Review

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What are the Techniques of Clitoral Hoodoplasty? Who should Undergo Hoodoplasty and Why? What is the Effect of Clitoral Hoodoplasty on Sexual Functions?: A Narrative Review

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ABSTRACT

Labia minora reduction is the most commonly requested procedure by women who are concerned about the appearance of the vulvar region. In most cases, simultaneous clitoral hoodoplasty should be performed to achieve better aesthetic outcomes. There are various surgical techniques to remove excess tissue in the clitoral hood area. This study aims to evaluate the different surgical methods used in hoodoplasty and to demonstrate the changes in patients' sexual functions during the postoperative period. In patients with excess clitoral hood tissue, performing only labiaplasty can result in an unbalanced postoperative appearance where the hood looks larger. Additionally, in cases where postoperative clitoral hood prominence is evident, it should be noted that revision surgery may not always be necessary; instead, hoodoplasty can be concealed with labia majora fillers, eliminating the need for further surgery. When performed with proper techniques, clitoral hoodoplasty, and labiaplasty have no negative effects on sexual function.

Keywords: Hoodoplasty, clitoral hood reduction, aesthetic surgery, sexual function

INTRODUCTION

In recent years, the increasing demand for aesthetic cosmetic procedures involving the whole body has also brought about the desire for the idealization of external genitalia. With the influence of social media, women have started to compare their bodies with the bodies of others. Additionally, the increased accessibility of hair removal methods, along with the exposure of bare female external genitalia, has raised awareness. Women have started to aim for an anatomy characterized by minimal labial protrusion, where the labia minora are hidden between the labia majora, and the clitoral hood remains behind the anterior labial commissure.[1]

The most commonly performed aesthetic surgical procedure in women is labiaplasty.[2] Among labiaplasty techniques, trimming labiaplasty is the most commonly performed, while wedge labiaplasty is most commonly associated with complications.[3] However, due to their close anatomical proximity, it is evident that the labia minora and the clitoral hood should be evaluated together. It has been observed that most patients who apply with a request for labiaplasty have an underlying clitoral hood hypertrophy. Dissatisfaction with remnant labial tissue after labiaplasty and the prominence of the remaining clitoral hood due to excessive labial tissue removal are the most common reasons for revision labiaplasties.

This review has been written to summarize clitoral hoodoplasty techniques, the purpose and criteria for performing clitoral hoodoplasty, and the surgical techniques to avoid affecting sexual functions.

Surgical Anatomy of the Clitoris

The clitoris, which has both internal and external parts, is the largest erectile organ of a woman. It has six main parts: the glans, suspensory ligament, body, root, crura, and bulbs.[4-9] The external part of the clitoris, the glans, is covered from above by the prepuce (hood) and is bordered laterally by the frenulum (Figure 1).

The glans clitoris, located at the upper of the vulvar vestibule, is the most erectile part of the clitoris, approximately 1-2 cm in length and 0.5-1 cm in width with a cylindrical shape (Figure 2).[4,5,9-11] Shih et al.[12] describe the cutaneous corpuscular receptors, which are similar morphologically to

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the receptors found in the glans penis. It has been shown that immunohistochemical studies that the clitoris is rich in neurovascular components. And histological evaluation of the clitoris has also shown that the glans contains a higher density of both small and large nerve fibers compared to other parts.[13] However, the length and width of the glans clitoris and the width of the clitoral hood do not affect female sexual function, genital perception, or orgasm.[14]

The clitoral body and crura lie under the ischiocavernosus muscles and Colles' fascia.[15] The clitoral body is deep to the glans and is connected to the pubic symphysis by the suspensory ligament of the clitoris. This ligament contains both superficial and deep components.[4]

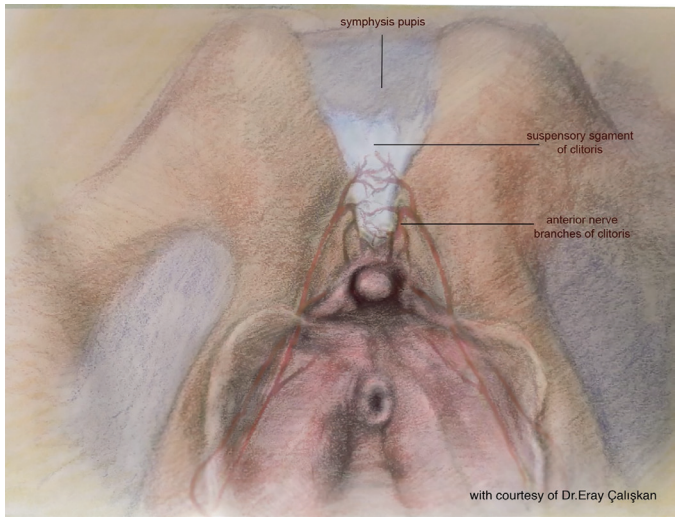

Figure 1. Anatomical parts and vascularization of the clitoris

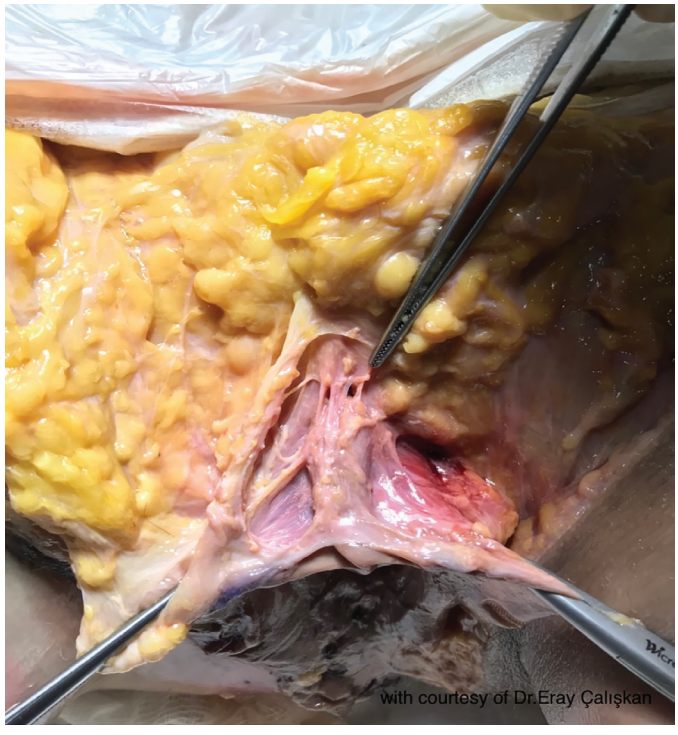

Figure 2. Dissection view of the clitoris

Preoperative anatomical evaluation of the clitoral hood should be performed both in the lithotomy position and standing. In the lithotomy position, the hood should cover more than two-thirds of the glans clitoris, with its free edges angled 30-60 degrees into the labia minora, and the skin surface should be smooth. In the standing position, the clitoral hood should not protrude from the anterior labial commissure, referred to as the "dolphin lip" appearance.[16]

The hypertrophic structure of the clitoral hood over the glans clitoris may cause dissatisfaction, leading to a loss of self-confidence and consequently sexual dysfunction. Additionally, excess tissue in this area can make it difficult to stimulate the glans clitoris and also result in sexual dysfunction. Whether or not there will be a loss of sensation after clitoral hoodoplasty is a separate topic of discussion, which will be addressed in later sections. Although female sexuality is a highly complex process, the functional contribution of the clitoris should be considered during clitoral hoodoplasty procedures. In this way, the innervation of the clitoris is another important issue for surgeons.

When performing surgery on the clitoral hood, it is crucial to remain in the superficial and lateral regions of the clitoral glans to avoid injury.[17] A thorough understanding of the dorsal nerve of the clitoris is essential for preventing iatrogenic damage. The pudendal nerve divides into three primary branches: the dorsal nerve of the clitoris, the perineal nerve supplying the external genitalia, and the inferior rectal nerve. The dorsal nerve of the clitoris is responsible for the afferent signaling involved in clitoral erection. The dorsal clitoral nerve becomes superficial by perforating the perineal membrane 2.4-3 cm lateral to the external urethral meatus and innervates the glans clitoris from 11 to 1 o'clock.[5]

In addition to the dorsal nerve, the clitoral cavernous tissue is innervated by the cavernous nerves originating from the uterovaginal plexus. The dorsal nerve of the clitoris splits into two cords, which terminate approximately 1 cm proximal to the glans. The clitoral shaft lies medial to the typical area of clitoral hood reduction and is positioned deeper relative to the surgical site.

The somatic innervation of the clitoris is through the dorsal clitoral nerve, a branch of the pudendal nerve, which originates from the pelvic sidewall.[4,5,7,18]

Respecting the innervation of the dorsal clitoral nerve during dissection and excision of the labial sulcus, as well as deep excisions of the clitoral hood, will help prevent sensitivity-related issues in the postoperative period.

The clitoral blood supply is complex and primarily derived from the pudendal vessels. It is nourished and drained from the anterolateral and posterolateral sides, as well as deeply along the midline. The prepuce receives its blood supply from the external pudendal artery, whereas the erectile tissues are vascularized by the dorsal clitoral artery, perineal arteries, and deep arteries.[19]

Various classification systems have been defined for clitoral hood hypertrophy to establish a common language in studies and to create standardization in surgery. In a classification made by Liu et al.[16] in 2022, clitoral hypertrophy was categorized

as central, lateral, and composite hypertrophy, and it was emphasized that 42.9% of women had lateral hypertrophy. In central hypertrophy, hypertrophic tissue is observed along the midline of the clitoral hood, with the labial sulcus continuous on the lateral sides and the edges of the hood fused with the labia minora. In lateral hypertrophy, the continuity of the labial sulcus is absent, and single or bilateral vertical hypertrophic tissues are observed. Another classification was made by Xia et al.[20] in 2022. In this classification, type 1 is described as isolated clitoral or labial hypertrophy, type 2 as combined hypertrophy, and type 3 as fusion hypertrophy, with an emphasis that type 2 is the most common type.[20] Triana et al.[21], in 2024, divided clitoral hypertrophy into two categories: longitudinal excess and horizontal excess.

Clitoral Hoodoplasty Techniques

In the literature, various hoodoplasty techniques, especially combined with labiaplasty, have been described; however, they all share the common goal of designing symmetrical external genitalia. Wedge resection techniques, pioneered by Alter[22], are considered more effective for addressing an enlarged clitoral hood compared to edge trim methods. By closing the wedge defect in the labia minora, these techniques not only reduce the hanging appearance of the labia minora but also decrease the forward projection of the clitoral hood by applying posterior tension.[1,22] The general principle in clitoral hood excisions is that it should be done superficially, leaving about a 1 cm bridge over the hood, while attention to the innervation of the dorsal clitoral nerve to prevent overstimulation of the clitoris in the postoperative period.[23] Since lateral clitoral hypertrophy is the most common type of clitoral hypertrophy, the most frequently used method is the excision of the lateral clitoral folds (Figure 3). The lateral clitoral folds can be excised in an oval, semicircular, or triangular shape.[24] Following the marking of the surgical area to be excised, a local anesthetic containing epinephrine should be administered in pinpoint injections to avoid distorting the contours of the marked surgical field (Figure 4). Excision can be performed using a scalpel, scissors, or needle-tip monopolar electrocautery. The excision should be done gently and superficially. For hemostasis after excision, care should be taken to avoid the spray mode of electrocautery to respect the neural innervation. During the closure of the surgical area, a multi-layered closure should be performed to allow for editing and modification. The deeper layers can be closed with a rapidly absorbable monofilament, but the skin should be closed with a rapidly absorbable multifilament suture material in the final stage (Figure 5).[17]

In the method described by Alter[22] in 2008, in which he operated on a total of 407 patients, he performed wedge resection on the labia minora and, in addition, excised the lateral folds in a hockey stick shape for the clitoral hood. Also, Alter[22] emphasized that preserving and approximating the subcutaneous tissue prevents wound separation and fistula formation. Although inverted V or resection of the lateral folds provides satisfactory cosmetic results in most cases when the clitoral hood is very prominent with wrinkled skin folds, it is necessary to extend the caudal incision and excision in an inverted Y shape (Figure 6). Eserdağ and Anğın[24], in 2021, emphasized that the reverse Y clitoral hoodoplasty performed on 63 patients after curvilinear labiaplasty is a very safe and cosmetically satisfactory method.

Another method is the composite reduction labiaplasty described by German plastic surgeon Gress[25] in 2013. In this technique, following the shaping of the labia minora with an S-shaped excision, pedicles of 2-3 cm were preserved. Then, a crescent-shaped superficial excision was performed under the clitoris, and a square-shaped excision was made above it. In this technique, which was performed on a total of 82 patients,

Figure 3. Lateral clitoral fold

Figure 4. Marking and removal of the lateral clitoral fold

Gress[25] emphasized that he achieved optimal functional and aesthetic results, especially in cases with excessive clitoral protrusion.

In addition to the described methods, three-step and two-step excisions combined with wedge labial resection, labioplasty with L-shaped flap, and clitoroplasty have been described.[20,26,27] The main goal is to ensure functional and aesthetic integrity after the excised clitoral tissue. It should be kept in mind that in deep dissections and excisions, overstimulation of the clitoris, in line with its histological structure, may cause patient dissatisfaction (Figure 7).[21]

Figure 5. Lateral clitoral fold excision before and after surgery

Figure 6. Inverted V plasty

The Effect of Clitoral Hoodoplasty on Sexual Functions

The sexual response in females is a series of events that may lead to orgasm followed by a resolution phase.[28] While clitoral stimulation is not essential for all women to complete this sequence, it often plays a central role in the process. The sexual response cycle is described as consisting of the phases of desire, arousal, orgasm, and resolution the clitoris is pivotal to arousal, orgasm, and resolution.[29] These stages are regulated by the previously described nerve pathways and vascular structures. When labioplasty and hoodoplasty are considered together, the aim of improving sexual function stands out among the surgical motivators.[30]

Along with the neurovascular density of the clitoris histologically, we now know that the labia minora are also densely neurovascular erectile tissues.[4,5] Therefore, surgical interventions involving these two tissues, which play a significant role in sexual function, raise the question of whether there will be issues with loss of sensation after surgery.

Recent studies have shown a significant decrease in the total Female Sexual Function Index score and subdomains in cases where the remnant tissue left after labioplasty is less than 1-1.5 cm.[31,32] After clitoral hoodoplasty, the current literature is still unclear. The most rational study on the subject was conducted by Placik and Arkins[33]. in 2014. In this prospectively designed study, a total of 37 patients who underwent labioplasty and clitoral hoodoplasty were included, and vulvar sensitivity was evaluated using the "Semmes-Weinstein" monofilament, which had been previously validated for the vulva.[33] On the 14th day, and during the follow-ups at the 3rd, 6th, and 12th months, it was shown that there was no change of sensitivity on the clitoris. In the sexual function questionnaire, it was noted that by the

Figure 7. Marking, before and after hoodoplasty and labiaplasty

6th month, there was an increase in the frequency of sexual intercourse and orgasm, as well as in the intensity of orgasms.

The study from Gress[25], composite reduction labioplasty, reports that approximately 30% of patients experienced more sexual stimulation, which is another study claiming that the surgery improves sexual functions. It was also reported by Eserdağ and Anğın[24] that after inverted Y plasties, there was no change in sensitivity or sexual satisfaction, and after the removal of the tissue over the clitoris, the clitoris became more stimulated during coitus. While there are studies indicating that approximately 70% of patients reported an improvement in their sexual life, Triana et al.[21], in the analysis of a large patient series, emphasized that he observed no changes in sensitivity or sexual satisfaction.[22,26] Contrary to these studies, Xia et al.[20] demonstrated that clitoral hood excisions added to labioplasty are more effective in terms of patient satisfaction compared to labioplasty alone, but have no impact on sexual life.

CONCLUSION

Clitoral hoodoplasty is almost an essential part of labioplasty. One of the most common causes of postoperative dissatisfaction after labioplasty is clitoral hood deformities. Therefore, preoperative anatomical evaluation should be carefully performed in both the lithotomy and standing positions. Hockey stick excisions are a more appropriate technic in cases with lateral clitoral hypertrophy, and inverted V-excision is the more appropriate technic in cases with central hypertrophy. In cases with prominent clitoral hypertrophy, wedge resection may be a better option based on the surgeon's experience. In cases with clitoral hood hypertrophy, not adding excision to labiaplasty will lead to patient dissatisfaction. It should also be noted that in cases where the postoperative clitoral hood is prominent, instead of revision surgery, the need for surgery can be eliminated by concealing the hood with labia majora fillers. When clitoral hoodoplasty and labioplasty are performed with the correct techniques, they do not have negative effects on sexual life. Superficial, gentle dissections and excisions, leaving at least a 1 cm bridge on the clitoral hood, and being cautious with energy modalities used for hemostasis are beneficial steps in preserving sensitivity. The definition of different clitoral hood excision techniques and studies with a large number of patients examining their effects on sexual function will be light on the literature.

Ethics

(All photos with courtesy of Dr. Eray Çalışkan).

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Author Contributions

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