



## Full-length article

## Severe cosmetic surgical complications of the labia minora

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## ABSTRACT

**Study Objectives:** Gynecologists need resources related to labia minora, severe cosmetic surgical complications currently unavailable in the medical literature. Women's requests for genital cosmetic surgery significantly increased within the last two decades; however, the medical literature does not report severe complications and their causes. Therefore, the author hypothesizes that currently used surgical concepts for labia minora reduction are partially responsible for cosmetic surgical debilitating complications. This clinical research aims to present photo documentation of severe surgical complications associated with various cosmetic surgical interventions.

**Designed:** A prospective case series study was conducted in a single gynecologic corrective surgical practice to show different debilitating symptoms associated with labia minora cosmetic surgery. Primary data sources were obtained from direct clinical examinations. Secondary data sources were acquired from scientific-clinical and psychological medical literature articles, websites, medical records, procedure reports, statistical data, and recommendations. Data collection was done prospectively, and data analysis performed retrospectively included variable clinical observations and the severity of symptoms related to different surgical technique concepts.

**Intervention:** Patients were exposed to medical interviews, examinations, discussions, and validated questionnaires. In addition, an analysis of commonly used surgical cosmetic intervention concepts scrutinized (labia minora amputation, central wedge resection, and labial delamination).

**Settings:** The single practice center for corrective cosmetic surgery.

**Patients:** The study's sample size was 110 women with severe cosmetic surgical complications of labia minora.

**Measurements and main results:** The primary outcome measures the prior cosmetic surgical intervention outcomes of the labia minora, and the secondary outcome measures the occurrence of symptoms. Procedure duration was measured from the initial incision to the last suture placement. The follow-up study was conducted at a one-year interval for three years. The labia minora cosmetic severe complications were associated in 76 % with labial amputation, 21 % with central wedge resection, and 3 % with modified delamination. The most common symptomatic complication in labia minora amputation was over-resection. In all subjects, debilitating physical pain, neurological pain, psychological disorders, and sexual dysfunction were observed.

**Conclusions:** Current labia minora cosmetic surgical concepts contribute to severe surgical complications with debilitating physical, emotional, and sexual dysfunction.

### Introduction

In the last two decades, cosmetic-plastic gynecologic surgery has increased in demand [1,2]. The concept of surgical procedures for female genital cosmetic surgery has not been scrutinized, and the safety and effectiveness have not been determined; although case reports and meta-analysis review articles suggest that "labioplasty" is a safe and effective operation, electronic and manual medical literature searches failed to verify it [3–5].

Lallemant et al. show that the labia minora functional cosmetic surgical complications is 53% [6], and Creighton et al. report that up to 80% of subjects will require corrective cosmetic-plastic surgery on adolescent patients [7]. However, those research groups have yet to study the relationship between adverse outcomes and the different cosmetic surgical interventions used. There is available information in the medical literature that minor surgical complications of labia minora occur [8,9]. However, labia minora cosmetic surgical severe complications have not been reported. Therefore, the present study is the first

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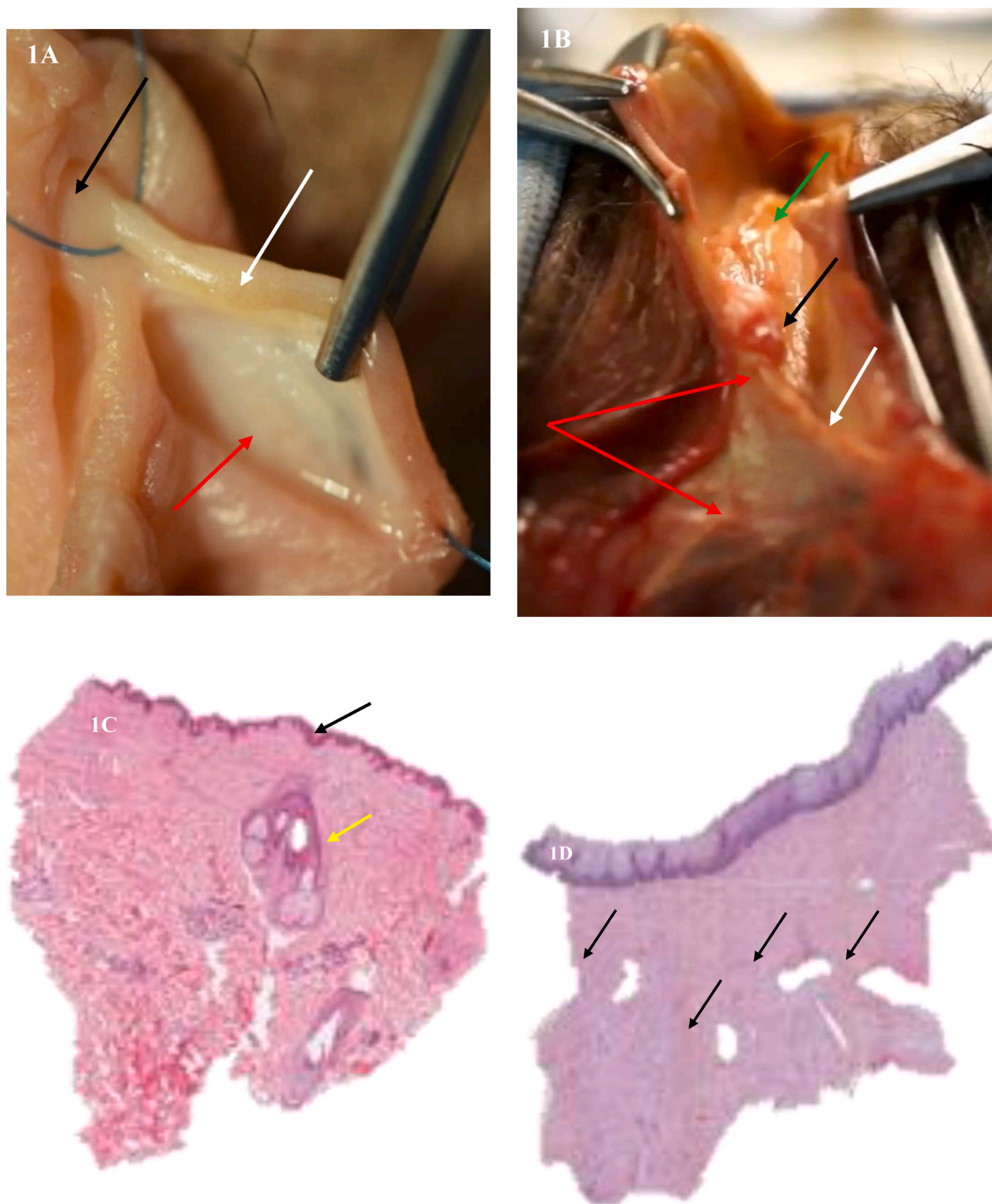
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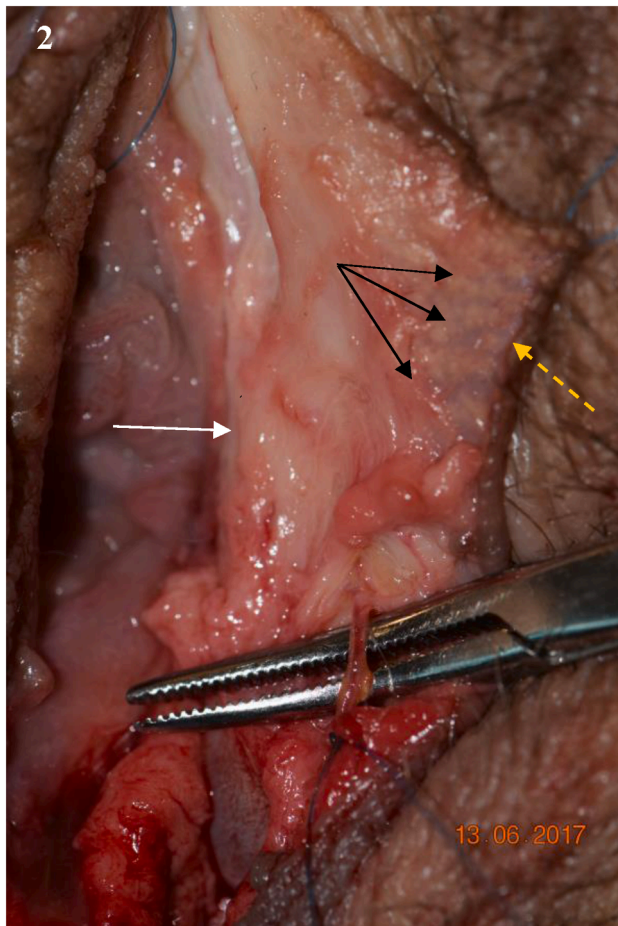
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**Fig. 1.** A photo of the newly discovered deep infraclitoral fascia bundle of the superficial layer of skin. **1a.** The clitoral frenulum consists of the superficial, horizontal skin fold in a vertical orientation (white arrow). The red arrow depicts the deep stratum of the infraclitoral fascia bundle. The black arrow shows the clitoral glans. **1b.** A photo depicts the sub-clitoral adipose tissue cushion covers the clitoral body (green arrow) and clitoral glans (black arrow); the white arrow shows the superficial layer of the clitoral frenulum, and two red arrows present the infraclitoral fascia bundle. **1c.** The microscopic picture portrays the histology of the superficial stratum (black arrow), and skin appendages are depicted by the yellow arrow. **1d.** The characteristic microscopic picture of the deep stratum – the corpus spongiosum vascular structures displayed by black arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



**Fig. 2.** Labium minus the superior and inferior vessels and anastomosis between them. Intraoperatively, a surgical instrument elevates the central labium minus the neurovascular bundle before the labial bifurcation. The yellow dotted arrow depicts the labium minus superior vessels, and the white arrow shows the inferior labium minus vessels. Three black arrows present multiple anastomoses between the labium minus superior and inferior vessels. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

pictorial and narrative presentation of significant complications of labia minora surgeries.

The labium minus consists of three branches: a) the trunk; b) the clitoral frenulum – inferior branch; c) the clitoral prepuce – superior branch. The branches originate from the labium minus trunk bifurcation, where the anterior labium minus trunk splits into those two branches. In 2018, Ostrzenski discovered the anatomical structure of the infraclitoral fascial bundle, Fig. 1, [10]. This structure prevents the clitoris, particularly the clitoral glans, from its up-down-lateral hypermobility, which makes clitoral stimulation difficult. Intraoperative complex blood supply is depicted in Fig. 2 and inadvertent injury to the artery can occur with perfused bleeding.

The study's question is, "What is the cause(s) of severe cosmetic surgical complications of labia minora?" The author hypothesizes that currently used cosmetic surgical techniques must be better designed. The objective is to present different labia minora complications associated with various cosmetic surgical interventions of the labia minora.

## Material and methods

### The terminology used in this study

- A Barbie-look procedure is a nonmedical but marketing term in which excessive labial trimming (over-resection) is performed
- Labia minora abrupt amputation is a surgical technique of resecting labial tissue from the fourchette to the labium minus bifurcation
- Labia minora neuropathy is neurological pain at the surgical site
- Labia minora reduction is to decrease the labial tissue volume
- Labia minora straightforward amputation is the excision of labial tissue from the fourchette through the portion of the clitoral prepuce
- Labioplasty is a non-medical term and is used loosely in labia minora marketing surgery
- Peripheral neuropathy is neurological pain at the surgical site
- Pudendal nerve neuralgia or reflective pain perception is in multiple areas, such as the pelvis, bladder, rectum, vulva, buttocks, and posterior perineum. It is caused by injury of one of the pudendal nerve branches, and the brain sends pain signals to another location than the surgical site.
- "Railroad track" complication – suture materials leave significant track marks
- The labium minus bifurcation is where the upper-anterior labium minus divides into inferior and superior branches.
- The labia minora branches are a) the labium minus trunk (the central stalk); b) the clitoral prepuce (the clitoral hood) is the upper branch of labium minus; c) the clitoral frenulum is the lower branch of the labium minus.
- The vaginal outlet is the newly discovered anatomical structure consisting of the hymeneal membrane, hymeneal ring, and hymeneal plate with different histology than the vaginal wall.

### Study design

This study is an open-label case series study with pictorial documentation that the participants were drawn from a surgeon's referral and women's self-referral worldwide. From those patients, the external genitalia digital photos will be taken with a camera equipped with a macro lens. Subjects will be relocated into three groups based on the type of original operation. An in-depth analysis of gross, topographic, functional, and surgical anatomy will be performed, and the currently used surgical technique concepts will be scrutinized utilizing anatomical and cosmetic surgery principles.

The clinical study was conducted at the Institute of Gynecology, a single-practice center specializing in corrective female genital cosmetic surgery and clinical research. The total sample size was 110 subjects. The number of participants was determined by the referred numbers of patients during the study duration, which opened on June 1, 2018, and concluded on June 1, 2022. Patients were referred either by surgeons or self-referred.

Eligibility criteria include a) patients must be symptom-free within the vulva, clitoris, pelvis, urinary bladder, rectum, and buttocks before the original labia minora cosmetic operation and become symptomatic after cosmetic labiorreduction surgery; b) prior labia minora cosmetic surgery that resulted in severe symptomatic complications; c) diagnosis of sexual dysfunction; e) psychological disorders including depression and anxiety associated with cosmetic surgical severe complications.

Pain and dyspareunia intensity will be measured by the validated Numeric Rating Scale-NRS (0–10; 0 is no pain; 1–3 is mild; 4–6 moderate; and 7–10) [11]. The -validated female sexual function index-6 (FSFI-6) will be used to establish the severity of female sexual dysfunction associated with labia minora cosmetic surgical complications (FSD) [12]. The validated brief depression severity (PHQ-9) will be used to screen initial psychological disorders [13].

The subjects will be relocated into three groups based on the type of original cosmetic surgical intervention performed on the labia minora



**Table 1**

Demographics of the Study Group (n = 26).

Median Age	Total Number	Race Caucasian	Latino	Black	Median Parity	BMI ** (kg/m <sup>2</sup> )	Prior Surgery A/P *** Colporrhaphy	A/P & PV **** Repair
42 (±8) *	26	16 (73%)	9 (8.1%)	1 (0.9%)	2 ± 1	26.4 (±5.2)	22 (80.2%)	4 (19.8%)

\* Mean Standard Deviation ± or Number of Participants Percentage in Parenthesis.

\*\*Body Mass Index.

\*\*\* Vaginal Anterior/Posterior Colporrhaphy.

\*\*\*\* Paravaginal Repair.

that resulted in severe complications: Group I - *labia minora amputation or nymphectomy, also known as the marketing phrases - labia minora trimming, linear cut, S-cut, or Barbie cut*) consists of patients who suffer from severe complications related to this technique. This surgery was first mentioned in the Egyptian Papyrus [14], and Rodman reintroduced it to the modern gynecological surgical field [15]. There are two types of techniques for labial amputation: a) abrupt amputations – labial resection is performed from the fourchette to the labial bifurcation; b) straightforward amputations in which incisions are made on the labia minora trunk full-length through the clitoral prepuce.

Group II – *central wedge resection (central V-plasty)* is one of the three most used labial wedge resections that can be performed on the labium minus a) posterior, b) central, and c) anterior. Martincik and Malinovsky first described the posterior wedge resection [16]. The v-shape flap wedge resection is done from the labia minora free margin to the labia minora base. Laufer and Galvin moved the posterior wedge resection to the central labial location [17]. Alter added to the central wedge resection the extension of the incisions to the clitoral prepuce [3].

Group III – *labial modified de-epithelialized reduction*, also known as *modified delamination procedure*, is a technique that resulted in creating the monolithic block structure by removing the labia minora full length of the labium minus above Hart's line, bifurcation, and joining those structures with the clitoral prepuce with the labium minus trunk. The term delamination is used in the present report since epithelium is the histological nomenclature. Cao et al. [18,19]. The original procedure was described by Choi and Kim [20]. *Primary* data sources would be obtained from in-person medical interviews with the author, clinical examinations, original surgical notes of the initial surgery, and post-operative pictures submitted for the author's consultation online. *Secondary* data sources were acquired from scientific-clinical medical and psychological articles, websites, medical records, statistical data, and medical societies' recommendations.

Patients were exposed to a medical interview by the author, a discussion on their current condition, and validated questionnaires (Numeric Rating Scale-NRS) [11], Sexual Function Index-6 -FSFI-6 [12], and psychological instrument (PHQ-9) [13]. Patients were also exposed to the interpretation of severe complication symptoms such as a) persistent and chronic pain at the surgical site (neuropathy); b) severe reflective pain in multiple locations (pudendal nerve neuralgia); and c) dyspareunia. The surgical concepts of different surgical techniques of cosmetic labia minora surgery will be analyzed to determine whether they can contribute to severe cosmetic surgical complications.

### Literature search

An electronic and manual searches of the medical literature will be carried out from 1900 to March 2023, using Medical Subject Headings (MeSH) and the following keywords or phrases: labia minora labior-eduction, labia minora labioplasty, cosmetic gynecologic surgery, esthetic gynecologic surgery, female genital cosmetic surgery, labia minora labioplasty complications, labia minora reduction complications, labia minora postoperative cosmetic complications, labia minora cosmetic surgical procedures, female external genitalia surgery, labia minora hypertrophy, and labium minus anatomy, labia minora corrective surgery, clitoral prepuce anatomy, clitoral prepuce cosmetic

surgery, prepucioplasty, preputioplasty, clitoral prepuce cosmetic surgery complications, clitoral prepuce corrective surgery, clitoral frenulum anatomy, clitoral frenulum cosmetic surgery, clitoral frenulum esthetic surgery, clitoral frenulum cosmetic surgery complications, clitoral frenulum cosmetic surgery, clitoral frenulum corrective surgery. The integrative medical literature review system will be applied that includes a) establishing a specific search pattern; b) the literature data collection and review for clarities and how the reviewed reports fit the current research; c) pertinent data analysis to evaluate the study's question, hypothesis, objectives, ascertain the study design, assess the methods; d) the study reproducibility; e) interpretations and clarifications of the qualitative and quantitative scientific-clinical articles; f) examine the study's quality, credibility, creativity, and appropriate transparency of the articles. In addition, the extrapolated pertinent data from the literature search will be included in the current study.

### Ethics

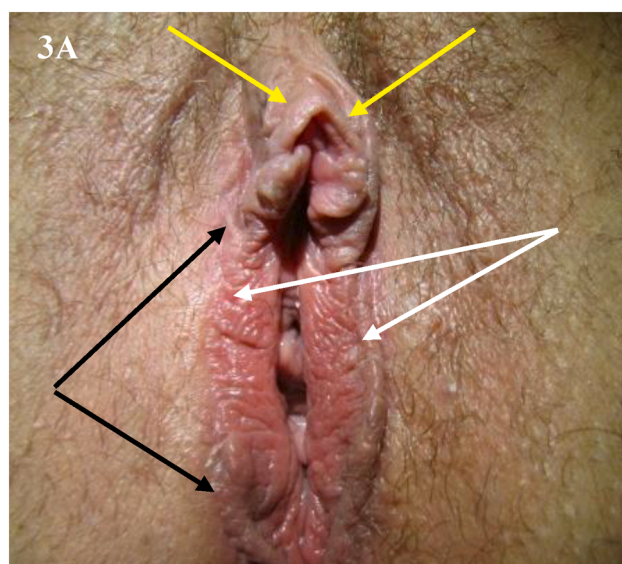
The study was conducted and strictly adhered to the Helsinki Declaration [21], quote: "Physicians must consider the ethical, legal, and regulatory norms and standards for research involving human subjects in their own countries as well as applicable international norms and standards [21]." The author requested IRB exemption from the local joint hospitals and was guided by the Declaration of Helsinki: a) "The physician must fully inform the patient which aspects of their care are related to the research." [21]. Subjects in this study were not exposed to any medical intervention or therapy; therefore, all participants were verbally informed about their urogenital digital photos being potentially used in this publication. Also, every woman was reassured that the selected pictures could not identify her body. All patients granted permission to the author in writing to use photograms in scientific-clinical publications, teaching, and presentation at medical conferences. Additionally, the study does not require informed consent because it is a part of the author's routine clinical practices; b) the information cannot identify the human subjects; c) it cannot readily be ascertained, directly or through identifiers linked to the issues; d) collected data will be used for investigator's analysis and health information [21].

### Results

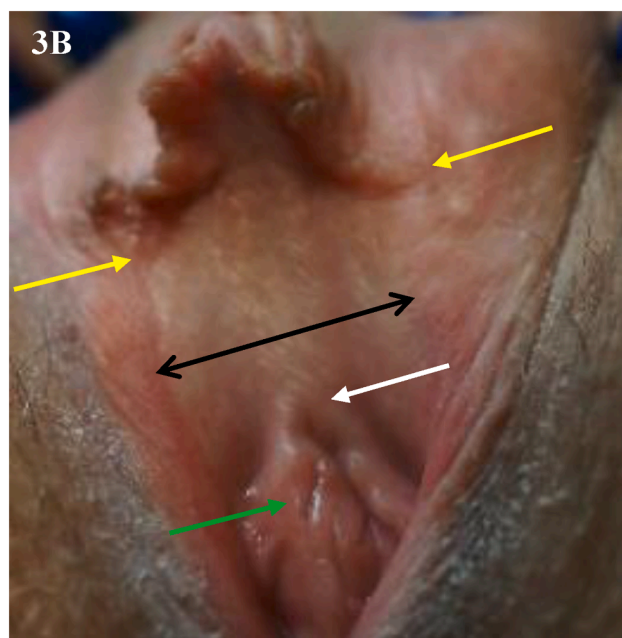
One hundred ten women who underwent labia minora cosmetic surgery and presented with severe physical pain, neurological pain, sexual dysfunction, and psychological disorders completed the corrective surgery study. Clitoral prepuce and frenulum complications did not occur as solo entities but were associated with labia minora operations; therefore, it is impossible to determine whether symptoms relate to which anatomical structures. Table 1 presents the demographic characteristics of this cohort.

Eleven surgeons (12%) did not provide a postoperative report of a labia minora original cosmetic surgery, and only terms such as labioplasty or labioreduction, labial trimming, linear, and s-shape labioplasty were available. The present study showed that labia minora reductive surgery was executed by 61% and 39% of female and male surgeons, respectively.

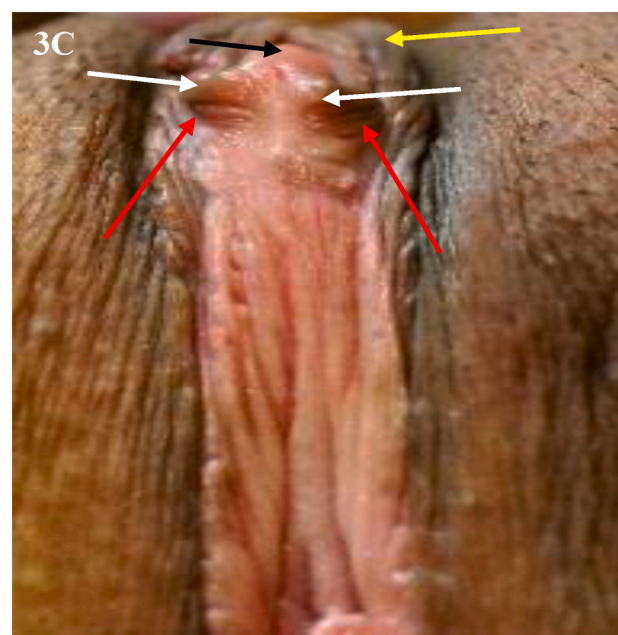




**Fig. 3a.** A photo demonstrates abrupt labia minora amputation complications. Excision of the labia minora was performed from the fourchette (the labial frenulum) to the labial bifurcations. The clitoral frenulum and the remaining upper labia minora trunk are sutured to the inner surface of the clitoral orifice wall (two yellow arrows). Labia minora trunks were over-resected, everted, and fused (two white arrows) to the interlabial crease and the adjustment edges of the labia minora (black arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



**Fig. 3b.** A photo of labial extreme abrupt amputation (“Barbie look procedure”). The clitoral prepuce is sutured bilaterally to the vaginal vestibule (two yellow arrows). The over-resected labia minora exposes the vaginal vestibule (double-head black arrow). As a result, the external urethral meatus membranous sphincter was flattened and deviated from midline to diagonal orientation, and the urethral orifice became an unnatural linear appearance (the green arrow). In addition, the left over-resected labium minus was connected to the upper part of the external urethral meatus (white arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



**Fig. 3c.** A photo of abrupt amputation affecting the labia minora and the clitoral frenulum. The over-resected labia minora were brought over the clitoral body (the yellow arrow), and it caused clitoral glance congestion (black arrow). Excised clitoral frenula healed and formatted “small balls” appearances (two white arrows), which horizontally were sutured to remaining over-resected labia minora tissues and the clitoral prepuce (two red arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

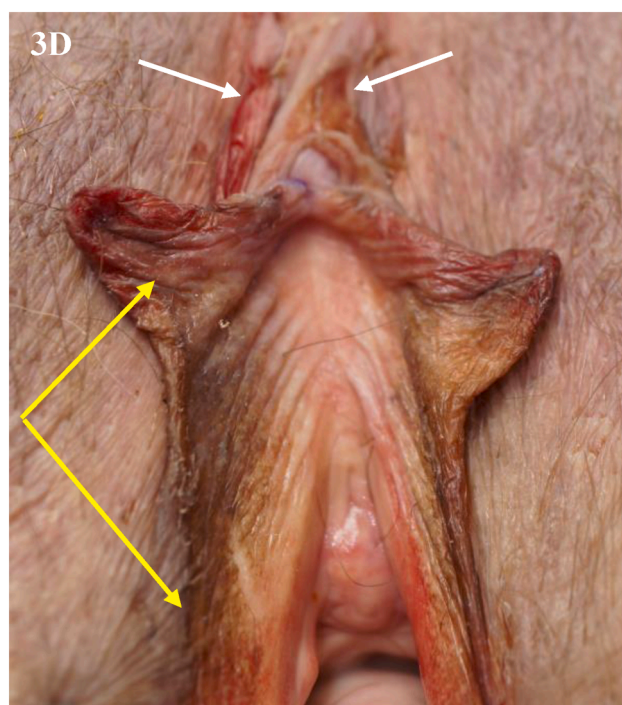
In Group I (*labia minora amputation*), seventy-five subjects (76%) out of 110 women underwent abrupt amputation in 34 patients (39%); straightforward amputations were performed in 52 (61%). Multiple complications affecting all three labial branches of the labium minus were associated with this procedure. The labia minora abrupt amputation complications are shown in Fig. 3a, 3b, and 3c, and the labia minora straightforward amputations are depicted in Figs. 4a through 4d. The most common symptomatic complication in labia minora amputation was over-resection, Fig. 3b.

In all subjects, the mean sexual dysfunction was diagnosed with a median of  $7 \pm 5$  SD; severe pudendal nerve neuralgia was diagnosed in 65 (59%) women with NRS 8 to 10. Furthermore, the analysis of the labia minora amputation concept revealed that it was an ill-designed procedure.

Two cases out of 110 presented irreversible complications related to a trimming technique, “the Barbie look procedure,” Fig. 3b, and laser application to the clitoral prepuce, frenulum, and labia minora trunks Fig. 3d.

The surgical concept evaluation of the labia minora amputation above Hart’s line revealed that the excision of the superior labium minus vessels and their anastomosis could lead to severe complications. Natural blood circulation was compromised, and innervation was interrupted within the labia minora. The aesthetic labial natural look from a rounded shape and half-moon appearance was changed to a straight anatomical structure. When the labia minora was amputated below Hart’s line, the labial superior, inferior, anastomosis between superior and inferior vessels, and superficial neurovascular bundle were removed, Fig. 3b, Fig. 4a.

In Group II (*central wedge resection*), the labia minora tissue volume reduction by v-shape flap resection caused severe complications in 26 (21%) patients; of 26 patients, 21 (81%) were subjected to central wedge resection without extension. Five subjects (19%) underwent significant wedge resection with extension, Fig. 5a and Fig. 5b. The labium minus v-

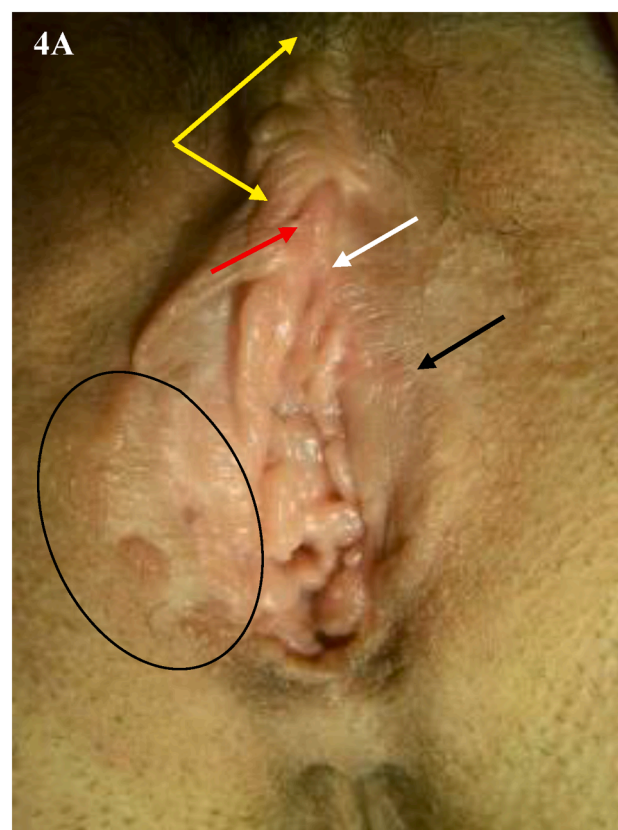


**Fig. 3d.** A photo of a labia minora laser cosmetic surgery complications. Thermo-energy (laser) was applied to the clitoral prepuce, clitoral frenulum, labia minora trunk, and vaginal vestibule. After laser treatment, the papyrus-like appearance of the affected structures with unhealed ulcers of the clitoral prepuce (the white arrows). The yellow arrow depicts the right labium minus fusion with the skin of the interlabial crease and the labia majora. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

shape flap wound separation, ischemic hole, ischemic ulcer, and clitoris compression, Fig. 5a. Scarring caused severe labial neuropathy and dyspareunia (both NRS was 9–10). The mean FSD score was low,  $9 \pm 7$ .

Assessment of the surgical concept of central wedge resection established that the procedure was ill-designed and responsible for severe complications. This conglomerate of surgical complications led to severe physical pain, neurological pain (labial neuropathy or pudendal nerve neuralgia), superficial dyspareunia, and psychological disorders, including severe depression that requires hospitalization. Aesthetically, an unnatural transverse scar on a longitudinal structure (the labia minora) was created. In addition, the labia minora anatomical deformity above and below resected wedges remained deformed and asymmetrical.

Group III (*labia minora modified delamination*) was a surgical procedure that created a monolithic fusion between the clitoral prepuce and the labia minora trunk, labial eversion, and fusion, Fig. 6. Such surgical changes are responsible for an unnatural labia minora straight appearance, clitoral pain, sexual dysfunction, severe labial neuropathy (NRS 9–10), pudendal nerve neuralgia (NRS 9–10), severe superficial dyspareunia (NRS 9–10), severe external genitalia pain (NRS 9–10), clitoral compression, persistent clitoral congestion, clitoral hypersensitivity, the limitation of the clitoral hood natural retractability, dryness, and profound emotional disorders, Fig. 6. Persistent burning pain (NRS 7–8), female sexual dysfunction with a mean FSFI-6 score of  $6 \pm 3$ , and severe depression (PHQ-9) score of  $23 \pm 3$ . Immediate initiation of pharmacotherapy and, if severe impairment or poor response to therapy, expedited referral to a mental health specialist for psychotherapy and collaborative management where these prevailing symptoms were recorded in all subjects of this group.



**Fig. 4a.** A photo of straightforward labial amputation with multiple complications. In straightforward amputation, incisions were carried from the fourchette (the labia minora frenulum) through clitoral prepuce (two yellow arrows). The clitoral prepuce was asymmetrically resected, which causes the clitoral glans to be permanently and unevenly exposed and congested (red arrow). This type of cosmetic surgery created the clitoral prepuce, “braided tissue scars” (two yellow arrows), which compress the clitoral body and glans, causing clitoral congestion and atrophy (red arrow). The left clitoral frenulum fused with the adjacent skin (the white arrow). The right labia minora trunk is fused with the skin of the interlabial crease and labia majora (the black circle), and the left labium minus was excised and fused with the skin (black arrow).

## Discussion

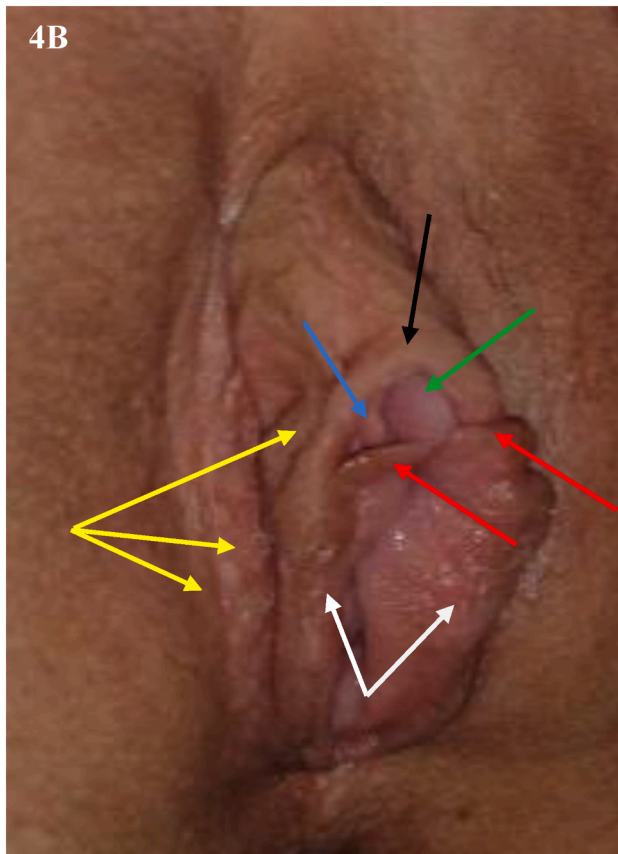
### Principles findings

Group I (*labia minora amputation*) – severe postoperative symptoms of labia minora amputation, including physical pain, neurological pain (labial neuropathy, pudendal nerve neuralgia), clitoral and peri-clitoral pain; however, the remaining vulvar structures are pain-free in those cases, Fig. 4a through Fig. 4d. In addition, clitoral atrophy, an irreversible sexual dysfunction resulting from long-lasting clitoral compression, can occur, Fig. 4a. Clitoral compression must be relieved as soon as it is clinically feasible. Over-resection of the clitoral prepuce can cause the inner clitoral prepuce fusion with the clitoral glans, reducing the natural ability of clitoral foreskin retraction, Fig. 4a, Fig. 4c, Fig. 4d.

Complications in Group I show no difference in symptomatology, whether abrupt or straightforward amputations were performed. The severity of symptoms is related to the degree of labial over-resection, Fig. 3a, Fig. 3b, Fig. 3c, or clitoral compression Fig. 3c, Fig. 4a, Fig. 4d, and Fig. 5a, Fig. 6. Additionally, patients in all groups reported significant psychological disorders, and all of them were referred for mental illness definitive diagnosis and therapy.

Clitoral prepuce cosmetic surgery is usually performed during labia minora operations, Fig. 3c, Fig. 4a, Fig. 4c, Fig. 4d, Fig. 5a, and Fig. 6,





**Fig. 4b.** A photo of the clitoral body and glans surgical shift to the left. The clitoral prepuce and the right labium minus redundant tissues were not removed (triple yellow arrows). Instead, the clitoral prepuce orifice wall was surgically everted, creating a “ring” that strangulates the clitoral glans and causes congestion (the green arrow). This preputial operation causes the clitoral prepuce orifice mucosa to prolapse (blue arrow). Next, both clitoral frenula were horizontally and laterally sutured to the labia minora (two red arrows), causing nerve-ending compression by stretching. Finally, the labia minora were asymmetrically resected, and the right labium minus was surgically everted, unnaturally fused with the clitoral prepuce. Such an operation deviates the clitoral body and glans from the natural midline location to the left.

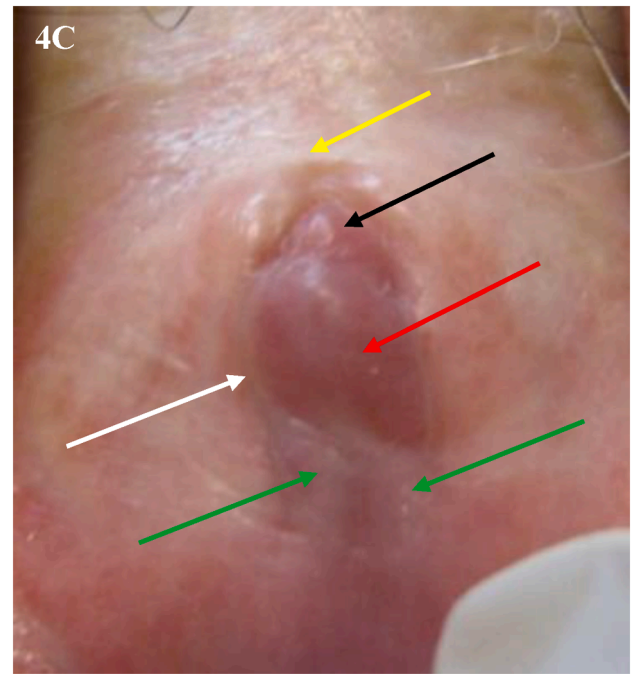
with railroad track scars, Fig. 4a, Fig. 4c, Fig. 4d. The railroad tract complications are predominantly related to the surgeon's skill of suturing, tying, and the timing to remove sutures. Too often, too tight, and too close placing sutures and not removing them timely results in the “railroad track” formation of scars. These cosmetic surgery complications can compress the clitoris, strangulating the clitoral glans and body with permanent clitoral congestions, Fig. 4a and Fig. 4d.

The clitoral frenulum can be affected by complications related to trimming or severing of those structures, which destabilize clitoral stability, elevate the clitoral glans, and partially fold the clitoral prepuce, Fig. 3b and Fig. 3c. In addition, healing of the excised clitoral frenulum creates two distinct “small ball” under the posterior clitoral glans, Fig. 3c. Also, surgically attaching the clitoral frenulum laterally can cause severe symptoms, Fig. 3b and Fig. 3c.

Multiple cosmetic surgical complications of all three branches (the labium minus trunk, clitoral frenulum, and clitoral prepuce) can occur, Fig. 4a through Fig. 4d and Fig. 5.

Analysis of the labia minora amputation surgical concepts established that they were ill-designed operations and contributed to complications, including undesirable aesthetic outcomes, Fig. 4a.

Group II, *labia minora central wedge resection* severe complications are related to the tissue ischemia created by v-shape flap resection of full width and thickness, including the fragment of the superficial



**Fig. 4c.** A photo of straightforward labial amputation with clitoral agglutination, congestions, and clitoral prepuce orifice inner wall mucosa prolapsed. The clitoral prepuce orifice wall was reduced, and bilaterally, the clitoral frenulum was also reduced by labia minora straightforward over-resection at the initial surgery. In the second surgery, the reversed v-shape clitoral prepuce orifice wall was cut out (the yellow arrow) to release the clitoral compression and congestion (red arrow). Unfortunately, this procedure causes an additional complication of symptomatic preputial mucosal prolapse (the black arrow). In addition, permanent fusions by agglutination between the clitoral glands and prepuce make preputial skin retraction impossible and cause clitoral congestion (the white arrow) and clitoral frenulum congestion (two green arrows).

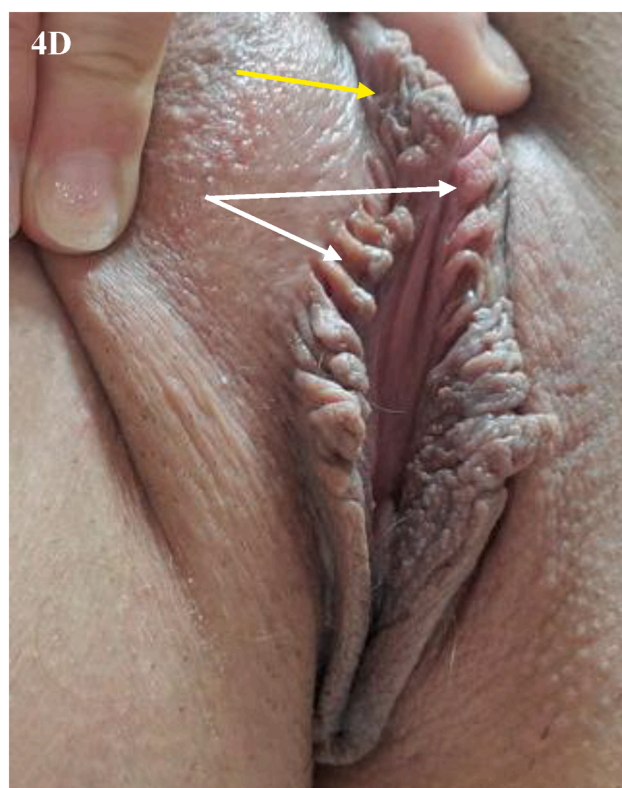
neurovascular bundle at the labium minus base, Fig. 5a. This method causes peripheral nerve disruption and fragmental vessel resection, resulting in labial ischemic defects; however, symptoms in this group are less severe than in the labial amputation group. However, they are severe enough to subject patients to the second or third corrective surgery. Those severe complications are related to the improper surgical technique concept.

Group III, *labial modified delamination* (modified de-epithelialization), the delamination term is used in this report since epithelium is the histological term and not the anatomical one. This surgical technique predisposes to the labia minora eversion, fusion, and an unnatural straight look that results from creating the monolithic, fixated structure, Fig. 5a. In addition, it causes clitoral glans compression or strangulation, Fig. 4c, Fig. 6, clitoral prepuce mucosal prolapse, Fig. 4c. Such surgical techniques are not only responsible for an unnatural labia minora straight appearance but also sexual dysfunction, clitoral hypersensitivity, the limitation of the natural retractability of the clitoral hood, and dryness, Fig. 6. In addition, severe superficial dyspareunia, (female sexual dysfunction) and persistent neurological pain were prevailing symptoms recorded in all subjects in this group.

The current research findings showed that the labia minora cosmetic surgical complications were in Group I – 76% of patients, Group II – 21%, and Group III – 3%. The analysis of the surgical intervention concepts of labia reduction revealed that they were ill-designed in all groups.

In all groups, pictorial documentation showed unnatural anatomical changes and significant complications caused by the labia minora cosmetic surgery. Anatomical changes differ between the study's groups, but many symptoms are similar. Furthermore, clitoral





**Fig. 4d.** Photo of “railroad track” complications of labia minora straightforward amputation. Straightforward labia minora amputation without appropriate suturing and tying techniques can result in debilitating railroad track complications by multiple scar formations of the clitoral prepuce, frenulum, and labial minora trunk (yellow and two white arrows). Bringing the labia minora over the clitoral prepuce not only causes compression on the clitoris but also obliterates access to the clitoral glans (the yellow arrow). In addition, unevenly resected labia minora and deformed by multiple lobules and deep groove scars running from the labial free edge to the labial base (white arrows) can cut labial nerves and produce neurological pain (labial neuropathy and pudendal nerve neuralgia).

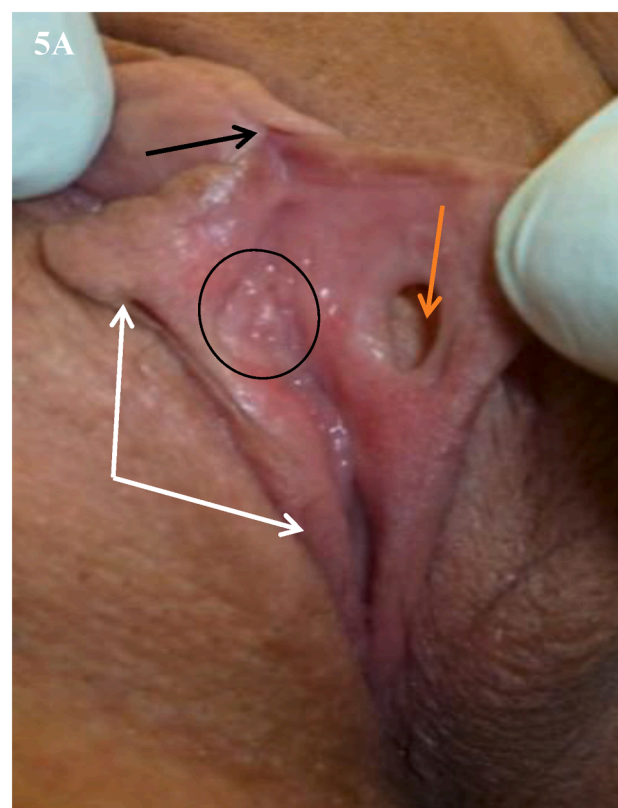
compression associated with cosmetic surgery can eventually cause clitoral atrophy.

#### Interpretation

To the best of this author's knowledge, pictorial and narrative descriptions of labia minora severe complications and their symptoms are unavailable in the medical literature. However, some previously described medical entities could be found in female genital cosmetic surgical complications that apply to female genital cosmetic surgery. Clitoral atrophy, an irreversible sexual dysfunction resulting from long-lasting clitoral compression, is one of them and has been documented in this clinical research, Fig. 4a [20]. Clitoral decompression must be done as soon as it is clinically feasible, and Ostrzenski's described surgical method for it [21]. It is essential to prevent recurrent labial fusion by placing retention suture and during postoperative follow-up, and debridement is needed, and Ostrzenski described such a method that can help prevent recurrent labial fusion [22]. Those types of complications often require surgery in two stages [22,23]. Unfortunately, surgical concepts are ill-designed and contribute to severe physical and neurological symptoms and psychological disorders [24,25].

#### Clinical implications

The present study's findings have documented that debilitating labia

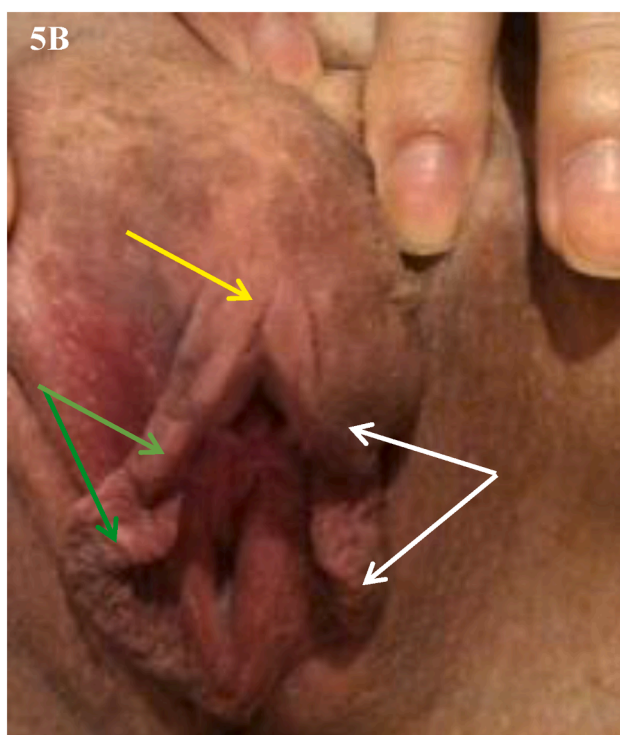


**Fig. 5a.** A photo of central wedge resection with extension can produce severe complications. To resect the clitoral prepuce and suture it in the midline will form a scar comprising the clitoris and obliterating the clitoral frenulum access. Such an operation is responsible for severe symptoms resulting from clitoral compression of the clitoris and the destruction of access to the clitoral frenulum (black arrow). In addition, the clitoral hood orifice wall scars compromise the distal clitoral prepuce retraction. The splitting v-shape of the labium minus can be unilaterally depicted by two arrows in Fig. 4a or bilaterally, presented in Fig. 4b. An ischemic ulcer can also occur (the black circle), and a hole with an ischemic halo can result from this surgery (the orange arrow).

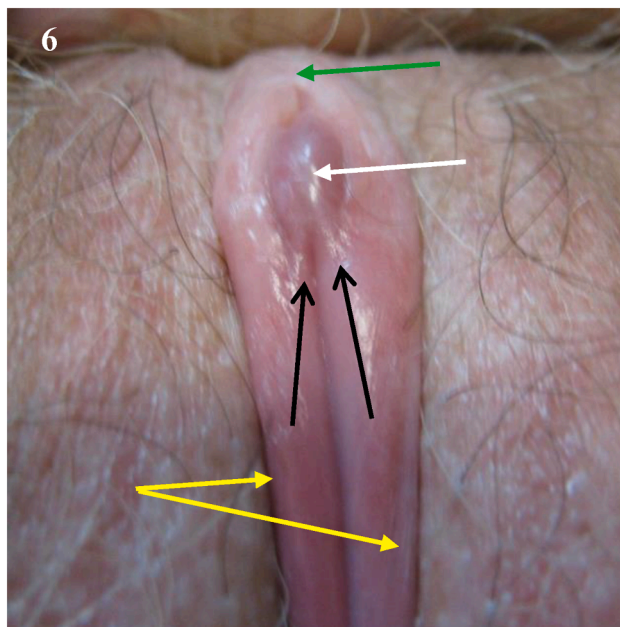
minora cosmetic surgical complications occur and profoundly negatively affect women's physical, mental, and sexual lives. To assist a woman in the decision-making process of undergoing elective genital cosmetic surgery, this study's pictorial documentation will be helpful not only to practitioners but also to women. For gynecologic surgeons, it is an essential clinical-scientific article for educating a patient on this topic and including the potential cosmetic surgical complications of the labia minora in the informed consent. Symptoms associated with labial cosmetic surgical complications, such as severe physical pain, neurological pain (labial neuropathy and pudendal nerve neuralgia), psychological disorders, and sexual dysfunctions, should be presented to a patient in preoperative consultations and included in the informed consent.

#### Research implication

The study results will guide future clinical-scientific research on avoiding severe surgical complications associated with labia minora cosmetic surgery. Future studies should concentrate on developing new surgical interventions and establishing their safety and effectiveness. Additionally, the educational system of labia minora surgery must be created to prepare the next generation of surgeons.



**Fig. 5b.** A photo of central wedge resection with extension shows the midline scar (yellow arrow) and also bilaterally depicts a v-shape healed wound separation (two white and two green arrows). This case exemplifies that thicker labia minora are not good candidates for this type of operation.



**Fig. 6.** A photo of labia minora modified delamination – significant complications. The bifurcation of the labia minora was surgically removed, which created an unnatural monolithic anatomical structure that was built from three labial segments: a) the labia minora trunk; b) the clitoral frenulum, and c) the clitoral prepuce. Bilaterally, the labia minora free edges were resected, everted, and fused with the interlabial crease (two yellow arrows). The everted clitoral prepuce orifice wall forms a thick collar (green arrow) that compresses the clitoris and causes persistent congestion of the clitoral glans (the white arrow). Finally, both distal clitoral frenula were sutured to the inner surface of the upper labia minora (the black arrows).

### Strengths and limitations

The primary strength of the current study is the pictorial documentation of the different labia minora cosmetic severe surgical complications associated with variant surgical procedures. In addition, the photos significantly enhanced the objectivity and credibility of the present investigation and showed that cosmetic gynecologic surgery needed urgent scientific-clinical attention and research. Limitations are a) the study design prohibits generalized conclusions; b) a single center study; c) no access to all subjects' preoperative photos; d) the study cannot decide about a motive(s) to select a specific surgical technique. The newly discovered anatomical structures within the labia minora also indicate that the field needs significant research to develop new surgical techniques that will honor the principles of human anatomy and cosmetic surgery principles [26].

### Conclusion

Current labia minora cosmetic surgical concepts contribute to severe surgical complications with debilitating physical, emotional, and sexual dysfunction.

### Author's contribution

This author conceived and designed the study, drafted, and edited the manuscript, collected data, prepared tables and figures, and edited the manuscript.\*\*

### Experimental ethics

Qualified for exemption.

### Precis

Current labia minora cosmetic surgical concepts contribute to severe surgical complications with debilitating physical, emotional, and sexual dysfunction.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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