

# Comprehensive Assessment of Labiaplasty Techniques and Tools, Satisfaction Rates, and Risk Factors: A Systematic Review and Meta-analysis

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## Abstract

**Background:** Various surgical techniques have been devised for the surgical cosmetic enhancement of female outer genitalia. The selection of an optimal method should be based on satisfaction rates and safety; however, comprehensive, contemporary systematic assessment of these factors has been limited in the literature.

**Objectives:** Our aim was to conduct a comprehensive systematic review and meta-analysis to evaluate the overall satisfaction rates and risk factors associated with various labiaplasty techniques and tools.

**Methods:** The authors performed a systematic literature search in 3 medical databases: PubMed, Elsevier, and Cochrane (Central) with the closing date of October 2023. Original articles with quantitative satisfaction rates and frequencies of the most common complications (hematoma, dehiscence, swelling, bleeding, and infection) were included.

**Results:** Systematic search provided a total of 3954 records. After selection and review of the articles, 86 eligible, peer-reviewed studies were identified, of which 53 provided quantitative data. High overall satisfaction rate was found for all methods (proportion [prop] 94%; confidence interval [CI] 93%-95%), with highest satisfaction for deepithelialization (prop 97%; CI, 85%-99%). Complications were generally rare, with elevated incidences for some techniques (wedge resection: dehiscence, prop, 8%, CI 5%-13%; and composite reduction: swelling, prop 13%, CI 2%-54%). Scalpel technique had significantly higher incidence of complications than laser, namely for bleeding, swelling, and hematoma.

**Conclusions:** Labiaplasty can be considered a generally effective approach to outer female genitalia beautification, with low associated risks. Surgeons must tailor their approach to the patients' needs and anatomy to achieve maximal satisfaction, given the differences in the frequency of complications for each method.

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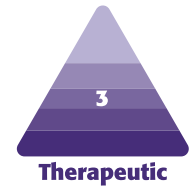
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## Level of Evidence: 3



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In contemporary society, the self-image of females is increasingly tied to perceptions of their genitalia, a trend that significantly influences relationship dynamics and psychological health. The media's ubiquitous presence and influence serve to amplify the perceived importance of genitalia appearance, often showing a biased portrayal.<sup>1,2</sup> Contemporary trends, such as the decrease in pubic hair, further emphasize the expectation of symmetrical, normometric labia, thereby influencing females' perceptions of their bodies.<sup>3,4</sup> Beyond the realm of aesthetics, variations in the female genitalia, such as labia minora hypertrophy, can carry functional implications.<sup>5,6</sup> This can manifest as discomfort when wearing tight-fitting clothes, exercising, or during sexual intercourse.<sup>7</sup> Consequently, an increasing number of females are turning to labiaplasty as a solution to these physical and psychological challenges.<sup>8</sup> The indications for these procedures have also expanded, now addressing not only hypertrophic labia minora but also labia majora volume loss, typically associated with aging and in some cases as a result of other medical interventions.<sup>9,10</sup>

According to statistical data released by the American Society for Aesthetic Plastic Surgery, there has been a significant rise in the demand for labiaplasty, marked by an upswing of 217.2% from 2012 to 2017.<sup>11</sup> This upward trend continued into the subsequent period, with a further increase of 20% observed between 2017 and 2021 and a minor downward turn of 26% in 2022.<sup>12,13</sup> Concurrently, vaginal rejuvenation surgery emerged as a new category in the field, with over 71,000 procedures recorded within this time frame. In response to this demand, a burgeoning array of techniques have been developed, expanding the options available to both patients and surgeons. Emerging techniques, such as allogeneic and autologous fillers, hyaluronic acid, and fat grafting, offer opportunities to treat both labia minora and majora.<sup>14</sup> Overall, these procedures boast high satisfaction rates (90%) and low complication rates.<sup>15,16</sup> The objective of this study was to systematically review the literature on surgical techniques and tools (scalpel vs laser) for female genital beautification and perform a meta-analysis to assess satisfaction rates and common complications, such as swelling, bleeding, hematoma, dehiscence, and infection.

## METHODS

The study was performed according to the *Cochrane Handbook for Systematic Reviews of Interventions*, version 6.3.<sup>17</sup> The study was registered with PROSPERO (registration no. CRD42022380481) and adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-P) guidelines.<sup>18</sup>

## Literature Search, Inclusion, and Exclusion Criteria

A comprehensive search across 3 databases—MEDLINE (PubMed; National Institutes of Health, Bethesda, MD), Embase (Elsevier, Amsterdam, the Netherlands), and Cochrane (Central Register of Trials; Wiley, Hoboken, NJ)—was conducted up to and including October 2023. The following search key was applied: “(labiaplasty OR labia minora reduction OR labia majora augmentation OR female genital plastic surgery OR female genital beauty OR female genital beautification) AND (outcome OR complication OR satisfaction OR psychological).” Case reports, commentaries, and conference letters were excluded from the analysis due to their low patient numbers, limited data, and subjective quality. Additionally, prospective or retrospective studies providing data on aesthetic surgeries of the labia minora and labia majora were included. The primary outcome was patient-reported satisfaction rates for all known genital beautification techniques, including labiaplasty and complex surgical approaches, which occasionally involved surgical alteration of the labia majora as well as the surgical tool, namely scalpel or laser (when applicable). Literature published in English, Spanish, or French was included. The secondary outcomes included complication rates (bleeding, hematoma, dehiscence, swelling, infection).

## Selection and Data Extraction

Duplicates were removed with EndNote version 20 (Clarivate, Philadelphia, PA). The research team conducted a title-abstract assessment with Rayyan, with 2 independent reviewers (A.M.G. and R.V.) overseeing the screening process for eligible studies. In the case of the disagreement, a third independent party (T.V.) resolved it. The

following data were extracted from studies that met the inclusion criteria: author, number of patients, indication for labia minora plasty, surgical techniques, supplementary procedures, satisfaction rate, and follow-up, as well as specified complications. The data we reviewed and extracted encompassed patient numbers, indications, techniques or combination of techniques, complications, and patient satisfaction. Classification of interventions was based on the recommendations of Motakef et al, however, because numerous subtypes of techniques emerged, we established 10 major categories based on the original method: deepithelialization, direct excision/edge resection, W-plasty, Z-plasty, butterfly technique, wedge resection, wedge resection with preserved blood vessels and neural supply, composite reduction, combined techniques with labia majora alteration, and radiofrequency.<sup>19</sup>

## Risk of Bias Assessment

The evaluation of outcome quality was independently conducted by 2 independent reviewers (A.M.G., R.V.). Disagreements were resolved by a third reviewer (T.V.). Quality was assessed based on the Methodological Index For Non-Randomized Studies (MINORS) system.<sup>20</sup> Studies were included if they reached a score of 9 for noncomparative studies and 18 for comparative studies. Evaluation results of included studies are presented in [Supplemental Table 1](#), available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com).

## Statistical Analysis

The statistical analyses were performed with the software R (R Core Team 2020, version 4.0.3); calculations and plots were performed with the meta (version 6.1-0) package.<sup>21</sup> Proportion with 95% confidence interval (CI) was employed for the effect size measure. To calculate the study proportions and pooled proportion, the total number of patients and those with the event of interest were extracted from each study. To pool the effect size the random effect model was applied; the logit transformation of proportions was implemented to calculate an overall proportion.<sup>22</sup>

To estimate the heterogeneity variance measure ( $\tau^2$ ), the Paule-Mandel method was utilized.<sup>23</sup> The confidence interval for  $\tau^2$  and  $\tau$  were calculated with the Q-Profile method.<sup>24</sup> A Hartung-Knapp adjustment was performed for CIs to avoid false positive conclusions.<sup>25,26</sup> To quantify the degree of heterogeneity  $I^2$  statistics by Higgins and Thompson were applied.<sup>27</sup> An  $I^2$  above 75% represented considerable heterogeneity based on Cochrane's recommendations. Prediction interval calculations were based on  $t$  distribution. For all studies, irrespective of 0 cell counts, the individual study proportion with 95% CI was calculated by adding 0.5 as a continuity correction (only for

visualization on the forest plot). In the case of subgroup analysis, we assumed different  $\tau^2$  values in the subgroups. Forest plots graphically summarized the results. For all outcomes, statistical significance was defined as  $P < .05$ .

## RESULTS

### Literature Search

Primary literature search provided 2968 results. After duplicate removal there remained 1950 articles; 1835 were excluded based on title and abstract. From the remaining 115 articles 87 studies fulfilled the inclusion criteria based on full-text review, with 53 studies finally that provided adequate quality data.<sup>3,15,19,28-76</sup> The details of the selection process are summarized in [Figure 1](#). The reason for further exclusion was the imprecise or incompletely executed sequestration of techniques, which made it impossible to make statistical comparisons. The characteristics of the included studies can be found in [Supplemental Table 1](#).

This meta-analysis included 3954 patients, all females between the age of 10 and 72, with an average age of 29.44. The most common indications for labia minora plasty were aesthetic dissatisfaction; discomfort in clothing, while practicing sports, or during sexual activity; hygiene problems; recurrent infections; and sexual dysfunction.

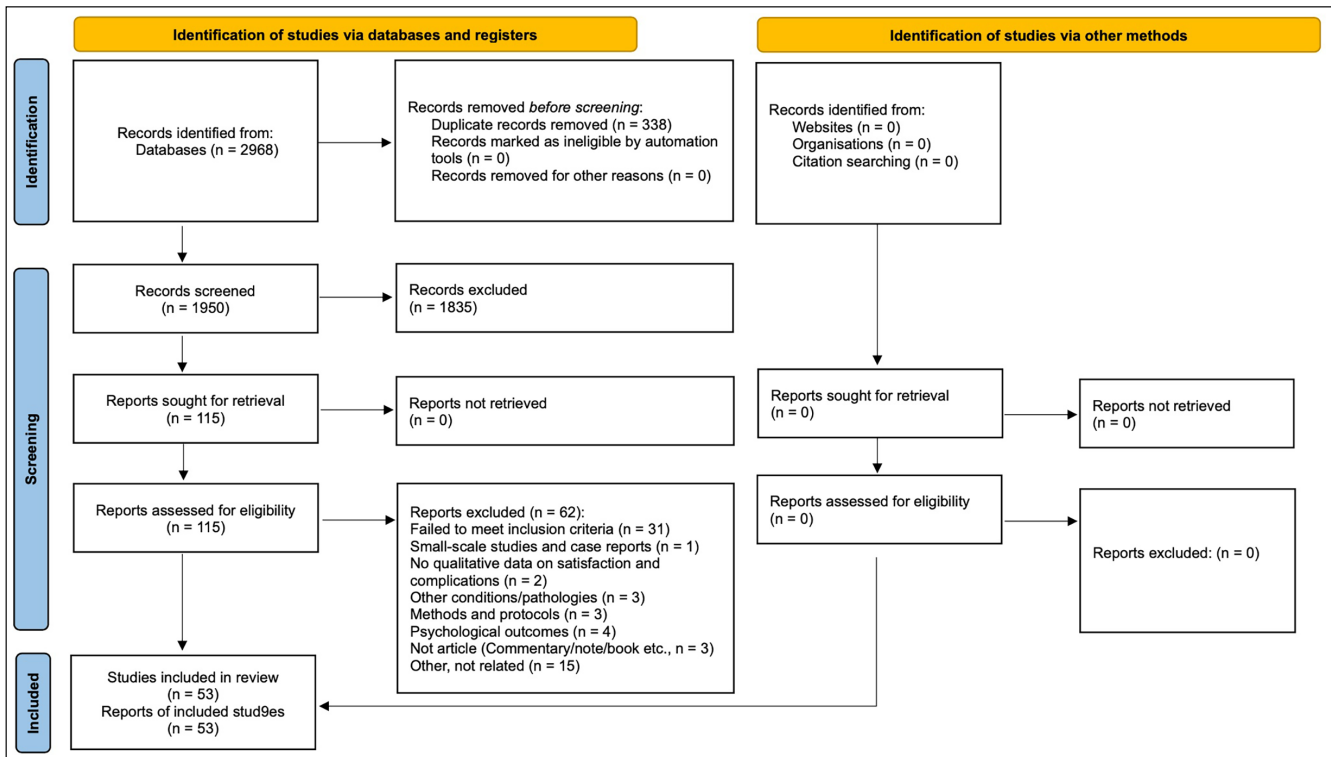
### Risk of Bias Assessment

Our meta-analysis incorporated numerous studies, each meticulously evaluated for risk of bias with the Methodological Index for Non-Randomized Studies (MINORS) criteria.<sup>20</sup> From the analysis, it was evident that most studies were comprehensive in reporting of the study aims, patient inclusion, data collection methods, and appropriateness of their endpoints. However, variability in the scores was observed in the areas of unbiased assessment of study endpoints and prospective calculation of the study size. A majority of the studies had an appropriate follow-up period relevant to the aim of the study. Comparative studies overwhelmingly had adequate control groups, contemporary groups, and statistical analyses, however, scores varied in the baseline equivalence of groups.

### Satisfaction

The analysis involved the synthesis of 53 studies with a total of 3766 observations, accounting for 3954 events. The pooled satisfaction proportion calculated with a random effects model was 0.9443 (CI: 0.9316-0.9548,  $I^2 = 20\%$ ). The results regarding satisfaction are summarized in [Figure 2](#).

Subgroup analyses were conducted based on the technique applied in the individual studies. For studies that



**Figure 1.** PRISMA flow diagram of the study selection process.

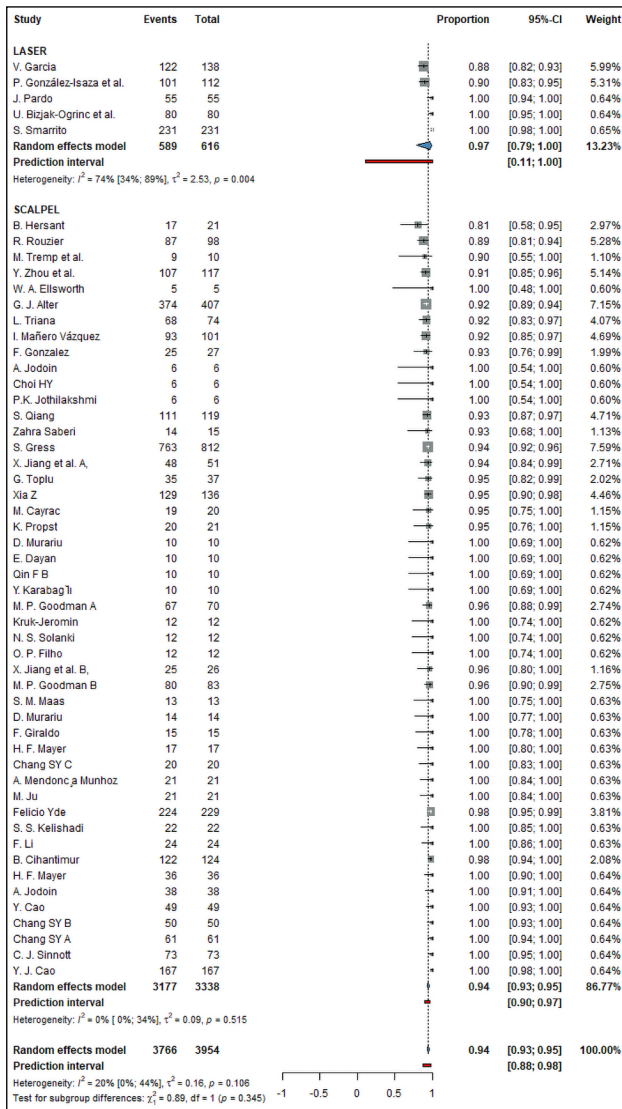
utilized a combination of techniques ( $n = 2$ ), the pooled satisfaction proportion was 0.9394 (CI: 0-1,  $I^2 = 88.5\%$ ). For studies utilizing wedge resection ( $n = 15$ ), the pooled satisfaction proportion was 0.9573 (CI: 0.9286-0.9748,  $I^2 = 23\%$ ). Furthermore, in studies in which wedge resection was performed with preserved blood vessels and neural supply ( $n = 2$ ) satisfaction proportion was 0.9414 (CI: 0.0267-0.9999,  $I^2 = 0\%$ ). In studies that included the butterfly technique ( $n = 6$ ), the pooled satisfaction proportion was 0.9441 (CI: 0.7428-0.99,  $I^2 = 0\%$ ). For studies involving deepithelialization ( $n = 5$ ), the pooled satisfaction proportion was 0.971 (CI: 0.8549-0.9948,  $I^2 = 0\%$ ). Edge resection yielded a combined satisfaction proportion of 0.9589 ( $n = 13$ , CI: 0.9301-0.9761,  $I^2 = 46.6\%$ ), composite reduction a pooled proportion of 0.9293 ( $n = 10$ , CI: 0.9163-0.9403,  $I^2 = 0\%$ ). Last, for the single studies implementing radiofrequency ( $n = 1$ ), the satisfaction proportion was 0.9545 (CI: 0.5517-0.9972,  $I^2$  not applicable due to only 1 study); for W-shape resection ( $n = 1$ ) it was 0.9643 (CI: 0.6161-0.9978,  $I^2$  not applicable); and for Z-plasty ( $n = 1$ ) it was 0.9688 (CI: 0.6497-0.9981,  $I^2$  not applicable). The differences between subgroups were not statistically significant ( $\chi^2 = 10.33$ , degrees of freedom [df] = 9,  $P < .325$ ). In addition to the surgical technique, we compared satisfaction with laser and satisfaction with the scalpel as surgical tools. Of the 53 studies, the scalpel was employed in 48 and laser in 5, with a pooled satisfaction proportion of 0.9437

(CI: 0.7893-0.9972,  $I^2 = 73.6\%$ ) and 0.9734 (CI: 0.9323-0.9534,  $I^2 = 0\%$ ) respectively, with no significant difference between the 2 groups ( $P = .3448$ ). Results regarding the surgical tool are presented in [Supplemental Figure 1](#), available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com).

## Complications

For hematoma incidence, 44 studies with 2090 observations and 38 events were combined, yielding a proportion of 0.0331 (CI: 0.0234-0.0465,  $I^2 = 33.1\%$ ). Subgroup analysis demonstrated no significant difference in hematoma incidence across the surgical techniques, such as combination of techniques, laser-assisted labiaplasty, and wedge resection ( $\chi^2 = 10.5$ , df = 9,  $P = .312$ ). However, when comparing surgical tools, laser showed a significantly lower overall proportion of hematoma ( $\chi^2 = 17.7$ , df = 1,  $P < .0001$ ) of 0.0135 (CI: 0.006-0.03,  $I^2 = 32.9\%$ ) compared to the scalpel, with a proportion of 0.0494 (CI: 0.006-0.03,  $I^2 = 0\%$ ). Incidence of hematoma is summarized in [Supplemental Figure 2](#) for surgical techniques and [Supplemental Figure 3](#) for surgical tools, available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com).

Upon examining the incidence of dehiscence across 41 studies, significant variation was observed based on the different surgical techniques utilized ( $\chi^2 = 32.9$ , df = 9,



**Figure 2.** Forest plot showing a summary of the overall satisfaction rates of different labiaplasty methods.

$P = .0001$ ) (Supplemental Figure 4 for surgical techniques and Supplemental Figure 5 for surgical tools, available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com)). The approach involving Z-plasty had the highest incidence, with a proportion of 0.1333 (CI: 0.0336-0.4054,  $I^2 = \text{nonapplicable}$ ), and wedge resection had the second highest incidence at 0.084 (CI: 0.0542-0.128,  $I^2 = 27.8\%$ ). Notably, when wedge resection was performed preserving blood vessels and neural supply, the incidence of dehiscence became 0.042 (CI: 0.0082-0.1883,  $I^2 = 0\%$ ), a 50% drop compared to the original method. In stark contrast, the technique involving composite reduction displayed the lowest incidence, with a proportion of 0.0271 (CI: 0.0171-0.0429,  $I^2 = 0\%$ ). In the aggregate, dehiscence incidence was 0.0591 (CI: 0.0424-0.0817,  $I^2 = 48.5\%$ ), with substantial

variability across studies. The quantification of heterogeneity revealed a high level of inconsistency among the studies, suggesting a greater variability in study outcomes than would be anticipated by chance, potentially owing to divergences in surgical techniques or other study-specific factors. When comparing the laser and scalpel, there was no significant difference for the incidence of dehiscence ( $\chi^2 = 1.53$ ,  $df = 1$ ,  $P = .216$ ).

Analysis of the incidence of swelling based on 30 studies with a total of 1476 observations and 44 events showed considerable variation among different techniques. Overall incidence was 0.0395 (CI: 0.0244-0.0633,  $I^2 = 56\%$ ) with high heterogeneity. Among the techniques evaluated, composite reduction had a higher reported proportion of swelling at 0.131 (CI: 0.019-0.5405,  $I^2 = 23.3\%$ ). This was followed by the butterfly technique at 0.0567 (CI: 0.0-1,  $I^2 = 53.2\%$ ); radiofrequency at 0.0455 (CI: 0.0028-0.4483,  $I^2 = \text{nonapplicable}$ ); W-shape resection at 0.0357 (CI: 0.0022-0.3839,  $I^2 = \text{nonapplicable}$ ); Z-plasty at 0.0312 (CI: 0.0019-0.3503,  $I^2 = \text{nonapplicable}$ ); wedge resection at 0.0302 (CI: 0.0071-0.1188,  $I^2 = 65.3\%$ ); and edge resection labiaplasty at 0.0292 (CI: 0.0097-0.0844,  $I^2 = 62.2\%$ ). Again, wedge resection with preserved vessels and neural supply showed lower overall proportion of only 0.021 for swelling (CI: 0.0043-0.0894,  $I^2 = 0\%$ ). A test for subgroup differences was significant ( $\chi^2 = 17.82$ ,  $df = 9$ ,  $P = .0373$ ), indicating that the technique had a significant effect on the incidence of swelling. Regarding surgical tools, laser showed a significantly lower incidence of swelling ( $\chi^2 = 35.63$ ,  $df = 1$ ,  $P < .0001$ ). Summary of the incidence of swelling is shown in Supplemental Figure 6 for techniques and in Supplemental Figure 7 for tools, available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com).

In the evaluation of bleeding proportions, 31 studies with 2323 observations and 18 events were combined, resulting in a pooled proportion of 0.0215 (CI: 0.0141-0.0325,  $I^2 = 18.4\%$ ) and moderate heterogeneity between studies. Subgroup analysis showed no significant differences in bleeding proportions between the subgroups ( $\chi^2 = 5.92$ ,  $df = 9$ ,  $P = .748$ ). However, the choice of surgical tool again had a significant impact on the incidence of bleeding ( $\chi^2 = 8.3$ ,  $df = 1$ ,  $P = .004$ ). Whereas for laser the overall proportion was 0.0093 (CI: 0.0032-0.0269,  $I^2 = 0\%$ ), for the scalpel it was 0.0297 (CI: 0.0187-0.0469,  $I^2 = 35\%$ ). Incidence of bleeding is shown in Supplemental Figure 8 for techniques and in Supplemental Figure 9 for surgical tools, available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com).

The analysis of infection incidence incorporated 35 studies with 2122 observations and 20 events, revealing an overall pooled proportion of 0.0301 (CI: 0.019-0.0474,  $I^2 = 42.2\%$ ). Subgroup analyses based on surgical techniques demonstrated no significant difference in infection proportions between the subgroups ( $\chi^2 = 7$ ,  $df = 9$ ,  $P = .6369$ ). Similarly, the choice of surgical tool had no

effect on the incidence of infections ( $\chi^2 = 0.25$ ,  $df = 1$ ,  $P = .6155$ ). The results showing incidence of infection are summarized in [Supplemental Figure 10](#) for surgical techniques and [Supplemental Figure 11](#) for surgical tools, available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com).

Last, the total number of complications were compared between surgical techniques and the scalpel vs laser. Thirty-six studies were included in both comparisons. The overall pooled proportion for complications was 0.0888 for all methods, with 170 events out of 1914 observations (CI 0.0586-0.1326,  $I^2 = 73.9$ ). However, no significant difference was observed between subgroups ( $\chi^2 = 5.91$ ,  $df = 9$ ,  $P = .7489$ ), with overall high levels of heterogeneity between studies. When comparing scalpel against laser, we also saw that although laser had a lower proportion of complications (0.0727 to 0.0894), this difference was not significant ( $P = .6931$ ), most likely due to the low number of observations in the laser group to date. [Supplemental Figure 12](#), available online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com), details the total number of complications.

## DISCUSSION

Given the cautious approach of the American College of Obstetricians and Gynecologists (ACOG) to labiaplasty, primarily due to a perceived lack of medical indication and the substantial risks it may entail, many clinicians share the belief that labia minora hypertrophy does not necessitate medical intervention, but rather should be considered a matter of educating females about anatomical variation.<sup>77,78</sup> This sentiment is perhaps reinforced by the fact that gynecologists generally lack the specialized training for this procedure, which can often lead to suboptimal outcomes. Yet, this perspective may not be entirely comprehensive, because there is still a lack of consensus on what precisely constitutes labial hypertrophy, and strict thresholds for defining normal labia size might not always be clinically helpful.<sup>79</sup> Indeed, the motives behind requests for labiaplasty are not solely aesthetic, but often include functional and psychological considerations as well.<sup>8</sup>

Over recent years, with the rise in societal awareness and changing trends, the demand for labiaplasty has seen a substantial increase.<sup>11-13</sup> In response to this, a variety of techniques have emerged, each aiming to best cater to the individual needs of patients. The decision to adopt a particular surgical approach is a critical one, ideally informed by the patient's unique anatomy, their functional and aesthetic aspirations, and of course, a thorough appraisal of safety concerns and potential complications.<sup>80</sup> Currently, we do not have a universally ideal surgical method that balances all these factors perfectly for every patient.<sup>28,81</sup> However, it is encouraging to note that the range of techniques in use today have generally exhibited relatively high patient

satisfaction rates and safety profiles, suggesting their potential effectiveness across a broad range of scenarios, and this continues based on this latest meta-analysis.<sup>16</sup>

The wedge resection technique represents a prominent choice within the array of available approaches for labiaplasty, gaining considerable utilization within the field. The distinguishing facet of this method is its inherent allowance for precise determination of the excision line's size and boundaries. Forming a triangular configuration, this provision facilitates fine-tuned adjustments to the tissue volume intended for removal, all while ensuring preservation of the original labial contour.<sup>3,29,54,56,82,83</sup> Nevertheless, noteworthy considerations accompany this technique, including a statistically significant risk of dehiscence (0.08, CI: 0.05-0.13). This potential complication can be ascribed to the inherent characteristics of this approach, particularly the extensive excision area, which surpasses that in alternative methods, leading to heightened tension along the newly created suture lines.<sup>28,56,83</sup> Furthermore, it is important to mention that despite its relatively low incidence flap necrosis constitutes a possible adverse event following application of this technique.<sup>40,56,83</sup> In efforts to augment the outcome, a fusion of fundamental techniques may be employed, yielding enhanced results. Owing to the composite nature of these methods, we have elected to classify them within the composite reduction surgical approach category.<sup>43,46</sup> An improved wedge-resection technique was also developed, with the aim of preserving blood vessels and neural supply to mitigate potential adverse effects.<sup>32,40</sup> This method has comparable satisfaction, with a notable 50% decrease in the occurrence of dehiscence (0.04, CI: 0.01-0.19) and similarly low levels of other complications. Given the novelty of this approach, a wider application will show the reproducibility of these favorable results from other specialists.

The deepithelialization technique represents a minimally invasive approach within the realm of labiaplasty, featuring preservation of the original labial edge and minimal tissue, nerve, and vascular damage, facilitating a more natural postoperative appearance.<sup>28,41,70</sup> However, this method may impose limitations on the volume of tissue that can be safely excised, thereby potentially constraining its applicability in instances of more pronounced hypertrophy.<sup>28</sup> Notwithstanding this, these techniques have been linked with remarkably high patient satisfaction rates (0.96, CI: 0.93-0.97) and a notably low incidence of complications.<sup>19,28,41,70</sup> Under optimally suitable circumstances, namely in the absence of severe hypertrophy, the application of this technique can be confidently endorsed as a sound clinical decision. The butterfly technique, a combination of wedge resection and deepithelialization, was created to mitigate potential drawbacks of both methods, namely distal flap necrosis and the limited associated volume decrease, respectively, and to produce a more

aesthetic outcome.<sup>58</sup> However, it still shows a moderately higher probability of dehiscence (0.06, CI: 0-0.88), albeit to a lower extent than wedge resection. The occurrence of bleeding and infection is also among the highest of the different methods, but not to a statistically significant level (0.06, CI: 0.01-0.19 and 0.05, CI: 0-1 respectively).

The simplicity and expediency of the edge resection approach maintains its status as a popular choice among surgeons performing labiaplasty procedures. With a direct linear incision, it offers an efficient method for labial protrusion reduction.<sup>44,52,74,84</sup> However, it is crucial to note that this approach entails a direct and longitudinal incision line, often encompassing the entirety of the excess tissue. Consequently, this may result in the loss of the labia minora's original edge, which can exhibit variations in pigmentation and morphology. This method shows only moderate risk of complications, making it a well-rounded choice, especially given its simplicity, with the only recurring complication being potential rise to scar contracture at the site of the wound.<sup>74</sup>

The recent trend in labiaplasty procedures is a bespoke combination of techniques and approaches, tailored to address the unique requirements of each patient. Over the years, the popularity of this approach has grown significantly, contributing to a wealth of data for this group. Such procedures are designed to augment the patient's aesthetic self-perception, treating the outer genitalia as an integrated aesthetic unit. A gamut of techniques can be employed, including labia minora reduction, labia majora augmentation or reduction, clitoral hood reduction, clitoropexy, mons pubis liposuction, vaginoplasty, and perineoplasty.<sup>15,36,46,75</sup> These approaches can be classified in 2 major groups based on the surgical targets beyond the labia minora (labia majora and clitoral hood respectively), combined techniques with labia majora alteration and composite reduction. Both show comparably high satisfaction, with composite reduction having a slightly higher occurrence of hematoma (0.05, CI: 0.01-0.19) and a significantly higher probability of swelling (0.13, CI: 0.02-0.54), and combined techniques showing a higher chance of dehiscence (0.08, CI: 0.01-0.4).

In our meta-analysis, we evaluated several surgical techniques for labia minora reduction, highlighting a few less common but innovative approaches. These methods, although not widely utilized, offer distinct advantages and warrant consideration for their unique contributions to aesthetic and functional outcomes. The bipolar radiofrequency approach stands out for its short recovery time, minimal risk of flap necrosis, and absence of scarring, hematoma, or overresection.<sup>76</sup> Its primary drawback is the potential for burns due to heat generation. Despite limited data, patient satisfaction is reported at 100%, with no complications observed.<sup>76</sup> However, the scarcity of studies suggests that broader application may reveal more adverse effects.

The W-shape (zigzag) resection, developed to improve upon edge and wedge resection techniques, aims to prevent complications like stiff suture lines and continuous scars that distort the labia's natural appearance.<sup>45</sup> Although it achieves a 100% satisfaction rate, it has the highest incidence of hematoma and dehiscence (0.08, CI: 0-0.36 and 0.08, CI: 0-0.36 respectively) among the techniques evaluated, without other significant complications. Last, the Z-plasty approach modifies the wedge resection technique with 2 90° Z-plasties to excise prominent tissue, minimizing morbidities.<sup>31</sup> It too has a 100% satisfaction rate, with dehiscence (0.13, CI: 0.02-0.4) being the major complication. Its wider adoption could offer further insights into its efficacy and complication rates. These specialized techniques, although not broadly adopted, enrich the surgical repertoire for labia minora reduction, highlighting the importance of ongoing research and careful clinical application to enhance patient care and outcomes.

Finally, surgical tools for labia minora reduction were compared. Although the scalpel is currently the preferred tool of choice for most specialists, laser-assisted labiaplasty has become more prominent in recent years. Compared to the scalpel, lower observed probability of bleeding ( $P = .004$ ), swelling ( $P < .0001$ ), and hematoma ( $P < .0001$ ) were observed with laser, while maintaining similar levels of patient satisfaction. As laser becomes more available, we may see a significant upturn in laser for labia minora reduction due to these advantages.

## Strengths

This study stands out for its comprehensiveness, involving a broader array of studies and data and more fine-grained view on methodologies employed than any previous endeavors on this topic. Additionally, we took steps to ensure the quality of the studies considered by excluding case reports and studies with inadequate data. Our new approach to stratification of studies based on their methodology and surgical tool also contributes to a more comprehensive picture, serving as a meaningful guideline for practicing clinicians.

## Limitations

Despite our efforts, the available data on this subject remain scarce and heterogeneous. The present landscape could be significantly enriched by the contribution of new retrospective and prospective studies. However, the lack of standardized indicators and outcome measurements presents a formidable challenge to effective comparisons. Additionally, comparisons between surgical tools other than scalpel and laser were hindered by the lack of available information to date.

## Clinical Implications

As a whole, the study indicates a high level of patient satisfaction across the various labiaplasty techniques, with a pooled satisfaction proportion of 0.9443. This demonstrates that these surgical interventions can effectively meet patients' needs and expectations, with laser in the labiaplasty procedure being associated with a lower number of complications and similarly high patient satisfaction.

The study allows for a better understanding of which technique might best suit a given patient. Satisfaction rates remained high across all techniques, suggesting that the choice of technique may be best determined by the specifics of the individual patient's anatomy and desires, as well as the surgeon's expertise. One noteworthy finding from the study was that high satisfaction rates and low complication rates can be considered standard, but each technique has advantages and drawbacks. This suggests that a tailored approach to labiaplasty that takes into account the specific needs and anatomy of each patient may be the best approach. Due to varying levels of complications associated with different techniques, it is also clear from these results that a "1 size fits all" approach to labiaplasty is not suitable, and individualization of technique selection is necessary for optimal results. Notably, there are still new and emerging techniques for labiaplasty, warranting further study for their promising high satisfaction and low overall complication rates.

The study's findings can serve as a resource for specialized training and continuing medical education for gynecologists and other surgeons who may be performing labiaplasty. Understanding the satisfaction rates, complication rates, and other outcomes associated with various techniques and tools can help improve surgical practice and ultimately lead to better patient outcomes. Finally, these results can also assist with patient education, helping patients understand the different techniques available, their associated satisfaction rates and potential complications, and the importance of individualized treatment planning. This can empower patients to make informed decisions about their care.

## Research Implications

Because the field is lacking in standardized definitions and outcome metrics, patient satisfaction questionnaires remain the most popular method for assessing the success of these operations. However, in the absence of a unified, standardized scoring system, these outcome measurements remain largely subjective, making comparison a challenging task.

## CONCLUSIONS

Our results demonstrate that labiaplasty is generally safe and has high patient satisfaction rates. Notably, among

the most popular techniques, composite reduction and wedge resection have a higher overall complication rate. To achieve the highest patient satisfaction, surgeons must acquire a comprehensive repertoire of techniques, treating each patient as a unique case. It is crucial to perceive the outer female genitalia as an aesthetic unit rather than isolated structures.

## Supplemental Material

This article contains [supplemental material](http://www.aestheticsurgeryjournal.com) located online at [www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com).

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## Racial Perspectives on Facelifts: Evaluating Techniques and Outcomes Across Diverse Populations

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### Objectives

To outline literature on race in facial aging & rhytidectomy, & to discuss relationship between race & facial aesthetic surgery.



### Methods


Literature review was conducted on studies before 2023 discussing facial aging & rhytidectomy in non-Caucasian patients.



### Conclusions

Aesthetic surgeons must be culturally sensitive, observe subtle anatomical nuances, & be informed on aging in diverse populations.





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