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Case Report

Genital Feminizing Surgery without Vaginoplasty as a Safe, Aesthetic, and Cost-Effective Option for Gender-Affirming Surgery for Transwomen

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Gender affirming surgery (GAS) has important impacts for people with gender incongruence (GI), both physically and socially. As the societal acceptance of gender diversity spreads, the number of individuals with GI who wish to be identified as the gender of their choice is increasing. Indeed, many elderly people who have lived a long time with GI now wish to undergo GAS, but face greater surgical risks due to greater burdens of underlying medical conditions. Generally, vaginoplasty is performed for transwomen; however, this surgery is time-consuming and involves heavy bleeding, and thus, should be avoided in elderly people. A less invasive technique is needed. In this article, we describe a new, less invasive genital feminizing surgical technique for transwomen with reports from two clinical cases. We present this novel technique as a safe, aesthetic, and cost-effective option for gender-affirming surgery for transwomen.

Key words: gender-affirming surgery, vaginoplasty, gender incongruence, transwomen

Patients with gender incongruence (GI) are treated with hormone therapy and gender-affirming surgery (GAS), which includes chest wall contouring surgery for transmen, facial feminization surgery for transwomen, and genitoplasty. Since the genitalia are an important symbol of one's gender, making them closer to that of the desired gender can be expected to relieve the psychological stress associated with GI [1,2]. Genitoplasty for transwomen has generally included such as flap vaginoplasty and intestinal vaginoplasty [3-5]. Flap vaginoplasty has a high risk of postoperative contracture; intestinal vaginoplasty is more invasive, but can provide a flexible vagina. Postoperative stenosis of the vulva is an unavoidable complication of both methods and has occurred in 11% of previously reported vaginoplasties [6]; to prevent stenosis, permanent self-expansion is required. Here, we describe our novel technique of genital feminizing surgery without vaginoplasty and offer it as an effective option to such invasive and high-maintenance methods.

Materials and Methods

In this paper we describe a case series including 15 cases of genital feminizing surgery, 23 cases of flap vaginoplasty, and 23 cases of intestinal vaginoplasty at our hospital in collaboration with a research institute between April 2010 and March 2021. The decision on the surgical technique was left to the patient after a thorough explanation of the advantages and disadvantages of each technique. In one case, a patient with a history of deep venous thrombosis requested intestinal vaginoplasty, and the decision to perform intestinal vaginoplasty secondly to genital feminizing surgery was made after consultation with the anesthesiologist.

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Genital Feminizing Surgical Procedure. Patients were placed in the open-leg position. First, the penile and scrotal skin flaps were designed using the sciatic tuberosity, the perineal body, and central penile suture as guides. After skin excision was performed, the scrotal skin flap was raised above the dartos fascia, and the ventral penile skin flap was raised above the deep penile fascia. After orchiectomy was performed by the urologist, the dorsal penile skin flap, along with the partially resected glans (to include the bilateral dorsal penile nerves), was elevated on the tunica albuginea. After catheterization, the urethral spongiosa was detached from the penile spongiosa and resected, leaving the required length. The urologist then conducted a penile amputation. The raised flaps were fixed to the surrounding skin and subcutaneous tissue to form the labia majora, labia minora, and clitoris (Fig. 1).

For postoperative evaluation, we compared the outcome of genital feminizing surgery with that of flap vaginoplasty and intestinal vaginoplasty. Primary endpoints were operative time, blood loss, and presence of complications, and secondary endpoints were age, BMI, smoking status, presence of perioperative blood transfusion, length of hospital stay, and surgical cost. Complications were assessed based on the Clavien-Dindo classification for short and long-term events [7]. Statistical analysis was performed using the Kruskal-Wallis test for age, BMI, operative time, blood loss, and length of hospital stay, and the Steel-Dwass method was used for multiple comparisons. In addition, Fisher's exact probability test was used to confirm the association of genital feminizing surgery, vaginoplasty, blood transfusion, and smoking with the reoperation rate (complication rate of Clavien-Dindo classification 3b or higher). The test results were considered significant when p values < 0.05.

All statistical analyses were performed with EZR (Saitama Medical Center, Jichi Medical University, Saitama, Japan), which is a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria). More precisely, it is a modified version of R commander designed to add statistical functions frequently used in biostatistics [8]. Details for the surgical procedures of flap vaginoplasty and intestinal vaginoplasty have been described in previous papers [3-5]. Vaginas were created in the adipose tissue between the rectum and the Denonvilliers' fascia.

Approval for the preparation of this paper was obtained from the Clinical Research Review Committee of Okayama University (No. 2108-026). Written permission for the use of photographs was obtained from each patient.

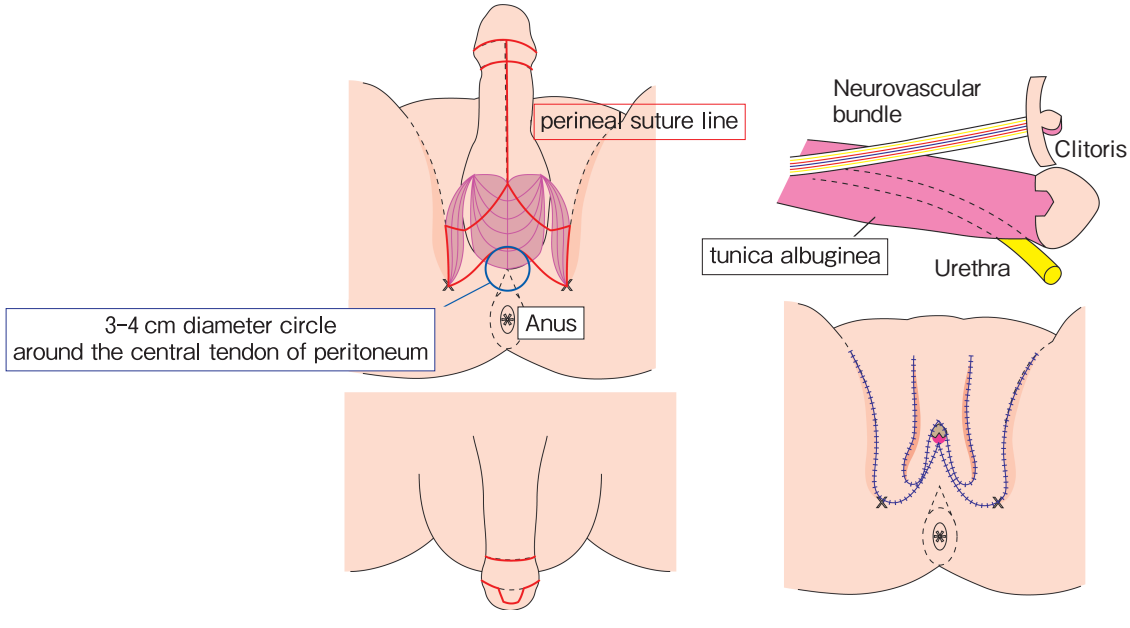


Fig. 1 Schema of Genital feminizing surgery. The centerline follows the perineal suture line. A 3-4 cm diameter circle is drawn around the center of the perineal body and is used as a marker to design the scrotal flap. The scrotal flap is aligned with the skin groove.

Results

Comparison of the results of age, BMI, operative time, and blood loss among the three groups — genital feminizing surgery, flap vaginoplasty, and intestinal vaginoplasty — is shown in Table 1. As a result of statistical comparison, operative time were significantly shorter and blood loss was significantly lower in the genital feminizing surgery group than in other vaginoplasty groups (Fig. 2). In the one patient who underwent two-stage vaginoplasty, the operative time for vaginoplasty was 318 min, and the amount of blood loss was 70 g; both values were less than the average values.

Complications included those that occurred perioperatively, such as compartment syndrome and urethral injury, and those that occurred over the long-term postoperative period, such as vulvar stricture and abnormal sensation. The complications and the percentage of reoperation for each group are shown in Table 2. Details of the complications of genital feminizing surgery are as follows: one patient developed wound failure between the labia minora and the labia majora, which healed conservatively. Another patient had a deformity of the urethral opening due to the asymmetry of the volume of the urethral spongiosa, and surgical volume reduction of the urethral spongiosa was performed on one side two years postoperatively as per the patient's wish. Another case reported hypersensitivity of the clitoris, which only needed observation. No serious complications were observed in any of the other cases.

The cost of genital feminizing surgery was 1.28 million yen (about 11,200 US dollars), while that of skin vaginoplasty was 1.7 million yen (about 14,870 US dollars) and that of one-stage intestinal vaginoplasty was 2 million yen (about 17,490 US dollars). The cost of the two-stage vaginoplasty was slightly higher, at 2.84 million yen (about 24,830 US dollars) because the vaginoplasty was performed laparoscopically (Table 3). Two representative cases are presented below:

Case 1 (Fig. 3). A 45-year-old transwoman with a history of asthma and epilepsy required a less invasive surgical technique. The operation time was 208 min, and the blood loss was 132 g. There have been no complications during the 3-year follow-up.

Case 2 (Fig. 4). A 59-year-old transwoman with no specific pre-existing medical condition wanted to undergo less invasive surgery because of her age. The operation time was 161 min, and the blood loss was 136 g. There have been no complications during the 2-year follow-up.

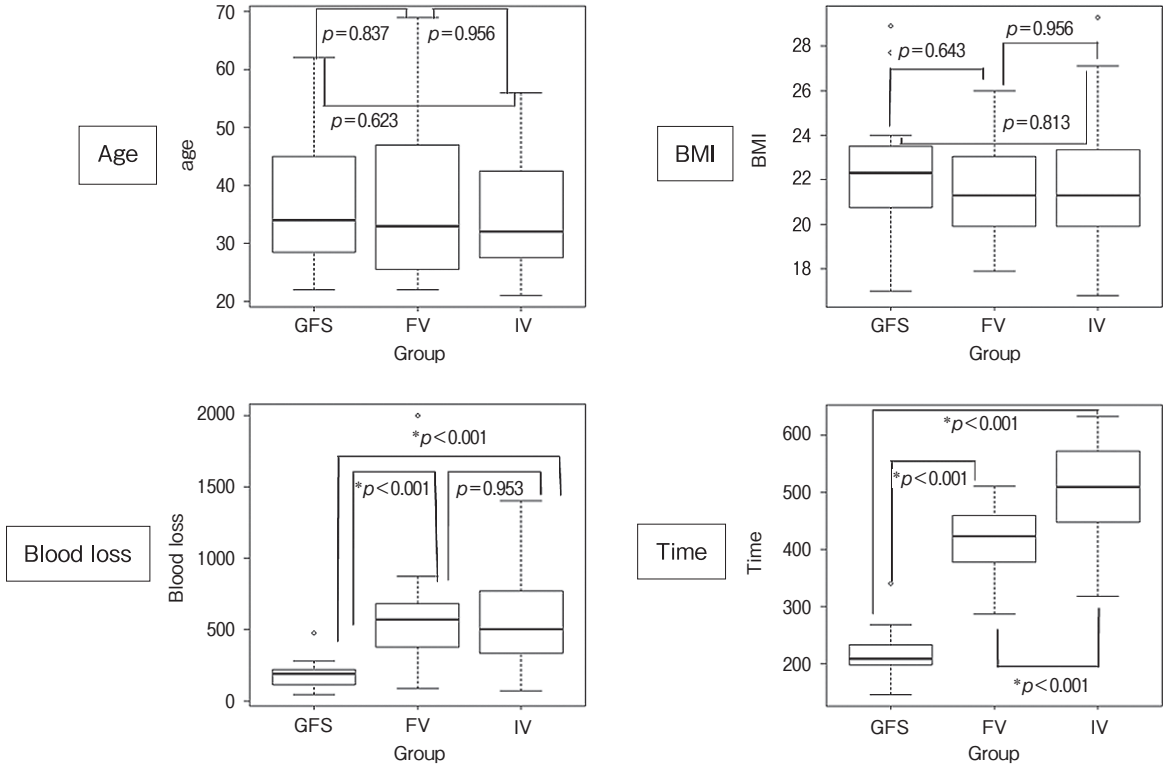
Discussion

Societal acceptance of diverse gender identities has been spreading in recent years; as a result, an increasing number of individuals with GI wish to be identified as per the gender of their choice. Legally, to change one's family register in Japan, people with GI must "be deprived of their reproductive organs or reproductive ability," and "have external genital organs similar to other members of the sex to which the applicant wishes to be assigned" [9]; thus, many trans-people opt for genitoplasty. Indeed, many elderly people who have lived with their biological sex identity for a long time

Table 1 The surgical results of genital feminizing surgery, flap vaginoplasty, and intestinal vaginoplasty

	*GFS (n = 15)	**FV (n = 23)	***IV (n = 23)	*P*-value
Age	38.5 ± 12.1	36.4 ± 13.0	34.3 ± 9.15	$p = 0.669$
BMI (kg/m^2)	22.3 ± 3.02	21.5 ± 2.28	21.9 ± 3.01	$p = 0.669$
Operative time (min)	216 ± 46.7	415 ± 61.1	488 ± 127	$p < 0.0001$
Blood loss (g)	183.2 ± 104	577 ± 382	546 ± 342	$p < 0.0001$
Blood transfusion (ml)	none	121 ± 275 (17.4%; 4/23)	183 ± 258 (34.8%; 8/23)	–
Complication rate (%)	20.0 (3/15)	43.5 (10/23)	52.2 (12/23)	–
Smoker rate (%)	13.3 (2/15)	8.70 (2/23)	13.0 (3/23)	–
Days	13.8 ± 1.76	14.6 ± 1.73	15.4 ± 1.85	$p = 0.0703$
Cost (yen)	1,280,000	1,700,000	2,000,000	–

Age, BMI, operative time, blood loss, blood transfusion, complication rate, smoking rate, length of hospital stay, and cost are compared. The amount of blood loss and operative time were significantly lower in genital feminizing surgery than in vaginoplasties.
*Genital feminizing surgery, **Flap vaginoplasty, ***Intestinal vaginoplasty, SD: Standard deviation.



GF, Genital feminizing surgery; FV, Flap vaginoplasty; IV, Intestinal vaginoplasty.

Fig. 2 Surgical outcomes of genital feminizing surgery, flap vaginoplasty, and intestinal vaginoplasty. There were no significant differences in age or BMI between those three techniques. On the other hand, the amount of blood loss and operative time were significantly lower in genital feminizing surgery than in vaginoplasties.

Table 2 List of short-term and long-term complications for each procedure according to the Clavien-Dindo classification

	Short-term complications	Long-term complications	Reoperation rate (%)
*GFS	Class Ⅱ: Failure of wound adhesion	Class Ⅱ: Hypersensitivity of the clitoris Class Ⅲb: Urethral insufficiency (aesthetically)	6.67 (1/15)
**FV	Class Ⅱ: Necrosis of the clitoris, Necrosis of the labia minora/majora, Urethral injury Class Ⅲb: Postoperative hemorrhage	Class Ⅱ: Keloid Class Ⅱ or Ⅲb: Vaginal stenosis, Vaginal prolapse	4.35 (1/23)
***IV	Class Ⅲb: Compartment syndrome, Necrosis of the intestine	Class Ⅱ or Ⅲb: Vaginal stenosis, Vaginal prolapse, Insufficiency of the clitoris (aesthetically)	30.4 (7/23)

*Genital feminizing surgery, **Flap vaginoplasty, ***Intestinal vaginoplasty.

now wish to undergo GAS, but their surgical risks have increased with the number of underlying medical conditions [10]. Previous studies have found correlations between operative time and complications. In the field of plastic surgery, Hardy *et al.* reported no change in complications for up to a 3.1-h surgery, but the odds steadily increased with increases in surgical time beyond that, being 3.1 and 4.7 times more common

Table 3 Comparison of the cost of genital feminizing surgery, flap vaginoplasty, and intestinal vaginoplasty

	*GFS	**FV	***IV	****TSV
Cost (yen)	1,280,000	1,700,000	2,000,000	2,840,000 (Laparoscopy) 2,560,000 (Laparotomy)

*Genital feminizing surgery, **Flap vaginoplasty, ***Intestinal vaginoplasty, ****Two-stage vaginoplasty.

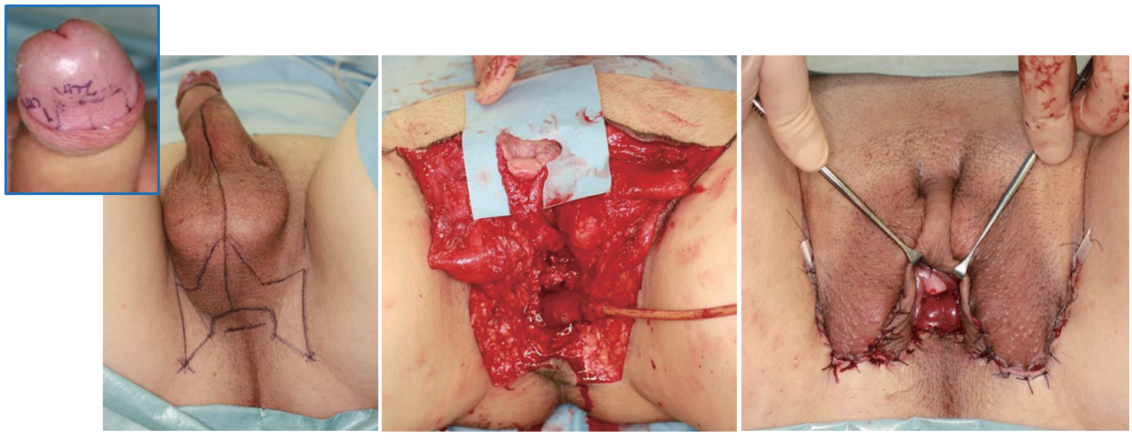


Fig. 3 Left, The preoperative design; Center, Raising the neurovascular pedicled flap with a part of glans and penile skin above the corpus cavernosum; Right, Appearance at the end of the surgery.

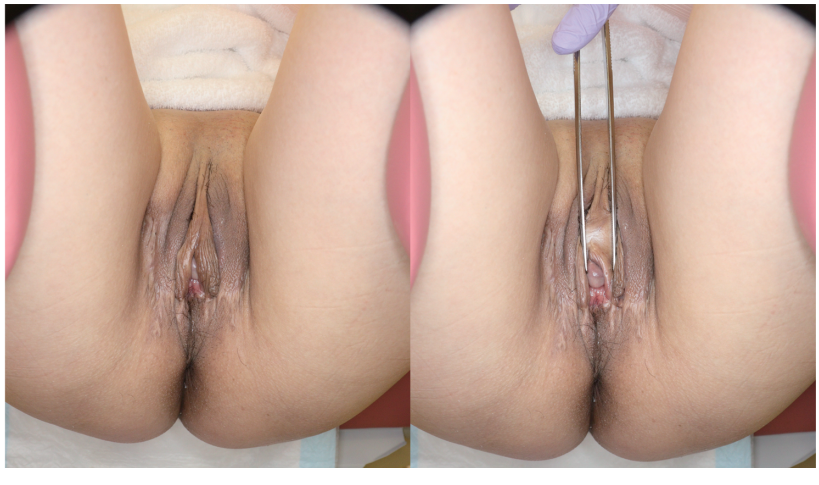


Fig. 4 Case 2 appearance two years postoperatively. The good shape of the labia majora, the labia minora, and the clitoris is maintained.

after 4.5 and 6.8 h, respectively [11]. As revealed in our study data, genital feminizing surgery has a significantly shorter operative time and less blood loss than vaginoplasty. The average operative time for this technique was less than 4.5 h; only one case exceeded 4.5 h. In that particular case, although it took time to stop the bleeding, the final blood loss was 218 g, and no perioperative complications occurred.

As for the overall length of hospitalization, no significant difference was observed. However, at the cooperating institution the length of hospitalization was set at 15 days regardless of the course of recovery; when a comparison was made only at our institution, the length of hospitalization was significantly shorter for

genital feminizing surgery than for intestinal vaginoplasty (Fig. 5).

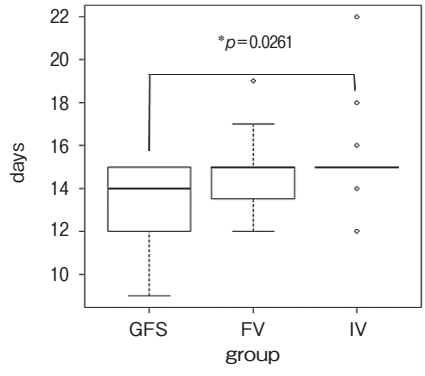
Although there was no significant difference in the reoperation rate between the groups in this study, a detailed review of the results shows that genital feminizing surgery was associated with only one revision of urethral morphology, which was minor compared with the complications that occurred after vaginoplasties such as postoperative bleeding, intestinal necrosis, compartment syndrome, severe vulvar stenosis, and vaginal prolapse. The complications of genital feminizing surgery tended to be negligible compared to those of vaginoplasty (Table 1, 2). The reason for that result could be not only the shortened operative time and reduced blood loss but also the operative position. It has been reported that the open-leg position can reduce the risk of compartment syndrome compared to the lithotomy position [12]. In the largest study for intestinal vaginoplasty, performed by Kaushik *et al.* [13], the total rate of complications was 20.2%, 97.4% of which were minor. The reoperation rate was 11.4%: 2.6% for introital stricture and mucosal prolapse and 8.8% for aesthetic modification. Hontscharuk *et al.* reviewed postoperative outcomes following penile inversion vaginoplasty and reported an overall complication rate of 20-70%, with most being minor complications that could be managed observantly or by minor revision surgery (their "minor" complications included rectal or urinary injuries not needing surgical treatment) [14]. Ive *et al.* reported major complications in 16.8% of their patients, with 5% of patients requiring reoperation for bleeding, 7.9% requiring reoperation for wound complications, 2% requiring readmission without reoperation, and 1% developing venous thromboembolism (VTE) [15]. As suggested, the inclusion criteria for "major" and "minor" complications varies among surgeons, and that, along with the small sample size, could be one reason why the complication rate for vaginoplasties in this study is slightly higher than those of other studies.

Gender feminizing surgery also provides good cosmetic results. Unlike intestinal vaginoplasty, which leaves an abdominal wound, in this procedure the scars are localized, and all suture lines are designed to fit into the newly constructed genitals, resulting in scarless healing. In addition, natural morphology can be reproduced using the glans for the clitoris, the penile valve for the labia minora, and the scrotal valve for the labia majora reconstruction. Cosmetically, this is superior to the results of vaginoplasty, with which it is difficult to reconstruct the labia minora.

In terms of cost, this technique costs only 65% of that of primary intestinal vaginoplasty and 75% of the cost of a flap vaginoplasty; thus, it might break the

	Genital feminizing surgery n=11	Flap vaginoplasty n=23	Intestinal vaginoplasty n=23	*P*-value
Days	13.4 ± 1.87	14.6 ± 1.73	15.4 ± 1.85	$p=0.0261$

※Kruskal-Wallis



GF, Genital feminizing surgery; FV, Flap vaginoplasty; IV, Intestinal vaginoplasty.

Fig. 5 Comparison of hospitalization days for each procedure at Okayama University Hospital. At this institution, genital feminizing surgery had a significantly shorter hospital stay than intestinal vaginoplasty (The other institution maintained a set duration for hospital stay, regardless of clinical course).

financial barrier for GAS.

Although a vagina is required for vaginal intercourse, many transwomen have anal intercourse or have no desire to have sexual intercourse. The sexual sensation is preserved in this technique because the neoclitoris contains the dorsal penile nerves, and previous studies have shown that the erogenous sensation is maintained over the long term [16, 17].

Moreover, vaginoplasty can be performed later if desired. In this study, one case of two-stage vaginoplasty was included, and the operative time and blood loss during vaginoplasty were significantly reduced (318 minutes/70 g), with no perioperative complications.

In conclusion, we believe that the safe, aesthetic, and cost-effective technique described in this report is indicated for patients who require minimally invasive procedures and who do not wish to undergo vaginoplasty.

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