

## Vaginal Reconstruction Using Pudendal Thigh Flap: A Study of 20 Cases

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### ABSTRACT

**Aim & Objectives:** The surgical management of the vaginal agenesis is a complex problem and constitutes a significant technical challenge. The aim is to create a neovagina that is satisfactory both functionally and aesthetically using a technique that is simple, reliable, and applicable to most patients.

**Materials & Methods:** Twenty patients were opted for this prospective observational study conducted in the Department of Plastic Surgery, Dhaka Medical College and Hospital (DMCH), Dhaka over a period of one year from September 2014 to August 2015. All patients with congenital absence of vagina were selected for surgery. Neovagina was created with a technique using bilateral pudendal thigh flaps.

**Results:** Age distribution shows that 19 (95%) patients were between 15- 20 years old. The mean age of the patients was 17.9 ( $\pm$  3.39) years. The average length and breadth of the designed flap were 11.5 ( $\pm$  0.089) and 5.1 ( $\pm$  0.22) cm respectively. During the post-operative follow up 16 (80%) patients presented with neovaginal length  $\geq$  7 cm. 17 (85%) patients could appreciate touch and pain sensation at their neovagina. In-hospital outcome of the patients demonstrates that only 1 (5%) patients had marginal flap loss (<1 cm). The reconstructed vagina was expansible and post-operative stenting or dilatation was not required.

**Conclusion:** Pudendal thigh flap is a useful technique to reconstruct the vagina which can provide satisfactory anatomical and functional outcome with negligible post-operative problems.

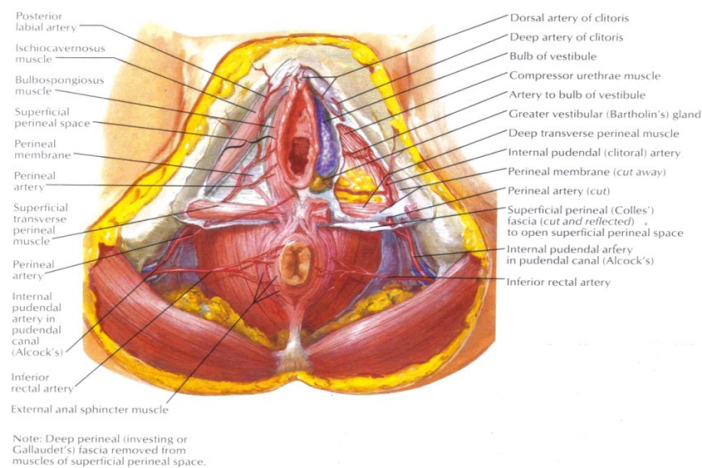
### Keywords

Vaginal Agenesis, Neo-vagina, Pudendal thigh Flap.

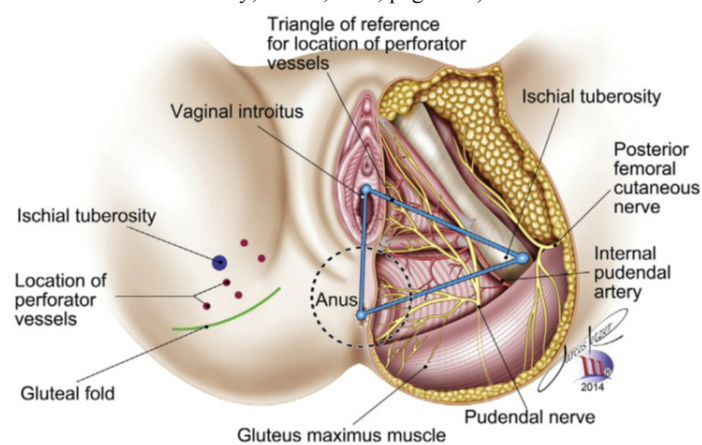
### Background

Vaginal agenesis is a rare congenital condition and is often associated with the Mayer-Rokitansky-Kuster-Hauser syndrome. Its incidence approximates 1 in 4,000 to 10,000 female births [1]. It consists of primary amenorrhea with normal female phenotype,

genotype, ovarian function and endocrine status. Rarely is the abnormality discovered at birth. On physical examination findings include a normal vulva with absent vagina or vagina represented by a dimple. The uterus is either completely absent or is represented by two rudimentary horns. In 8% of cases, a functional uterus with or without cervix is present, resulting in concealed menstruation and hematometra [2].



**Figure 1:** Vascular anatomy at superficial and deep perineal space (Ref: Atlas of Human Anatomy; Netter, 2006; page 681).



**Figure 2:** Triangle of reference for location of perforator vessels (blue). Perforator vessels from the internal pudendal artery are located within this triangle, along with the branches from the pudendal nerve [Ref: Evaluation of cutaneous sensibility of the internal pudendal artery perforator (IPAP) flap after perineal reconstructions. Pedro S. Coltro, Marcus C. Ferreira, Fa'bio F. Busnard, Marcelo V. Olivian, Thiago Ueda, Victor A. Grillo, Carlos F. Marques, Caio S. Nahas, Se'rgio C. Nahas, Rolf Gemperli b Journal of Plastic, Reconstructive & Aesthetic Surgery (2015) 68, 252-261].

The condition carries a serious sexual, psychological, and even social burden. Vaginal reconstruction is a complex problem and constitutes a significant technical challenge. The aim is to create a neovagina that is satisfactory both functionally and anatomically using a technique that is simple, reliable, and applicable to most patients. The aims of reconstruction are to provide a cosmetically satisfactory introitus, a conduit for normal menstruation, and also to facilitate pain-free, enjoyable sexual intercourse [3]. The ideal procedure to reconstruct the vagina should pose little risk to the patient, be a single stage procedure with minimal donor-site morbidity, and create a vaginal canal in the correct axis and of adequate size that allows intercourse without the need for long-term postoperative dilatation. There are many surgical techniques for reconstruction of the vagina. The basic step in all methods is the creation of a pocket between urinary bladder and rectum.

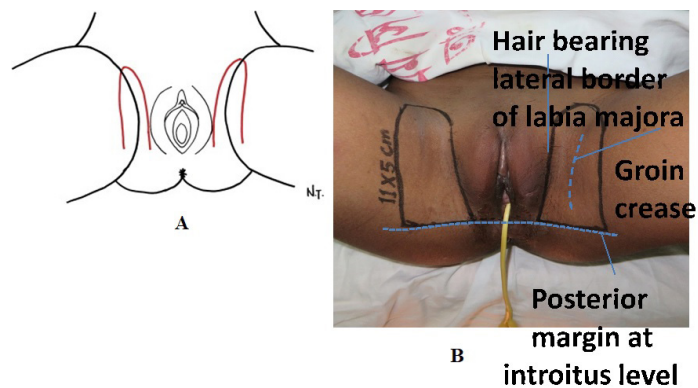
The lining of this cavity differs in each technique ranging from a full-, or a split-thickness skin graft (McIndoe operation) [4], enteric segments for vaginoplasty [5], Regional musculocutaneous flaps as gracilis myocutaneous flap, the inferiorly based rectus abdominis myocutaneous flap for both vaginal and pelvic floor reconstruction [6]. In 1989, Wee and Joseph described a technique using neurovascular pudendal-thigh skin flaps to (re-) construct the vagina in congenital or acquired conditions [7].

### Surgical Anatomy

Blood supply of the pudendal thigh flap is based on the terminal branches of the superficial perineal artery, which is a continuation of the internal pudendal artery. These branches, named posterior labial arteries, anastomose with branches of the deep external pudendal artery as well as the medial femoral circumflex artery and the anterior branch of the obturator artery over the proximal part of the adductor muscles [8] (Figure 1). The posterior part of the pudendal thigh flap retains its innervation from the posterior labial branches of the pudendal nerve, as well as from the perineal rami of the posterior cutaneous nerve of the thigh, while the anterior part of the flap near the medial corner of the femoral triangle, supplied by nerve twigs from the genitofemoral and ilioinguinal nerves, may be denervated in the process of elevation. Hence, sensation would be retained in the lower part of the reconstructed vagina [7] (Figure 2).

### Operative technique

Under spinal anaesthesia the patient is placed in the lithotomy position with hips abducted 60-70° and laterally rotated, the legs on stirrups and urinary bladder is catheterized. Bilateral islanded pudendal-thigh flaps are outlined with marking pen on both sides of proposed vagina, base at the level of introitus extending from lateral to hair bearing part of labia majora across groin crease to medial thigh. The flap is centered on the groin crease with the distal margin of the flap located at femoral triangle. The flap is designed with a 5 cm base, which will allow easy direct closure of donor site, and a length 12 cm keeping the distal 2 cm tapering and apex about 3 cm wide (Figure 3).



**Figure 3:** Preoperative Marking of pudendal thigh fasciocutaneous flap. (A) Red outline marks traditional flap placement. (The pudendal thigh flap for vaginal reconstruction: Optimising flap survival, Nicole L.Y. Thama, Wei-Ren Pan et al, Journal of Plastic, Reconstructive & Aesthetic Surgery, Volume 63, Issue 5, Pages 826-831, May 2010) (B) Pre-operative marking.

Recanalization of the neo-vagina is proceeded by very meticulous blunt dissection with scissors, assistant keeping one finger in rectum and anal canal as guard and urethra is guarded by catheter. Dissection is continued until 3 fingers can be introduced with ease upto the peritoneal reflection can be reached. Dissection is proceeded forward and Then in upward direction until resistance is felt with gentle push (Figure 4). The tendon of the adductor longus muscle is identified and flap elevation started at the apex. The skin at the base of the flap is incised to the sub-cutaneous tissue level and is undermined in this plane posteriorly for about 1 cm. This allows rotation of the flap medially and brings the posterior margin next to the inner edge of the labia to which it will be sutured (Figure 5). The labia are lifted off the pubic rami and perineal membranes and flaps from both sides are tunneled under labia majora and everted through introitus. Posterior suture line is completed first and after the tip was reached then anterior suture line is commenced (Figures 6-8). The tip of cul-de-sac is then invaginated and anchored to the tissue at the apex of the vaginal space. The opening of the neo-vagina is sutured to the muco-cutaneous edge of labia minora. Donor site is closed primarily under suction drain. Neovagina is loosely packed with antibiotic impregnated Vaseline gauze and removed on 1st post-operative day (Figures 9,10).

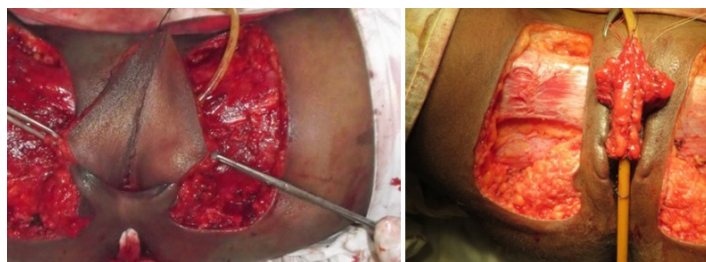


**Figure 4:** Creation of neovaginal space.

**Figure 5:** Flaps levated on both sides with base of flaps deepithelized.



**Figure 6:** Tunnels to vaginal defect.



**Figure 7:** Flaps sutured to each other to form neovagina (A,B).



**Figure 8:** Donor site closed primarily.

Post operatively, patient was kept in bed for 48 hours, Dressing was done from 1st to 7th postoperative day with normal saline irrigation and loosely packed with antibiotic impregnated vaseline gauze. Flap was monitored daily with vaginal speculum (Figure 8).



*Flap assessment with vaginal speculum*



*Assessment of vaginal orifice*



*Measurement of length of vaginal canal*

**Figure 9:** Assessment of functional outcome on post operative follow up.

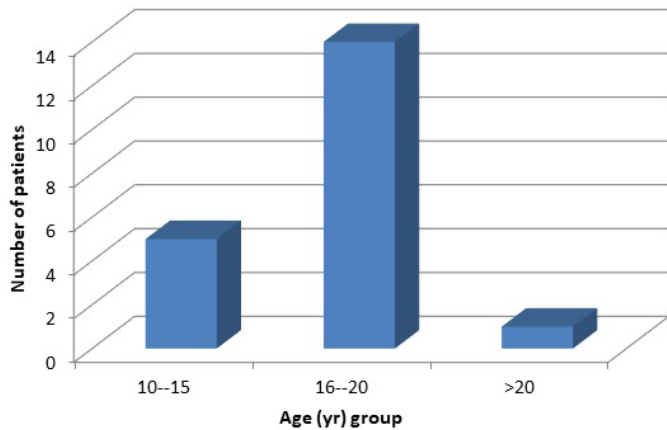
## Results

In this study, 19 (95%) patients were between 15-20 years old (Figure 9); mostly (17,85%) patients were unmarried. Three-fifth (60%) of the patients presented USG finding as non-visualization of uterus/Hypoplastic uterus. Rest (40%) patients presented clinically with lower abdominal pain and sonographic findings of hematometra (Figure 10).

The average length and breadth of the designed flap were 11.5 and 5.1 cm respectively (Table 1). The operation time ranged from 160 min to 220 min (mean  $\pm$  SD 193.5  $\pm$  16.2 min). During the post operative follow up, 16 (80%) patients presented with neovaginal length  $>$ 7 cm and 4 (20%) patients presented with neovaginal

length  $\leq 7$  cm. The diameter of the vaginal canal were 2 cm and 3 cm in 3 (15%) and 16 (80%) patients respectively. In one patient neovaginal canal diameter was 1 cm breadth. 17 (85%) patients could appreciate touch and pain sensation at their neovagina (Table 2).

**Distribution of patients according to age group (n=20)**



**Figure 10:** Distribution of patients according to age of presentation.

**Distribution of patients according to pattern of anomaly**



**Figure 11:** Distribution of patients according to pattern of anomaly (on the basis of ultrasonography of lower abdomen).

Per operative findings	Mean $\pm$ SD	Range
Length of the flap (cm)	11.5 $\pm$ 0.89	10- 12
Width of the flap (cm)	5.1 $\pm$ 0.22	5- 6
Operative time (min)	193.5 $\pm$ 16.2	160- 220

**Table 1:** Distribution of patients by their Per operative findings (n = 20).

Variables determining functional outcome		Frequency	Percentage (%)
Vaginal length (cm)	$\leq 7$ cm	4	20
	7-8 cm	8	40
	> 8 cm	8	40
Vaginal canal diameter (cm)	$\leq 1$ cm	1	5
	2 cm	3	15
	3 cm	16	80
Sensation	Present	17	85
	Absent	3	15

**Table 2:** Distribution of patient according to variables determining functional outcome (n=20).

In-hospital outcome of the patients demonstrates that only 1(5%) patients had marginal flap loss (Table 3). Postoperative flap-monitoring did not reveal infection, seroma, hematoma in any of the patients. One patient developed wound dehiscence at the donor site on one side (Right side) (Table 4).

Outcome	Frequency	Percentage (%)
No Flap loss	19	5
Flap loss	-	-
Total flap loss	-	-
Partial flap loss	-	-
Marginal loss	1	5

**Table 3:** Distribution of patient according to outcome of flap (n=20).

Complication		Frequency	Percentage (%)
Receipient site	Marginal loss	1	5
	Infection	0	---
	Seroma	0	---
	Wound dehiscence	1	5
Donor site	Infection	0	---
	Hematoma	0	---
	Seroma	0	---
	Wound dehiscence	1	5

**Table 4:** Distribution of patients by postoperative complications (n = 20).

More than 90% of the patients exhibited good outcome that was defined as described in Table 5. In two patients the outcome was considered acceptable (Table 6).

Result	Criteria
Good	<ul style="list-style-type: none"> <li>Vaginal Orifice admits <math>\geq 2</math> cm</li> <li>Length of the canal &gt; 8 cm</li> <li>Sensation: present</li> </ul>
Acceptable	<ul style="list-style-type: none"> <li>Vaginal Orifice admits 1-2 cm</li> <li>Length of the canal: 7-8 cm</li> <li>Sensation: +/-</li> </ul>
Poor	<ul style="list-style-type: none"> <li>Vaginal Orifice admits <math>\leq 1</math> cm</li> <li>Length of the canal: <math>\leq 7</math> cm</li> <li>Sensation: absent</li> </ul>

**Table 5:** Definition of functional outcome of reconstruction.

Final outcome	Frequency	Percentage (%)
Good	18	90
Acceptable	2	10
Poor	0	---

**Table 6:** Distribution of patients by final outcome (n = 20).

## Discussions

In this study, the age ranged between 15 to 30 years. Age distribution shows that 19 (95%) patients were between 15- 20 years old. The mean age of the patients was 17.9 ( $\pm$  3.39) years. Mostafa et al. 2012 stated these cases usually not discovered earlier because of the cultural taboos limiting early diagnosis especially in rural areas from which these cases came from [6]. In the present

study, the females with isolated vaginal agenesis presented earlier ( $15.4 \pm 0.5$  yr) at age than those with uterovaginal agenesis ( $19.7 \pm 3.4$ ), probably because of cyclic abdominal pain and hematometra. Majority of these conditions present in adolescence, which enables the patient to be involved in decisions about the type and timing of treatment [9]. When presentation is earlier in childhood, it is accepted to defer both non-surgical and surgical methods of vaginal creation until adolescence or even adulthood, when the patient reacts physical and psychological maturity. This allows for proper decision making and also increases the compliance with vaginal dilation therapy whether used as primary treatment or post-operative adjuvant treatment to prevent vaginal stenosis [10].

In present study, the mean length of the raised flap was 11.5cm and the mean width was 5.1cm. Previously other authors mentioned the flap dimensions were planned to be 4-6 cm wide and 12-15 cm long. Kalam et al. (2010) designed flap  $12 \times 5$  cm [11]. Mean operation time was  $193.5 \pm 16.2$  min.

During the post-operative follow up 16 (80%) patients presented with neovaginal length  $>7$  cm and 4 (20%) patients presented with neovaginal length  $\leq 7$  cm. Others reported easy entry of two fingers in the neo-vaginal pouch, and the vaginal length was 8cm [12]. The diameter of the vaginal canal was 2 cm in 3 (15%) and 3 cm in 16 (80%) patients. In one patient neovaginal canal diameter was 1 cm breadth.

17 (85%) patients could appreciate touch and pain sensation at their neovagina. All the flaps in the present study showed preserved sensation specially near the base. Joseph and Wee [1989] illustrated that the posterior part of the pudendal thigh flap retains its innervations. Kalam et al. (2010) also stated vaginal reconstruction with pudendal flap showed wide vaginal canal with intact sensation. Other studies, stated that their flaps were sensate having the same erogenous potential as the upper thigh and perineum [13,14].

In-hospital outcome of the patients demonstrates that only 1 (5%) patients had marginal flap loss. Postoperative flap-monitoring did not reveal infection, seroma, hematoma in any of the patients. One patient developed wound dehiscence at the donor site on one side (Right side). There was only one case of distal flap necrosis in our study that was repaired by conservatively by regular irrigation with normal saline. Some authors suggested suggested that the flap should be designed more medially and recommended delay procedure to avoid flap necrosis [13].

In the present study none of the married patient with uterovaginal connection, experienced pregnancy during the follow up period. Selvaggi et al, 2003 mentioned in 8% of cases of total or partial vaginal aplasia, a functional uterus with or without cervix is present, resulting in concealed menstruation and hematometra. In such cases, two surgical options are available: hysterectomy, or reconstruction of the vagina and connection of the uterus with the neovagina. Creation of a uterovaginal connection was first reported by Warthon in 1938. The first pregnancy after this procedure was

reported by Zarou et al., in 1973. Although some successful cases have been reported which were mainly incomplete vaginal atresia cases, restoration of continuity between a functioning uterus and the vagina in cases of cervical or vaginal atresia is daunting. As a consequence, hysterectomy has been recommended as the most straightforward treatment option [15].

More than 90% of the patients exhibited good outcome as evidenced by vaginal orifice  $>2$  cm in diameter, length of vagina  $>8$  cm and a sensate vagina. In two patients the outcome was considered acceptable, who had vaginal orifice 1-2 cm, length of vagina 7-8 cm with equivocal vaginal sensation. In this study, no patient showed poor outcome. No other authors defined the outcome of the neovagina with such working definition.

## Conclusion

Bilateral fasciocutaneous pudendal thigh flaps permit vaginal reconstruction and an uterovaginal connection in patients with vaginal agenesis and a functional uterus respectively. The main advantages of this technique are; this is a one- stage operation, the flap is sensate, neovagina is both anatomically and functionally spacious, no need for dilatation and linear scar is hidden in the donor site. In this study, complication was negligible as well as minimal donor site morbidity.

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