

Aesthetic Labia Minora Reduction with Inferior Wedge Resection and Superior Pedicle Flap Reconstruction

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Background: Aesthetic surgery of female genitalia is an uncommon procedure, and of the techniques available, labia minora reduction can achieve excellent results. Recently, more conservative labia minora reduction techniques have been developed, because the simple isolated strategy of straight amputation does not ensure a favorable outcome. This study was designed to review a series of labia minora reductions using inferior wedge resection and superior pedicle flap reconstruction.

Methods: Twenty-one patients underwent inferior wedge resection and superior pedicle flap reconstruction. The mean follow-up was 46 months. Aesthetic results and postoperative outcomes were collected retrospectively and evaluated.

Results: Twenty patients (95.2 percent) underwent bilateral procedures, and 90.4 percent of patients had a congenital labia minora hypertrophy. Five complications occurred in 21 patients (23.8 percent). Wound-healing problems were observed more frequently. The cosmetic result was considered to be good or very good in 85.7 percent of patients, and 95.2 percent were very satisfied with the procedure. All complications except one were observed immediately after the procedure.

Conclusions: The results of this study demonstrate that inferior wedge resection and superior pedicle flap reconstruction is a simple and consistent technique and deserves a place among the main procedures available. The complications observed were not unexpected and did not extend hospital stay or interfere with the normal postoperative period. The success of the procedure depends on patient selection, careful preoperative planning, and adequate intraoperative management. (*Plast. Reconstr. Surg.* 118: 1237, 2006.)

Aesthetic surgery of female genitalia is an uncommon procedure performed by gynecologists and plastic surgeons. Among the main procedures available, labia minora reduction can achieve excellent results, and the new genitalia greatly enhance self-esteem.¹⁻⁷ In addition to the aesthetic outcome, better local hygiene, relief of chronic irritations, and lower interference with sexual intercourse have been reported as the main additional benefits.^{4,5,7} Recently, increased attention has been focused on cosmetic results and surgical techniques for labia

minora reduction.¹⁻⁷ Among the main options, simple protuberant tissue resection is the most simple and commonly used technique.^{1,8-13} Despite the reproducibility of the technique, this procedure removes the natural contour of the labia minora and replaces it with an irregular suture line with an unsatisfactory aesthetic result.²⁻⁷ In addition, wide and simple resection of the protuberant tissue can occasionally extend to the clitoris and put sexuality at risk.^{4,7}

To avoid these undesirable aesthetic and functional outcomes, since 1998 we have used a simple and reliable technique based on inferior wedge labia minora resection and superior pedicle flap reconstruction.⁷ This study was designed to review a series of labia minora reductions performed using this technique. The demographic characteristics of patients, aesthetic results, and postoperative outcomes regarding flap

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and resection area complications were collected retrospectively and evaluated. These findings are reported, as well as the main indications, advantages, and limitations of other techniques, patient satisfaction, and operative planning.

PATIENTS AND METHODS

Between May of 1998 and December of 2004, 21 patients underwent aesthetic surgical reduction of the labia minora at the Hospital das Clínicas, University of São Paulo School of Medicine, and the senior authors' (A.M.M. and J.R.F.) private practice. Surgical treatment was requested by the patient, who sought surgical correction for a better labia minora appearance and functional problems. The reasons for surgical treatment varied and were as follows: aesthetic complaints, 21 patients (100 percent); interference with sexual intercourse, 13 (61.9 percent); poor hygiene, 10 (47.6 percent); and difficulty wearing tight-fitting pants, 7 (33.3 percent) (Table 1). Regarding etiology, 19 patients (90.4 percent) had congenital labia minora hypertrophy, one patient (4.7 percent) had congenital genital malformation associated with vaginal agenesis, and one patient (4.7 percent) had Paget's disease with a unilateral intraepithelial vulvar carcinoma. The technique was indicated in patients with moderate to large labia minora hypertrophy with a dimension more than 3 cm measured horizontally from the midline when placed in lateral traction with minimal tension. The average follow-up was 46 months (range, 6 to 77 months). All patients were followed closely in the postoperative period by the gynecologist and plastic surgeon. Normally, the patients were followed with physical examination, which was performed weekly during the first month after surgery and monthly thereafter.

Flap and resection area complications were evaluated. The latter included flap necrosis, wound dehiscence or retraction, infection, and hematoma. To perform a preoperative and postoperative comparison, standard anteroposterior digital color photographs were obtained. An acquired informal questionnaire was used to grade the patient's level of satisfaction with the aesthetic results. The patients classified their level of satis-

faction as very satisfied, satisfied, mixed, disappointed, or regretted their decision. The aesthetic evaluation was performed by an independent surgeon after a minimum period of 3 months and was classified as very good or good, satisfactory, or poor. Data were collected retrospectively from personal communications, physical examinations, and charts.

Patient Selection and Flap Design

All patients with moderate and large labia minora hypertrophy are potential candidates for inferior wedge resection and superior pedicle flap reconstruction. Preoperatively, with the patient in the lithotomy position, the genital region is carefully examined. This fact is important, because superior flap reconstruction relies on the redundancy of the skin and mucosa in this region. Patients with minimal hypertrophy or absence of skin laxity are not good candidates for the procedure. With a small forceps, the middle portion of the labia minora is stretched inferiorly until the posterior part of the vaginal introitus (pinching test). If skin tension is observed, the forceps is moved upward; otherwise, if skin laxity is noted, the forceps is moved downward to resect more tissue. According to this maneuver, it is possible to simulate the final aesthetic result and estimate the amount of tissue necessary to be resected and the extension of the superior flap. In addition, this approach provides a tension-free superior flap closure. The ideal point grasped by the forceps in the middle portion of the labia minora is defined as point A and represents the tip of the flap. The posterior part of the vagina is defined as point B. A wedge-shaped area located between the two points, the labia edge and its base, is then designed and represents the area of tissue to be resected. The angle and extent of the wedge resection vary, depending on the tissue excess and the cutaneous-mucosal laxity. The superior wedge-shaped flap is designed on the remaining upper part of the labia minora between point A (tip) and the clitoral region (base). This design is based on the dense network of perforating vessels near the midline in the perineum. For moderate hypertrophy, the area to be resected is planned as an isosceles triangle located exclusively on the inferior aspect of the labia minora. For large hypertrophy, the area to be resected can reach the anterior region of the labia minora, and the limits are designed more obliquely with curved borders. This convex design allows a large amount of skin and mucosa to be resected, resulting in a thin superior flap (Figs. 1 and 2).

Table 1. Reasons for Surgical Treatment

Reason	No. of Patients (%)
Aesthetic complaints	21 (100.0)
Interference with sexual intercourse	13 (61.9)
Poor hygiene	10 (47.6)
Difficulty wearing tight pants	7 (33.3)



Fig. 1. Intraoperative views of the basic surgical plan demonstrating the resected area and the superior flap design. With a small forceps, the middle portion of the labia minora is stretched inferiorly until the posterior part of the vaginal introitus (pinching test) (*above, left and right, and center, left*). The surgical markings are designed. The ideal point grasped by forceps in the middle portion of the labia minora is defined as point A, and the posterior portion of the vagina is defined as point B (*center, right*). A wedge-shaped area located between the two points is then designed and represents the area of tissue to be resected. The angle and extent of the wedge resection vary, depending on the excess tissue and the cutaneous-mucosal laxity (*below, left and right*).

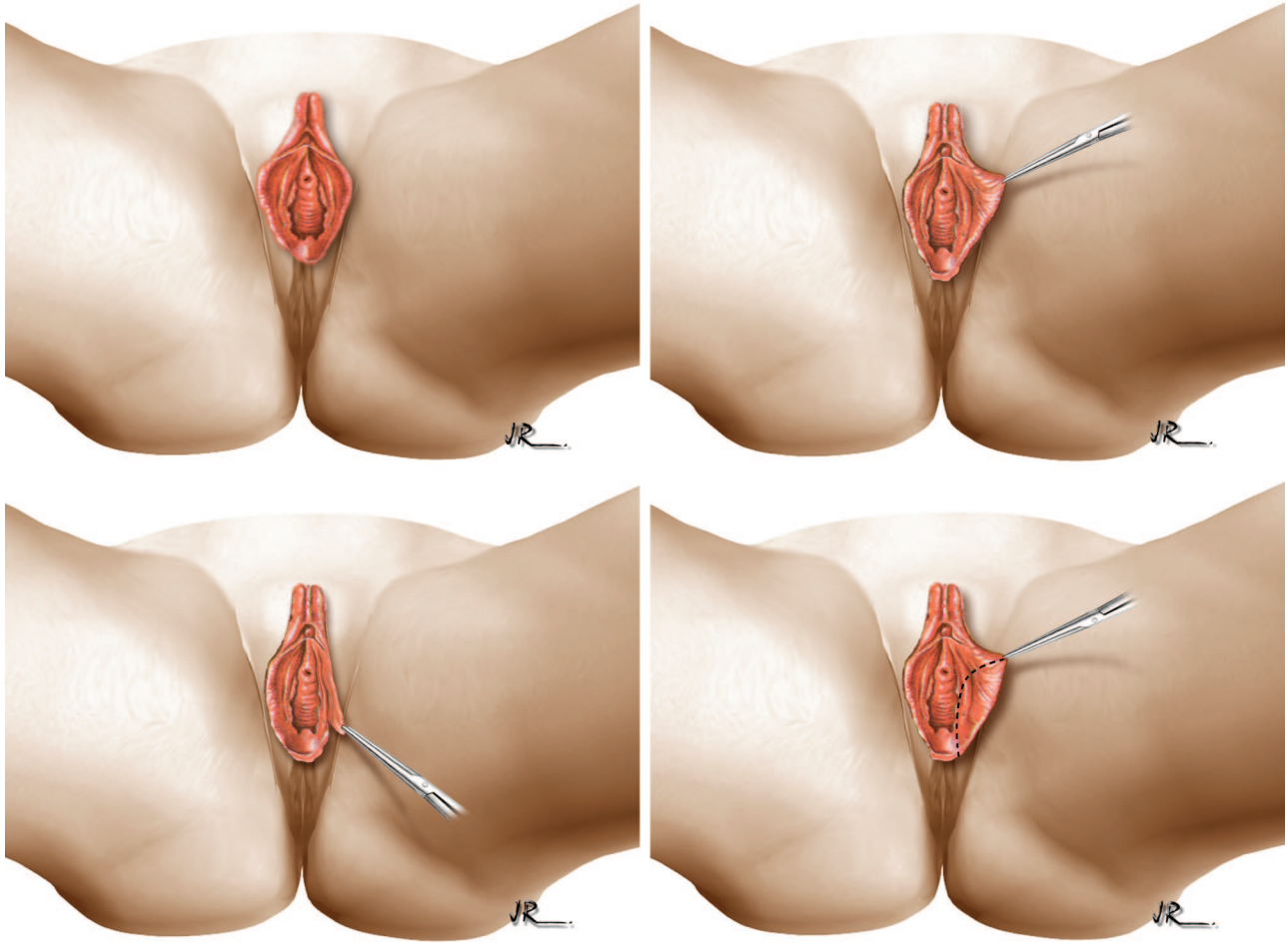


Fig. 2. Illustrative views of the surgical plan demonstrating the resected area and the superior flap design. With a small forceps, the pinching test is performed (*above, left and right*). The ideal point grasped by forceps in the middle portion of the labia minora is defined as point A, and the posterior portion of the vagina is defined as point B. A wedge-shaped area located between the two points is then designed (*below, left and right*).

Surgical Technique

With the patient in the dorsal lithotomy position and under local anesthesia (1% lidocaine with 1:200,000 epinephrine), the surgical plan is designed in the redundant tissue of the labia minora. In addition to the benefits of vasoconstriction, local infiltration increases the virtual subcutaneous space between lateral and medial skin layers of each labium and facilitates tissue resection and insertion of skin sutures. The skin incision is carried down to the subcutaneous tissue on the medial layer of the labia minora. The complementary incision is performed on the lateral layer, and then the total wedge-shaped area is resected. Careful hemostasis of the fine vessels is performed before closure. Because the flap's vascular supply derives from the base near the upper part of the labia minora, care must be taken to avoid wide undermining and hemostasis in this region.¹⁴

The tip of the flap represented by point A is then approximated to the inferior point represented by point B. The medial and lateral incisions are closed in layers with resorbable sutures. No drains are inserted. All patients receive treatment with intravenous antibiotics, and oral administration of antibiotics is continued until the third postoperative day. The patients are instructed to rest, to maintain good hygiene, to keep the surgical wounds dry, and to apply antibiotic ointment for approximately 10 days (Figs. 3 and 4).

RESULTS

Twenty-one patients were treated with inferior wedge resection and superior pedicle flap reconstruction for labia minora hypertrophy (Figs. 5 through 7). Mean age of the patients was 38 years (range, 31 to 49 years). Mean operative time was

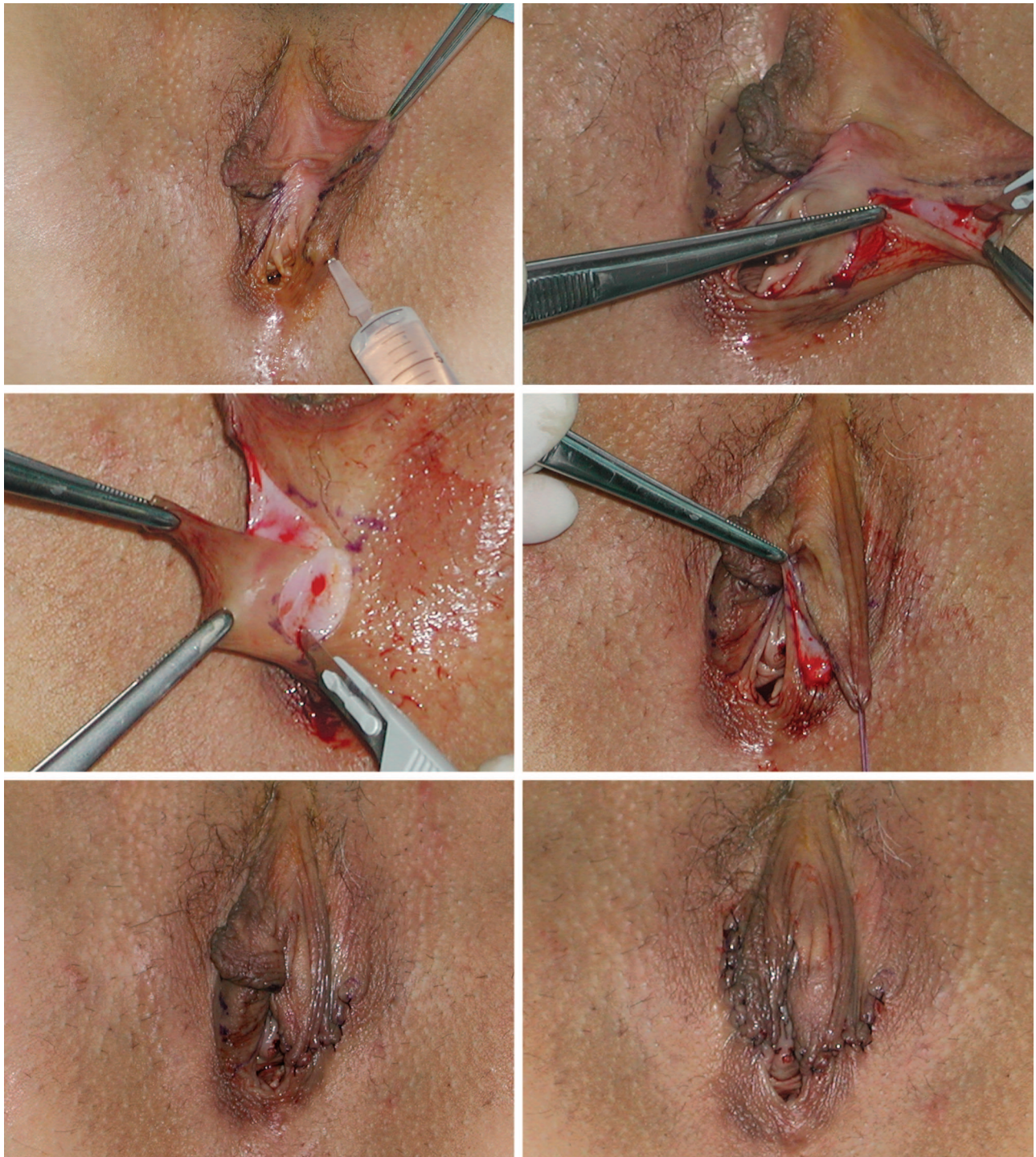


Fig. 3. Intraoperative views of inferior wedge labia minora resection and superior pedicle flap reconstruction. With the patient in the dorsal lithotomy position, the skin incision is carried down to the subcutaneous tissue on the medial layer of the labia minora. The complementary incision is performed on the lateral layer, and then the total wedge-shaped area is resected (*above, left and right, and center, left*). The tip of the flap (point A) is then approximated to the inferior point (point B) (*center, right*). The medial and lateral incisions are closed in layers with resorbable sutures. The same procedure is performed on the opposite side (*below, left and right*).

37 minutes (range, 28 to 55 minutes). Most patients in our series were discharged on the day of the operation.

Twenty patients (95.2 percent) underwent bilateral procedures, and only one patient underwent unilateral resection. In the bilateral group,

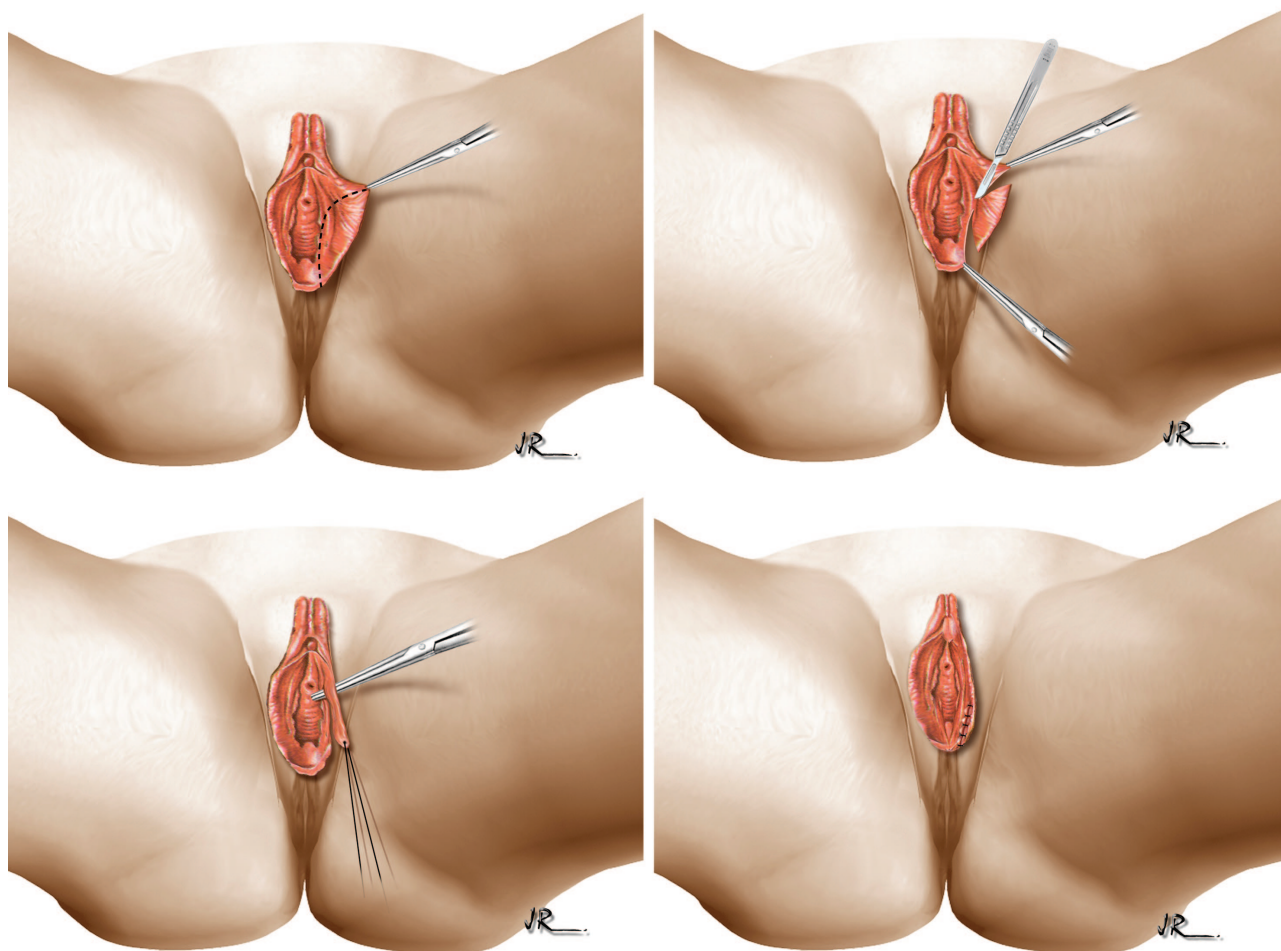


Fig. 4. The skin incision is carried down to the subcutaneous tissue on the medial layer. The complementary incision is performed on the lateral layer, and then the total wedge-shaped area is resected (*above, left and right*). Point A is then approximated to point B (*below, left*). The medial and lateral incisions are closed (*below, right*).

14 patients (70 percent) underwent symmetric cutaneous-mucosal resection. Because of an asymmetric deformity in six patients (30 percent), tissue resection required different planning. The patient with Paget's disease and unilateral intraepithelial vulvar carcinoma underwent partial vulvectomy of the affected side and a contralateral aesthetic inferior wedge resection and superior pedicle flap reconstruction technique. Mean dimensions of the removed specimens were 2.3 cm (free border) and 2.7 cm (wedge length).

Flap and Resection Area Complication Rates

Five complications occurred in 21 patients (23.8 percent). All complications except one were observed immediately after the procedure. Distal flap necrosis was observed in one patient (4.7 percent), small local hematoma was observed in one patient (4.7 percent), and superficial infection was observed

in one patient (4.7 percent). Wound dehiscence between the flap and the resected area was observed in two patients (9.5 percent), with one in the immediate postoperative period (fifth day) and one in the late postoperative period (1 month). One patient (4.7 percent) had two complications represented by distal flap necrosis and wound dehiscence (Table 2). The one patient with infection was treated with oral antibiotics with satisfactory outcome. No patient reported sexual dysfunction, late local pain, or skin retraction, and aesthetic alteration of the free border of the labia minora was not observed.

Cosmetic Results and Level of Satisfaction

The overall cosmetic result was evaluated at a minimal period of 3 months (range, 3 to 7 months). The cosmetic result was considered to be good or very good in 18 patients (85.7 percent) and satisfactory in three patients (14.2 percent). No patient had



Fig. 5. Preoperative view of a 41-year-old patient with severe symmetric bilateral labia minora hypertrophy (*above, left*). The surgical markings showing planned inferior wedge labia minora resection and superior pedicle flap reconstruction, with the superior limit designed more obliquely and the angle greater than 120 degrees permitting resection of a large amount of tissue (*above, right, and below, left*). Immediate postoperative appearance with a very good result (*below, right*).

a poor result. The three patients with satisfactory results had complications represented by distal flap necrosis and wound dehiscence. In these cases, an unaesthetic scar, distortion of the remaining labia minora wedge, and local fibrosis were noted. Five patients (23.8 percent) with previous labia minora asymmetry had a small residual cutaneous-mucosal asymmetry. In this group, the patients were satisfied with the aesthetic result, and no surgical revision was indicated. Twenty patients (95.2 percent) were very satisfied, and one patient (4.7 percent) was satisfied with the aesthetic appearance of the external genitalia. All patients mentioned smaller and finer labia minora with a more youthful appearance. None of the patients were disappointed or regretted the operation.

DISCUSSION

Currently, labia minora hypertrophy constitutes a well-recognized physical deformity; how-

ever, there is no consensus about the objective clinical definition.^{1-13,15} Friedrich¹¹ utilized a length of 5 cm or less calculated horizontally from the midline. Other investigators have suggested that normal labia minora length is less than 4 cm when measured between the base and its free edge.^{4,15} In our study, combined with the objective parameter defined as 3 cm, skin laxity and physical symptoms were also taken into consideration. In addition, individual aesthetic evaluation was also performed for reduction surgery, and it is our impression that most patients have their own idea of what constitutes normal aesthetic appearance.

In the past, external genitalia operations were usually reserved for patients with ambiguous genitalia and adrenogenital syndrome¹; however, more patients are seeking surgical treatment for aesthetic purposes. One might surmise that this behavioral alteration can be partly explicated by



Fig. 6. Preoperative view of a 42-year-old patient with moderate symmetric bilateral labia minora hypertrophy (*above, left*). The surgical markings showing planned inferior wedge labia minora resection and superior pedicle flap reconstruction, with a moderate reduction and the angle between the two lines of greater than 90 degrees (*above, right, and below, left*). Late postoperative appearance (18 months) with a very good result (*below, right*).

the high exposure of female genitals in the popular media.⁵ In addition, in some cultures, labia minora enlargement is usually associated with excessive masturbation or sexual intercourse.^{4,5}

Traditionally, labia minora hypertrophy has been treated by simple straight amputation of the excess tissue.^{1,8-13} Despite the simplicity of this procedure, by its nature, it often results in a poor aesthetic outcome and sometimes even sexual dysfunction.^{4,7} Moreover, with this technique, the labia minora margin is replaced by a breakable suture line that is associated with local irritation and discomfort.²⁻⁷

Recently, more conservative labia minora reduction techniques have been developed.²⁻⁷ Independently of the technique used, the main principle is based on hidden incisions and free labia minora edge preservation.

Up to now, there has been no consensus concerning the best procedure for labia minora reduction. The main advantages of the technique utilized should include reproducibility, low interference with the physiological functions, and long-term results. Probably, these goals are not attained by any single procedure, and each technique has its advantages and limitations depending on the excess of cutaneous-mucosal tissue, skin laxity, and the patient's sexual and athletic activities.

In the present study, the surgical treatment was always requested by the patient, who sought surgical correction for better genitalia. Besides the aesthetic complaints, 61.9 percent of patients also mentioned problems related to sexual intercourse, and 47.6 percent indicated difficulty in performing adequate local hygiene. Similar to our findings, Rouzier et al.⁴ observed aesthetic dissat-



Fig. 7. Preoperative view of a 28-year-old patient with moderate symmetric bilateral labia minora hypertrophy (*above, left*). The surgical markings showing planned inferior wedge labia minora resection and superior pedicle flap reconstruction, with a small reduction and the angle between the two lines of less than 90 degrees (*above, right, and below, left*). Immediate postoperative appearance with a very good result (*below, right*).

Table 2. Overall Complication Rates

Complication	No. of Patients (%)
Flap*	
Skin necrosis	1 (4.7)
Infection	1 (4.7)
Wound dehiscence	2 (9.5)
Resected area*	
Infection	0
Hematoma	1 (4.7)
Total	5 (23.8)

*One patient had more than one complication.

isfaction in 87 percent of patients and discomfort in clothing and taking part in sports in 64 and 26 percent, respectively, as the main reasons for surgical treatment. Contrary to our experience, Maas and Hage³ and Choi and Kim⁵ observed functional symptoms in all patients, and fewer patients mentioned the aesthetic complaints as the main reason for surgical treatment.

Preoperative patient evaluation is crucial to determine the amount of tissue to be resected and to allow optimal positioning of the incisions to avoid an ischemic flap. Care must be taken to make certain that the labia minora enlargement is not overresected to prevent a tight introitus or pulling during sexual intercourse. When planning the wedge-shaped resection area through the pinching test, the surgeon should place two or three fingers inside the introitus and stretch the labia minora, in this manner estimating the safe size of tissue resection.

In terms of aesthetic outcome and surgical morbidity, wedge resection with flap advancement has some advantages. Skin texture and color are similar, the technique is simpler and less aggressive, and the free margin of the labia minora is always preserved. All these factors are important

because some patients are young or engage in sexual activity.

Wedge resection and flap advancement techniques have been previously described.^{2,4,6} Basically, all techniques use a wedge-shaped resection located in the upper,² central,⁶ or inferior⁴ part of the labia minora. In the technique where upper or inferior resection is performed, an inferior or superior labia minora flap is advanced into the resected area. In the technique in which central wedge resection is performed, the remaining superior and inferior margins are directly approximated by means of single stitches.

Inferior wedge resection and superior pedicle flap reconstruction is a modification of the original technique described by Alter² in 1998 and modified by Rouzier et al.⁴ in 2000. In Alter's original article, he mentioned a wedge-shaped resection in the inferior part of the labia minora and superior flap reconstruction in the cases where the labia minora are more protuberant throughout its extension. Correspondingly, Rouzier et al. described a "V"-shaped redundant labial tissue resection located in the inferior region of the labia minora. The surgical planning was performed through rigid marking where the investigators utilized two Kocher clamps. The first clamp was placed on the posterior part of the labia minora close to its base, and the second was placed across the labia minora, together forming an angle of approximately 90 degrees.

Differently from the technique of Rouzier et al., we avoid rigid marking because the tissue redundancy varies considerably. Moreover, combined with the tissue volume, skin laxity can contribute to enlargement. For moderate hypertrophy, we prefer a small reduction with an angle between the two lines of equal to or less than 90 degrees. In the presence of severe hypertrophy and if the patient desires more aggressive reduction, the angle can be more than 120 degrees. In both situations, a superior flap is maintained to reconstruct the inferior defect (Fig. 8).

In our study, most complications with inferior wedge resection and superior pedicle flap reconstruction occurred in the early postoperative period and were related to wound-healing problems. Despite 23.8 percent of patients having some complications, all were minor, predictable, and comparable to those in previous clinical trials^{3,4,6} (Table 3). These complications did not extend hospital stay and were treated on an outpatient basis by conservative methods.

Wound-related problems can be a potential cause of an unsatisfactory aesthetic result. This

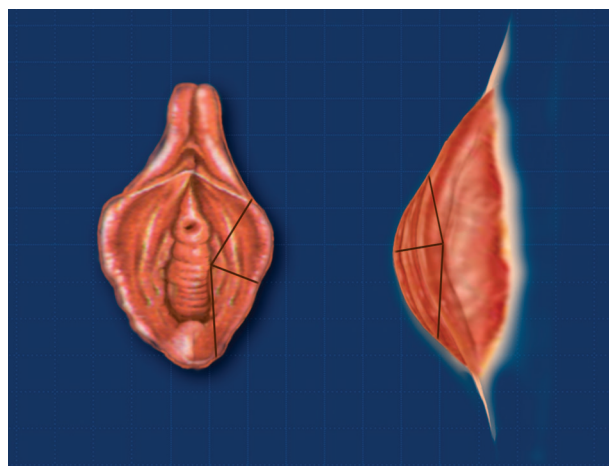


Fig. 8. Illustrative views of the surgical plan demonstrating the resected area and the superior flap design. For moderate hypertrophy, we prefer a small reduction with an angle between the two lines of ≤ 90 degrees (A'-B). In the presence of severe hypertrophy and if the patient desires more aggressive reduction, the angle can be > 120 degrees (A-B).

complication was not frequently mentioned in other clinical series, but it was observed in 14.2 percent of our patients. In these cases, distal flap necrosis and wound dehiscence resulted in an un-aesthetic scar, distortion of the remaining labia minora wedge, and local fibrosis. Therefore, care must be taken in planning the flap and resection area because wound tension closure may be involved. Moreover, with the objective of avoiding additional tissue damage, we refrain from using Kocher clamps to perform skin incision markings as proposed by Rouzier et al.⁴

Cosmetic evaluation was performed after a minimal postoperative period of 3 months. At this time, 85.7 percent of patients had good or very good aesthetic results, and 95.2 percent of patients were either very satisfied or satisfied with their result. All patients mentioned smaller and finer labia minora with a more youthful appearance.

Compared with other reduction techniques that involve straight amputation of labia minora, the technique of inferior wedge resection and superior pedicle flap reconstruction has positive aspects in terms of aesthetic outcome and safety. The wedge resection with superior flap advancement leaves no continuous scar at the labial edge and avoids longitudinal scar contraction once the final scar runs more obliquely close to the base of the labia minora. Because no interrupted sutures are placed at the free edge of the labium, this edge will turn out more natural.

Despite its main benefits, inferior wedge resection with superior pedicle flap reconstruc-

Table 3. Aesthetic Reduction of Labia Minora: Patients, Follow-Up, Technique, and Main Complications

Study	No. of Patients	Follow-Up (mo)	Reduction Technique	Necrosis	Infection	Wound Dehiscence	Hematoma
Hodgkinson and Hait, ¹ 1983	3	60	Straight amputation	0	0	0	0
Alter, ² 1998	4	*	Central wedge resection	0	0	0	0
Choi and Kim, ⁵ 2000	6	*	Central deepithelialized reduction labioplasty	0	0	0	0
Rouzier et al., ⁴ 2000	163	30	Inferior V-shaped resection	†	0	11 (7.6)	0
Maas and Hage, ³ 1999	13	72	Running W-shaped resection	0	0	1 (7.6)	1 (7.6)
Giraldo et al., ⁶ 2004	15	30	90-degree Z-plasty	0	0	2 (13.3)	6 (40)
Munhoz et al., 2006	21	46	Inferior wedge resection and superior pedicle flap reconstruction	1 (4.7)	1 (4.7)	2 (9.5)	1 (4.7)

*Not specified.

†The complication was mentioned, but the incidence was not specified.

tion has some disadvantages. Because the flap is not an axial flap, tissue vascularization to the most distant parts is difficult to predict. This situation can result in partial necrosis and an undesirable result. Even though our study demonstrated a very low incidence of flap complications, care must be taken in high-risk patients such as smokers and patients with comorbid associated diseases. Furthermore, care must be taken to avoid wide undermining and hemostasis near the base of the superior flap because the vascular supply derives from this region.

CONCLUSIONS

The results of this study demonstrate that inferior wedge resection with superior pedicle flap reconstruction is a simple and consistent technique that has its place among the main procedures available. The complications observed were expected and did not extend hospital stay and interfere with the normal postoperative period. The success of the procedure depends on patient selection, careful preoperative planning, and adequate intraoperative management.

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