

# Sensation-Preserving Clitoral Reduction Surgery: A Preliminary Report of Our Experience

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## Abstract

**Background:** The knowledge that preservation of clitoral sensation is essential for future sexual satisfaction gave rise to sensation-preserving clitoral reduction surgery. We present our results of sensation-preserving clitoral reduction procedure in the small group of patients. **Aims and Objectives:** To show our technique and result of sensation-preserving clitoral reduction surgery. **Materials and Methods:** This is a retrospective study of cases with clitoromegaly, over a 5-year period, in which sensation-preserving clitoral reduction procedure was done by us at our centre. Demographics, indication for clitoral reduction, operative procedure, operative time, any intraoperative difficulty or problem, anaesthesia type, post-operative stay and outcome were analysed. Pre-operative and post-operative evaluation for clitoral viability done in all the cases, and evaluation for clitoral sensory testing and vibratory sensory testing done in selected cases. **Results:** A total of eight cases were operated in the last 5 years. Five were due to congenital adrenal hyperplasia. Immediate post-operative period was uneventful in all. Cosmetic appearance and viability were satisfactory in all the cases. In five cases, clitoral sensory testing and vibratory sensory testing were done, an average degree of sensation of 3.2 at the labia minora and 4.7 at the clitoris and an average values clitoral vibratory sensory testing for the introitus, clitoris, labia and thigh were 3.56, 1.61, 5.08 and 5.83, respectively. **Conclusions:** Clitoral enlargement in girls is a rare problem. Sensation-preserving ventral clitoral reduction surgery leads to preservation of neurovascular bundles leads to acceptable cosmesis and preserved sensation.

**Keywords:** Clitoromegaly, congenital adrenal hyperplasia, reduction clitoroplasty

## INTRODUCTION

Several pathologies can cause clitoral hypertrophy. It can be caused by androgenic hormones such as in congenital adrenal hyperplasia (CAH), drugs, tumours, or it can be idiopathic.<sup>[1]</sup> The incidence of clitoral hypertrophy varies from one to three per 10,000 new-borns worldwide.<sup>[1]</sup> The average clitoris should be <5 mm wide and 16 mm long.<sup>[1]</sup> When a hormonal pathology has been demonstrated, hormonal manipulation is necessary, followed by surgical reduction of the clitoris hypertrophy required for psychological and cosmetic reasons. The surgical goal is to achieve a normal-appearing clitoris while preserving sensation as loss of sensation in the clitoris is disabling with inability to achieve orgasm. The techniques described for surgical reduction of clitoris include clitoridectomy (amputation of the clitoris), corporal sparing technique (preserve all erectile tissue) and reduction clitoroplasty (preservation of neurovascular

bundles) with the removal of erectile tissue.<sup>[2]</sup> The earliest surgery done was clitorectomy due to earlier believe that clitoris was unnecessary for sexual functions, which is no longer acceptable.<sup>[3]</sup> Next was clitoral recession involving repositioning of the clitoris under the symphysis pubis. This procedure has a disadvantage that engorgement of the clitoris during sexual stimulation can be painful and also it can interfere with micturition.<sup>[4]</sup> Therefore, clitoral reduction should involve removal of all erectile tissue from the corpora cavernosa of the clitoris with preservation of the neurovascular supply to the glans clitoris.<sup>[5]</sup> Here, we have presented the technique of sensation preserving ventral clitoral reduction procedure in cases of clitoral hypertrophy.

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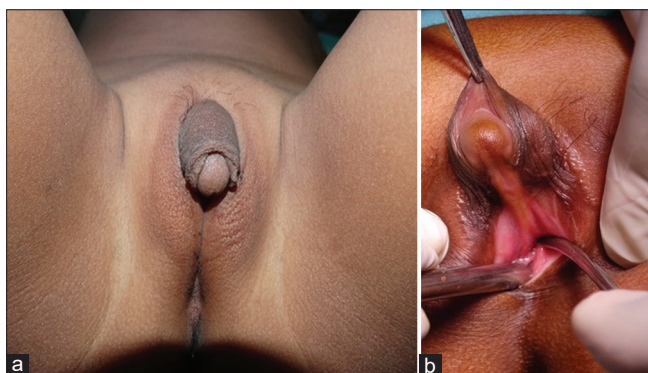
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## MATERIALS AND METHODS

Records of cases, in which sensation preserving clitoral reduction procedure was done, over 5 years (January 2013–January 2018) at our centre, were examined. Procedure was explained in details to the parents before the surgery, and written informed consent was taken. Demographics, indication for clitoral recession, intraoperative notes, post-operative stay and outcome were analysed. In all the cases, pre-operative and post-operative clitoral gross appearance was examined, and viability was tested by capillary perfusion. In five of selected co-operative cases, clitoral vibratory sensory testing done. We used a ventral approach wherein the neurovascular bundle was protected while the erectile tissue was removed. Clitoral viability was evaluated preoperatively and postoperatively by gross examination and capillary perfusion, performed by applying pressure to the clitoris until it blanched when pressure was removed. Capillary perfusion time was determined by time taken until complete reperfusion of the glans occurred. Co-operative patients older than 5 years were tested for clitoral sensation. A single monofilament was used for neurologic sensory testing. A biothesiometer is a small cylindrical instrument that is used to assess the sensitivity of inner thigh and genitalia (labia majora, labia minora, vaginal introitus and clitoris) to pressure, vibration and temperature. Advantages to this procedure, its low cost, non-invasiveness and ease of use. It allows quantification of genital sensation. Using a scale of zero, no sensation to five maximum sensation, the patient was asked to report the degree of sensation at various points. Inner thigh stimulation was set at level 3 for each patient and used as a baseline to compare other areas tested.<sup>[6]</sup>

### Our technique of sensation preserving ventral clitoral reduction surgery

The procedure was performed under general anaesthesia. The patient was in lithotomy position, catheterized, prepped and draped [Figure 1]. First a stay suture is applied to the glans. Degloving of the clitoris is done beginning with performing a sub-coronal circumferential incision five millimetre proximal to the coronal margin of the glans clitoris [Figure 2]. When degloving the clitoris, special attention is taken to leave the entire inner preputial layer of skin of at the coronal margin

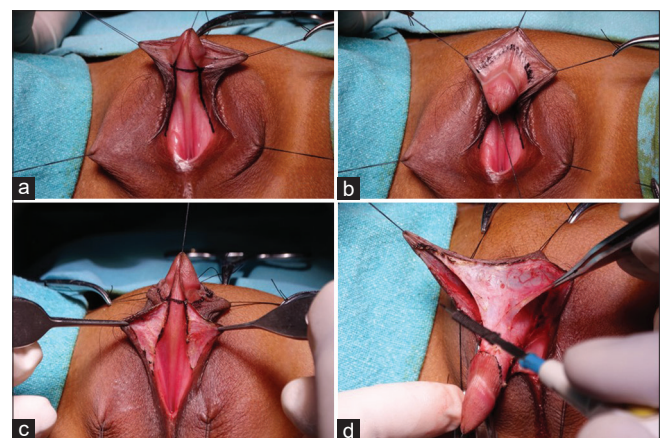


**Figure 1:** (a and b) Pre-operative clinical picture of cases of clitoromegaly

along the dorsal aspect of the phallus [Figure 2d]. This cuff of the skin is highly sensitive along with the glans itself.<sup>[7]</sup> This tissue will later be used to create the inner aspect of a classic tent like morphology for the clitoral hood. The clitoris is degloved and the ventral plate of tissue (urethral plate) preserved and divided under the glans clitoris. Two vertical incisions were made over the degloved clitoral shaft ventrally on either side of corporal bodies, incising the Buck's fascia and tunica albuginea in this region [Figure 3]. Neurovascular structures to the glans clitoris course on the dorsal aspect of the shaft of the clitoris deep to Buck's fascia. All the erectile tissue removed leaving behind the cover of corporal bodies. A ventral approach used to protect the neurovascular bundles. Reduction glansplasty performed through the ventral route [Figure 4a and b]. The preserved glans and attached ventral mucosa were then recessed beneath the pubic arch. The residual corporal bodies along with neurovascular bundles to be anchored under the pubis symphysis. This manoeuvre retracts the glans backwards and upwards in its hood and gives that natural look [Figure 5a and b]. Vaginoplasty performed simultaneously using a cutback procedure in selected cases.

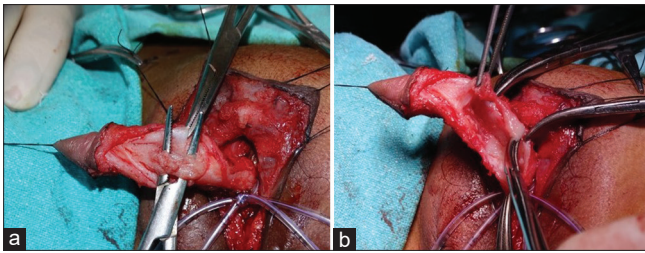
## RESULTS

Clinical profile of eight cases with a median age of 6.5 years (3–12 years) was operated over 5 years (January 2013–January 2018), as shown in Table 1. Five had CAH and three had idiopathic clitoromegaly (5:3). In three of cases of idiopathic clitoromegaly, in spite of through workup exact cause was not found. In all the cases, sensation preserving ventral clitoral reduction was done. In two cases, cutback vaginoplasty was also performed. Post-operative period was uneventful in all. Cosmetic appearance was satisfactory and parents were content with the overall outcome. Up to median follow-up of 2.6 years, none of them clitoral atrophy occurred. Patients reported a mean of sensation of, 3.2 at the labia minora and 4.7 at the clitoris. Five of the eight patients also underwent clitoral vibratory testing. Mean values for the introitus, clitoris, labia and thigh were 3.56, 1.61, 5.08 and 5.83, respectively [Table 2].

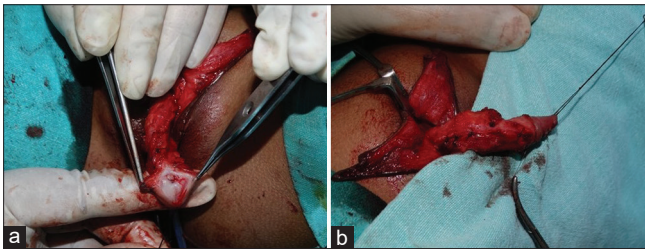


**Figure 2:** (a-d) Planning of incision

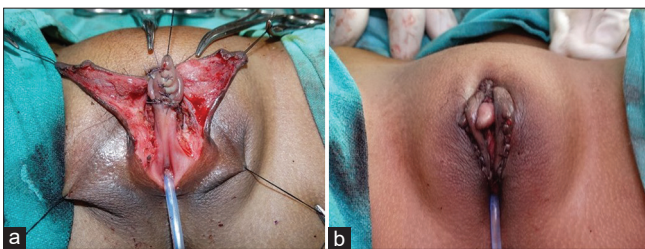




**Figure 3:** (a and b) Removal of erectile tissue with preservation of tunica albuginea



**Figure 4:** (a and b) Reduction glansplasty



**Figure 5:** (a and b) Rearrangement of skin labiaplasty, B after completion of procedure

## DISCUSSION

The clitoris, like the penis, consists of two corpora cavernosa, not having a defined corpora spongiosum and does have the male equivalent of the glans, which consists of spongiosal tissue. Arterial supply branches from the internal pudendal artery and nerve supply from internal pudendal nerve, major branch of the sacral plexus that travels through Alcock's canal near the ischial tuberosity. These neurovascular bundle course ventrally and are on the medial aspect of the bifurcated corpora, where they then course dorsally along the phallic shaft. Innervation governing tumescence and sensation are also similar to that observed in the penis.<sup>[8]</sup> Most important to the discussion of clitoral surgery is the anatomic course of the nerves that provide sensation to the glans along with providing an appearance closely resemble the typical female phenotype.

CAH as in our study is most common cause of virilisation and management of the condition is multidisciplinary. There is no unanimous opinion as to the optimal timing, indications and procedure of choice for clitoroplasty. Proponents of late surgery rightfully point out that later age allows the individual to feel more empowered in that they are able to participate in the decision process, although in the Indian scenario where society of intersex disorders of sex development people not

get enough social respect, so early surgery is advisable to maintain the social respect of family and relief parental anxiety. Although there is no definitive evidence to support whether early or late surgery is better.<sup>[9]</sup> In our study, median age was 6.5 years and intervention was done in cases presented to us with moderate-to-severe clitoromegaly. That is also found in the Endocrine Society guidelines on the management of CAH that clitoral surgery should be postponed in girls with mild degrees of clitoromegaly.<sup>[10]</sup>

The specific aims for intervening were providing a phenotypical appearance that resembles the assigned gender. Since the only known function of the clitoris itself is to provide sexual pleasure, this goal is the only one that is relevant to the discussion of clitoroplasty. Surgery for clitoral enlargement has gone through evolution. The neurovascular structures to the glans clitoris course on the dorsal aspect of the shaft of the clitoris deep to Buck's fascia. The customary approach to the reduction has been by the dorsolateral approach where these structures are identified, isolated, and protected while the erectile tissues are removed but the risk of neurovascular bundle injury is always there.<sup>[11]</sup> A newer ventral approach was adopted in our study where the erectile tissues are excised without disturbing the neurovascular structures. This technique results in better preservation of sensation in the clitoris and therefore may increase sexual satisfaction.

Papageorgiou *et al.* preserve both the dorsal and ventral neurovascular bundles through a semicircular incision in the phallus, though the glans reduction was not done.<sup>[12]</sup> In Kogan *et al.*, the dorsal neurovascular bundle was preserved and the dorsal central wedge glans reduction was performed but latter developed an unsightly longitudinal scar on the dorsum of the glans clitoris.<sup>[5]</sup> In our study, glans was reduced on the ventral side where the density of nerves is lowest. Ventral glans reduction also has the advantage of hiding the surgical scar and easing the removal of a sufficient amount of tissue. This is due to the dorsal nerve, which is widely distributed on the dorsum of the phallus. In our study, all patients had a viable clitoris on gross examination and capillary perfusion testing. Patients reported an average degree of sensation at the labia minora and at the clitoris. Six of the eight patients also underwent clitoral vibratory testing and found satisfactory in all these cases. This findings were comparable to other study.<sup>[13,14]</sup> In previous study, majority of cases need further procedure like vaginal dilatation to vaginoplate is to permit penetrative intercourse though in our study none of cases required second surgery though the girls are not sexually active till now.

Alizai *et al.* studied the post-pubertal outcome of patients who underwent clitoral surgery. They found the outcomes unsatisfactory with clitoral atrophy or a prominent glans in several cases, but in our study, no cases of clitoral atrophy occurred.<sup>[15]</sup> Crouch *et al.* studied the sensory thresholds in patients who had undergone clitoral surgery and found significant impairment to sensitivity in the clitoris compared to controls, although in our study, in all the cases clitoral sensation was preserved though in our study not compared with control.<sup>[16]</sup>

**Table 1: Clinical profile and management done in cases**

Patients serial number	Age (years)	Karyotype	Age of presentation and presenting symptoms	Examinations of clitoris (cm)	Hormone profile (suggestive of)	Managements
1	8	46XX	Increase size and erection	4.5	CAH	Ventral approach clitoral reduction with labiaplasty
2	12	46XX	Increase size and erection	5.5	CAH	Ventral approach clitoral reduction with labiaplasty
3	5	46XX	Increase size	4	Idiopathic	Ventral approach clitoral reduction with labiaplasty
4	4	46XX	Increase size	4	CAH	Ventral approach clitoral reduction with labiaplasty and cut back vaginoplasty
5	9	46XX	Increase size and erection	5.5	Idiopathic	Ventral approach clitoral reduction with labiaplasty
6	6	46XX	Increase size and discomfort	4.5	CAH	Ventral approach clitoral reduction with labiaplasty
7	3	46XX	Increase size	4	CAH	Ventral approach clitoral reduction with labiaplasty and cut back vaginoplasty
8	7	46XX	Increase size and discomfort	4.5	Idiopathic	Ventral approach clitoral reduction with labiaplasty

CAH: Congenital adrenal hyperplasia

**Table 2: Results of sensory testing and vibratory sensory testing in follow-up in operated cases**

Test	Area tested	Result (mean ± SD)
Sensory testing	Labia minora	3.2±0.8
	Clitoris	4.7±0.3
Vibratory sensory testing	Introitus	3.56±0.4
	Clitoris	1.61±0.5
	Labia minora	5.08±1.3
	Thigh	5.83±1.3

SD: Standard deviation

In a study by Dawood *et al.*, in six cases of CAH ventral nerve sparing clitoroplasty was performed, dissection was performed ventrally at 5° o'clock position in the plane between the neurovascular bundles superiorly and the intact tunica albuginea inferiorly till the 7° o'clock position on the other side encircling the corpus and lifting up the neurovascular bundle. Histology of excised tissue was done and suggest, in four of six cases (66%) thick nerve fibres can be seen on the dorsal aspect of the clitoral bodies at the anatomical location of the neurovascular bundle imbedded in the fibrous tissue of the clitoris. The long-term evaluation of operated cases of CAH supports the possibility of inevitable neural damage with variable degrees of functional disabilities, although in our study, result was excellent.<sup>[17]</sup>

## CONCLUSIONS

Although in our study, only eight cases were managed; however, results of sensation preserving ventral clitoral reduction have acceptable cosmesis, preserved sensation. The comments on sexual function will not become apparent if the surgery is truly successful until the individual has reached adulthood and become sexually active, and therefore, long-term outcome data are essential to assess current practice.

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## Conflicts of interest

There are no conflicts of interest.

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