suturing, the design line near the



**Fig. 2** Case 1. Prior to surgery, a 27-year-old female patient presented with aesthetic concerns regarding her labia minora and clitoral hood. Horizontal redundancy of the labia minora was observed. Therefore, this patient underwent edge resection as the main reduction method with wedge resection as the auxiliary method. The resected tissue is shown in red. **a** The golden section ratio was determined and marked with a horizontal line (line *h*). The protruding point (*P*), which is the most prominent portion of the proposed new labia edge, is marked 1.5 cm from the interlabia sulcus along line

*h*. The design flap on the lateral side of labia minora is the external flap (E-flap). **b** The clitoral-labial triangle is preserved. Two triangular middle flaps (M-flaps;  $0.8 \times 1.7$  cm) were created using the clitoris prepuce and a small part of the labia minora as the pedicle. A smooth curve (line *a*) is marked on the internal side of the labium minus to create the internal flap (I-flap), which is 2 mm narrower than the E-flap. **c** The E- M- and I-flaps are sutured to form a new labia minora. **d** The resected tissue is shown

interlabial sulcus is retained and the medial line is adjusted laterally. The midline of the clitoral prepuce is maintained as it cannot be moved.

### External Flap (E-Flap)

The distance from the clitoral frenulum to the posterior fourchette is measured, and the golden section ratio, approximately three-fifths of the total distance, is calculated and marked as the horizontal line (line *h*). The most prominent point along line *h* (*P*) is labeled 1.5 cm from the interlabial sulcus (Fig. 2a). The curved incision of the clitoral prepuce runs caudally along the external aspect of the labium minora toward the posterior fourchette. To ensure that both sides of the labia minora remain symmetrical, the depth of the bilateral interlabial sulcus must be monitored carefully.

### Middle Flap (M-Flap)

The clitoral-labial triangle must be preserved. The medial incision line of the clitoral prepuce is extended along the clitoral hood, clitoral frenulum, and superior labium minora (Fig. 2b). The size of the M-flap is dependent on the shape of the labia minora (Table 1). If the labia minora is mainly redundant in the horizontal direction, edge resection is used

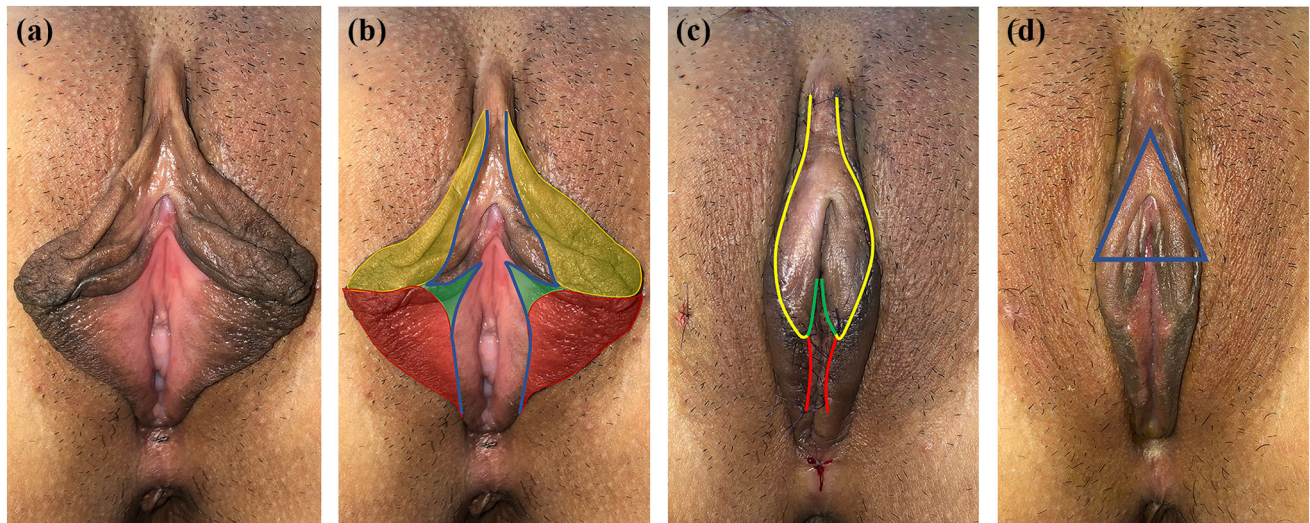
as the main reduction method and wedge resection as the auxiliary method, and the M-flap is smaller and includes the small part of the upper labia minora (Fig. 3). If the labia minora is mainly redundant in the vertical direction, wedge resection is the dominant reduction method, and the M-flap is larger. To achieve a favorable final shape of the labia minora, large M-flaps are paired with smaller external flaps (E-flaps) and internal flaps (I-flaps). The position of the M-flap is dependent on the degree of vertical tissue redundancy of the labia minora. If the inner and outer surfaces of the stretched labia minora need to be tightened, wedge resection is performed bilaterally, the E-flap and I-flap are lifted, and the M-flap includes the inner and outer surfaces of the upper labia minora (Fig. 2). If only the outer surface of the labia minora needs to be tightened, wedge resection is used only on the outer surface, and the M-flap includes only the outer surface of the upper labia minora (Fig. 4).

### Internal Flap (I-Flap)

A smooth curve is created on the internal side of the labium minus (line *a*). The I-flap is 2–3 mm narrower than the E-flap. The starting point of the arc is dependent on the position of the inner surface of the M-flap. The internal view appears to be a curved number seven, with the wedge resection area as the middle part of the seven (Fig. 2b). If

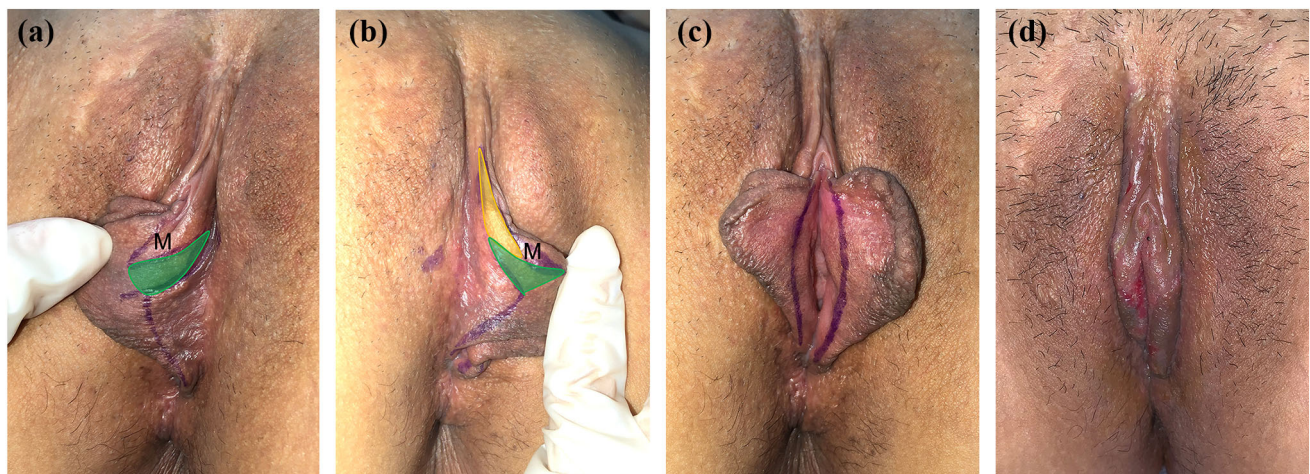
**Table 1** Proportion of edge and inferior wedge labiaplasty based on the patients’ morphologies

Morphology of labia minora hyperplasia	Edge resection labiaplasty	Wedge resection labiaplasty
Horizontal redundancy	Primary	Secondary
Vertical redundancy	Secondary	Primary



**Fig. 3** Trilobal labiaplasty. **a** Preoperative figure of a patient with bilateral labia minora hypertrophy and lateral clitoral folds. **b** The unstained area within the blue line was preserved tissue, the yellow area represents the clitoral hood reduction, the green area represents

the wedge resection, and the red area represents the edge resection. **c** Three flaps were sutured together to form new labia minora. **d** A postoperative figure is shown. The structure in blue triangle was “Clitoral-labial triangle”



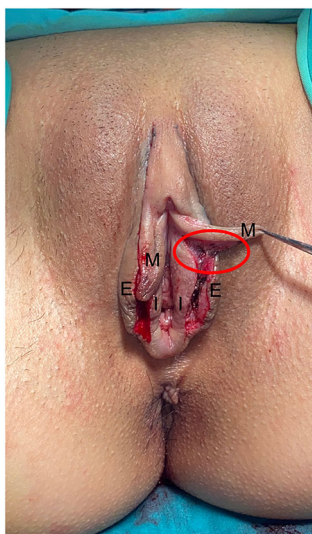
**Fig. 4** Case 2. A 26-year-old female patient with bilateral labia minora hypertrophy, unilateral clitoral hood hypertrophy, and labia minora asymmetry is shown. In this patient, only the outer surface of the labia minora needs to be tightened, so the middle flap (M-flap) is located on the outer surface of the upper labia minora. **a, b** As in

Fig. 3, the green area represents the wedge resection area on both external sides of the labia, the yellow area represents the clitoral hood reduction. **c** The incision on the internal side is shown. **d** A postoperative image is shown

the M-flap is located on the outer surface of the labia minora, the I-flap starts below the labia frenulum (Fig. 4c).

The final shape of the labia minora is dependent on the retained skin and the volume of retained fascia. Therefore, excision of fascial tissue is performed cautiously. If the labia minora is thin, the preserved fascia is flush with the

skin margin. If the labia minora is thick, the scalpel is tilted toward the incision and part of the fascia tissue is removed from the wedges for a thinner edge. To avoid vascular compromise at the tip of the M-flap, an adequate amount of subcutaneous tissue is preserved beneath the flap (Fig. 5). If the M-flap contains a thick or dark edge, the skin and



**Fig. 5** The middle flap is elevated to show the amount of preserved subcutaneous tissue

fascia tissue can be appropriately removed to achieve a favorable final appearance.

### Surgical Procedure

The trilobal composite reduction labiaplasty procedure is performed with the patient placed in the supine lithotomy position. The operative site is marked prior to the injection of local anesthetic (0.5% lidocaine mixed with epinephrine at a 1/20,000 ratio).

After the removal of the redundant tissue, the E-, M-, and I-flaps are sutured to form a new labium minus (Figs. 2c, 3c). Bipolar coagulation is used to achieve hemostasis. The skin and mucosal surfaces of the remaining labia are sutured in three layers to provide hemostasis and juxtaposition of the edge of these delicate tissues. The deep fascia is sutured using 6-0 Vicryl (Ethicon, Inc., Somerville, N.J.) interrupted sutures, the subcutaneous layer using 6-0 Vicryl (Ethicon) continuous sutures, and the skin using 5-0 Vicryl Rapide (Ethicon) continuous sutures.

### Postoperative Treatment and Follow-Up

Postoperative broad-spectrum antibiotics and oral analgesics were administered on the day of the procedure. The patients were advised to sit on a thick cushion roll in a forward-leaning position for the first 72 h postoperatively to prevent bleeding and hematoma formation. The patients were advised to sit in a bath with a potassium permanganate solution (1:5000; Kangfusheng Pharmaceutical Co., Ltd., Jinan, China) twice per day for 7–10 days postoperatively and to avoid spicy food, alcohol, strenuous exercise,

and sexual intercourse for 4 weeks postoperatively to prevent dehiscence or poor wound healing. The sutures disintegrated within 3 weeks of the procedure, although they were removed at 7–10 days postoperatively if requested by the patient.

The patients attended follow-up visits at 7–10 days and 3 months postoperatively. Re-examinations were conducted face-to-face or via video or graphic forms. The patients completed the Female Genital Self-Image Scale (FGSIS) questionnaire during the 3 month follow-up visit [8, 9]. The FGSIS includes seven items and is used to assess a woman's feelings and beliefs regarding their own genitals using a four-point response scale (strongly agree, agree, disagree, and strongly disagree). The scores for each item were summed, resulting in a total score ranging from 7 to 28 points, with higher scores indicating a more positive genital self-image. A total score  $\geq 21$  points were considered satisfactory in this study.

### Statistical Analysis

All statistical analyses were performed using SPSS version 24 software (SPSS Inc., Chicago, IL, USA). Quantitative data are reported as mean  $\pm$  standard deviation. The paired samples *t*-test was used to compare normally distributed data. Data that did not conform to a normal distribution were compared using the *t*-test or Wilcoxon rank-sum. Statistical significance was set at  $p < 0.05$ .

### Results

A total of 136 consecutive patients undergoing labiaplasty and clitoral hood reduction (including 88 bilateral and 48 unilateral procedures) were included in this study. The mean patient age was  $31.6 \pm 8.82$  years (range: 21–53 years).

Functional and aesthetic indications for surgery were present in 80/136 patients (58.8%). The most common indications for labiaplasty were poor aesthetic appearance (39/136, 28.7%) and pain and discomfort while wearing tight pants or during sports activities or sexual intercourse (17/136, 12.5%). Other causes included labia majora atrophy (which increases the hypertrophic appearance of the labia minora; 34/136, 25.0%) and abundant, odorous secretions and difficulty cleaning (25/136, 18.4%; Table 2).

The trilobal method was successfully performed in all 136 patients. The mean operation time was  $92.51 \pm 16.42$  min (range: 64–130 min). The mean size of the M-flap was  $1.10 \pm 0.24$  cm (range: 0.7–1.5 cm) in width and  $2.11 \pm 0.47$  cm (range: 1.5–3.2 cm) in length, with a length:width ratio of approximately 2:1. Due to the

**Table 2** Reasons that patients sought treatment

Reason for surgery	Number of patients ( <i>n</i> =136)
Poor aesthetic appearance	39 (28.7)
Pain or discomfort when wearing tight pants or during sports activities or sexual intercourse	17 (12.5)
Aesthetic and functional dissatisfaction	80 (58.8)
Postpartum atrophy of the labia majora	34 (25.0)
Abundant secretions and difficulty cleaning	25 (18.4)

Data are shown as number (percentage)

retention of the pedicle fascia tissue, no patient had tip necrosis.

All patients were evaluated at 7–10 days after the procedure, while 134/136 (98.5%) at 3 months after the procedure. Small hematomas ( $< 1 \times 1 \text{ cm}^2$ ) developed in 6.7% (15/224) of the sides within 72 h of the procedure. Seven patients returned to the hospital for the removal of the hematoma and eight patients did not require additional treatment (Fig. 6). No large hematomas were reported.

Postoperative wound dehiscence was observed in 0.4% (1/224) of sides, located at the clitoral prepuce. The dehiscence was short (3–8 mm) and superficial, and no secondary infection or poor wound healing was reported.

Mild swelling representing a thick free labial border was present in 20 sides (9.1%) at the 3 month follow-up. The swelling was treated with oral detumescence mediations, dietary changes including alcohol avoidance, and reducing cycling exercises. Three patients (2.2%) underwent secondary repair surgery due to incomplete bilateral symmetry.

Among the 134 patients with long-term follow-up, 122 patients (91.0%) scored  $\geq 21$  points on the FGSIS (mean score:  $24.84 \pm 3.47$  points; range: 10–28 points; Table 3).

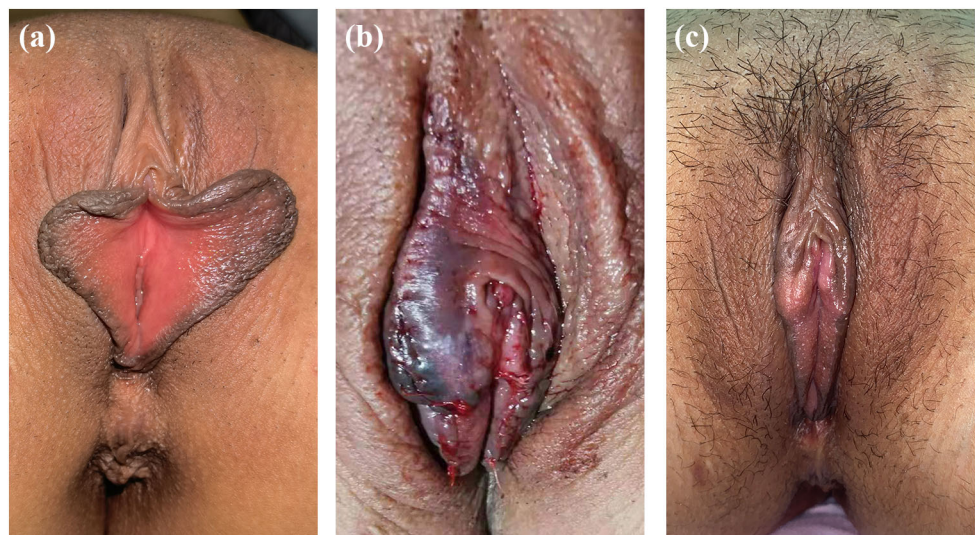
Of the patients who wished to improve the appearance of the genitalia, 91.5% (107/117) were satisfied with the outcomes. Of the patients who wished to improve the function of the genitalia, 95.9% (93/97) were satisfied with the outcomes (Fig. 7).

## Discussion

### Patients' Demands

The number of labiaplasty and clitoral hood reduction procedures has increased significantly in recent years, followed by a shift in the proportion of patients requiring cosmetic procedures instead of functional procedures [10]. In addition, relative hypertrophy of the labia minora caused by atrophy of the labia majora has become a major reason for postpartum women to require labiaplasty surgery. Age-related changes affect the physical appearance of the female external genitalia, as the labia majora becomes less plump and more wrinkled. With less or no coverage from the labia majora, the loose appearance of the labia minora is more obvious, and patients experience discomfort due to

**Fig. 6** Case 3 with a small hematoma. **a** A preoperative image of the patient's vulva area is shown. **b** The patient developed a small hematoma on the right labia minus. **c** An image obtained at 3 months postoperatively is shown. No further complications were noted



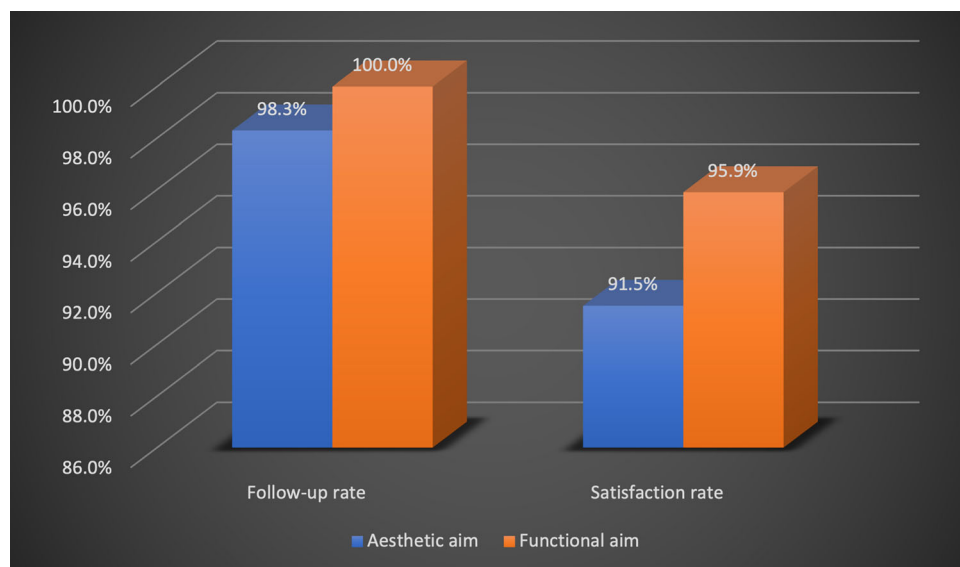
**Table 3** Female genital self-image scale scores

FGSIS item no.	Preoperative <sup>a</sup> (n=134)	Postoperative <sup>a</sup> (n=134)	p value <sup>b</sup>
Q1	1.84±0.50	3.76±0.48	< 0.001
Q2	1.84±0.50	3.76±0.48	< 0.001
Q3	1.21±0.41	3.26±0.70	< 0.001
Q4	1.73±0.49	3.72±0.50	< 0.001
Q5	1.48±0.50	3.69±0.58	< 0.001
Q6	1.34±0.47	3.27±0.63	< 0.001
Q7	1.37±0.49	3.37±0.67	< 0.001
Total	10.81±2.67	24.84±3.47	< 0.001

FGSIS Female Genital Self-Image Scale

<sup>a</sup>Continuous variables are shown as mean ± standard deviation

<sup>b</sup>A paired samples *t*-test is used to compare the preoperative and postoperative scores in the same group.

**Fig. 7** Follow-up and satisfaction rates of different demands

friction. The recently increased procedure rates also suggest improved cognition of the requirements for vulva aesthetics and functions as patients are able to recognize problems and request surgical treatments.

The reasons for patient visits can be divided into two basic categories: the improvement in aesthetics or function [11]. In this study, the follow-up and satisfaction rates were slightly lower when patients sought treatment to improve aesthetics compared to when surgery was sought to improve function. It is assumed that patients who desired improved aesthetics who did not attend follow-up visits were satisfied as they did not seek additional treatment. Their failure to follow-up may have been to maintain their privacy among relatives and acquaintances. Patients who sought surgery to improve the function of their genitalia may have had higher satisfaction rates due to the fact that the surgery improved physical abnormalities and helped heal psychological traumas. In addition, patients who seek

treatment for aesthetic purposes may be less satisfied with minor imperfections.

### Indications

As hypertrophy of the labia minora is not a disease [12], the surgical indications are mainly set by the patient's requirements and expectations. Prior to the procedure, the surgeon should counsel the patient regarding the shape of the patient's labia minora, clitoris prepuce, and vulva [13]. The patient's concerns should be acknowledged while education regarding the wide variety of normal anatomical variants is provided. It is also important to correct any misconceptions or unrealistic aspirations that the patient has, such as the removal of darker pigmented skin to achieve a smaller, pinker labia minora (< 0.5 cm). The changes after the surgery can also lead to improvement in the patient's relationships with their sexual partners.

## Advantages of the Trilobal Technique

In this study, most patients were found to prefer a prominence in the middle and upper thirds of the labia minora, similar to the shape of a willow leaf. Therefore, the novel trilobal method results in the creation of a prominence at the golden section ratio (at approximately three-fifths).

Traditional edge resection labiaplasty resolves horizontal redundancy of the labia minora, and traditional wedge resection resolves vertical redundancy [14, 15]. The novel trilobal method integrates these two methods to simultaneously remove redundancy in both directions and can be applied to several different labia minora shapes.

Edge labiaplasty may be complicated by over-resection, distortion of the natural contour, or pigmentation of the free labial border [14, 16]. Therefore, the M-flap is created between the E-flap and the I-flap using this novel technique. The M-flap preserves the natural appearance and pigmentation of the most prominent and conspicuous part of the labia minora and avoids linear scar contractures involving the free border. In this novel technique, the E-flap is 0.2 cm wider than the I-flap, resulting in a slightly inward contour of the labia minora, which also helps hide the incision scar within the free labial border.

The clitoral-labial triangle that contains the clitoral hood, clitoral glans, clitoral frenulum, and superior aspect of the labia minora is an important supporting structure and sex-sensitive area [6, 7]. If the triangle is damaged, the natural junction between the clitoris prepuce and the labia minora, which is difficult to repair, will be destroyed. Clitoral stabilizing mechanisms, including the clitoral glans stability, may also be affected. The novel trilobal method preserves the structure without damaging the sensitive clitoris or the clitoris frenulum, preventing pain, deformities, and an asymmetric appearance caused by damage to the structure. Moreover, this method corrects the position of the malformed clitoral-labial complex owing to the design of the M-flap. In addition, the redundant loose tissue is removed, revealing the originally buried supporting structure, resulting in a tighter, more natural appearance of the vulva. In our department, surgery to tighten the clitoral hood, correct vertical redundancy, and improve clitoral sensitivity [14] is not recommended as Asian women are more concerned with obvious incision scars that cannot be hidden than with increased sensitivity with an uncertain outcome.

## Complications

Few complications were observed in this study. Fifteen patients developed a small, postoperative hematoma that had no significant effect on postoperative healing or morphology. To avoid postoperative bleeding, the patients

were advised to use a cotton pad, which allows for a slightly forward posture in which patients can read or use their mobile phone. The cotton pad is inconspicuous within the patient's clothing.

Dehiscence is the most common complication of wedge labiaplasty [17]. In this study, the dehiscence was small and superficial, and healed easily due to reliable subcutaneous sutures. Slight and tiny epidermal damage at the junction of the three flaps is the inevitable course of healing and will heal quickly without affecting the final appearance of the labia minora and patient satisfaction (Fig. 4d). Good suturing is needed to ensure that the subcutaneous suture is tight and the skin suture is loose and to avoid edge scalloping deformities.

The amount of retained fascia affects the final shape of the labia minora. The final shape of the clitoral prepuce and labia minora after excision of the excess tissue must be predicted during the design step. The M-flap requires more retained pedicle tissue to maintain the blood supply of the flap tip, while tissue should be removed from the E- and I-flaps to ensure a thin appearance. The tissue thickness at the junction of the three flaps may be uneven, resulting in a partial depression. The novel trilobal method is technically difficult and must be performed by a trained surgeon.

## Conclusions

Surgeons often prefer a simple method for solving complex problems. The idea of this method is to select the three parts of tissue to be retained from the original thick, loose, and rugose tissue to form a new labia minora. The trilobal method combines the design concepts of edge and wedge resections as three flaps are designed using the hypertrophic, redundant, and sagging tissues to form a labia minora and clitoral hood that is satisfactory for the patient. This method is associated with low complication rates and high functional and aesthetic satisfaction rates, suggesting that it is a safe and effective reduction labiaplasty method for a wide variety of patients.

**Acknowledgments** The authors are grateful to the patients who provided informed consent for publication.

**Funding** None.

**Declarations**

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964



Helsinki Declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all participants included in the study.

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