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Neovaginoplasty with pudendal thigh flap for repair of vaginal agenesis: A case report and review of literature

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Abstract

Surgical management of vaginal agenesis constitutes a significant technical challenge. The goal of vaginal reconstruction is to create a neovagina that is both functionally and aesthetically satisfactory using a simple and reliable technique applicable to most. Bilateral pudendal thigh flaps were used to reconstruct neovagina for a 13-y girl with congenital vaginal agenesis. She presented with cyclical abdominal pain and hematometra, had normal secondary sexual characteristics and grossly normal external genitalia with a dimpling at the site of the vaginal orifice without lower vaginal tract.

Keywords: Bilateral pudendal thigh flap, neovaginoplasty, Singapore flap, vaginal agenesis

Introduction

Vaginal agenesis is a rare congenital deformity with the incidence of 1 in 4000–5000 female live births.^{1–5} It typically results in a dimple or small pouch approximately 1–4 cm in length in place of the vagina with the absence of uterus or cervix but functional ovaries and normal-appearing external genitalia.¹ It can occur as isolated vaginal atresia or as a part of more complex anomalies such as Bardet-Biedl Syndrome, Kaufman-McKusick Syndrome, Fraser Syndrome, or Winters Syndrome. The most common causes, however, are Mayer-Rokitansky-Kauster-Hauser (MRKH) Syndrome (Mullerian Agenesis) and Androgen Insensitivity Syndrome (AIS).^{1,2,6} Vaginal defects may also occur secondary to procedures such as Abdominoperineal Resection or Pelvic Exenteration. Patients with MRKH syndrome and AIS have normal secondary sex characteristics and external genitalia but present with primary amenorrhea, typically in adolescence. The goal of treatment is not only to create an adequate passageway for penetration but also to facilitate satisfactory sexual intercourse.

Many operative and nonoperative methods of vaginal construction have been described to date. A nonoperative method used for a rudimentary vagina is serial dilatation.⁷ Other techniques used to construct the neovagina have included skin grafts using the peritoneum, bladder mucosa, amnion, synthetic material, or skin flaps as well as intestinal and sigmoid vaginoplasty with endoscopic or laparoscopic-assisted techniques.^{3,8,9} These modalities all require long-term dilatation and stenting to prevent canal closure. Amussat performed the first vaginal reconstruction in 1832.⁸ In 1872, various techniques were employed by several different surgeons following these initial efforts. Pudendal Thigh Flap (PTF), also referred to as a Singapore flap, was first reported in 1989 by Wee.¹⁰

The PTF method utilizes highly vascularized, reliable, and pliable flaps that conform well to the surface of the vaginal cylinder. The flaps

are supplied by posterior labial arteries and are innervated by perineal branches of the posterior cutaneous nerve of the thigh, creating a sensate fasciocutaneous flap.^{1,10,11} This case report presents a neovaginoplasty procedure with the PTF method to treat vaginal atresia.

Case Report

A 13-year-old female from the Western hills of Nepal came in with complaints of cyclic abdominal pain for one year with no menstrual bleeding. She had an average build and had secondary sexual development and other systemic examination findings were unremarkable. On examination, external genitalia grossly looked normal, but there was a dimpling at the vaginal opening with an absence of the lower vaginal tract. Ultrasonography of the abdomen and pelvis showed a normal uterus and adnexa but the cervix was not appreciable.

Before commencing the treatment, psychosexual counseling was done to address the concerns of the patient and parents. To drain the hematometra and to ensure space for inserting the skin flap, the obstetrics and gynecology team made a transverse incision at the tip of the vaginal dimple, then exfoliated the connective tissue between the bladder and the rectum to create space. Then the case was handed over to the plastic surgery team for vaginoplasty. A Foley catheter was inserted in the newly created crude pseudo-vaginal space to drain the hematometra, Figure 1A.

Bilateral PTF neovaginoplasty was formed under spinal anesthesia with the patient in a lithotomy position. The posterior labial arteries on both sides were confirmed by Doppler before surgery. Flaps were marked on both sides of the labia with the groin creases in the center, just lateral to the hair-bearing labia majora, Figure 1B.

Xylocaine 1% with adrenaline 1:100,000 was injected in the margins of the flap. Each flap was triangular or horn-shaped, roughly 15 cm

in length and 6 cm in breadth (measured at the base of the flap, which was in line with the posterior end of the introitus). The flap tapered off gradually with the tip reaching the groin near the femoral triangle. Incision began at the tip of the flap, deepened to the level of deep fascia on both sides of the flap except posteriorly where it was raised in the subfascial plane including the epimysium of the adductor muscles with the fascia. Polyglactin 3/0 (Vicryl®) sutures were used to anchor the deep fascia to the flap to prevent shearing and injury to the pedicle. Each flap was elevated until the posterior margin was reached. The labia majora were undermined to tunnel the flap under the labia for transfer in the newly formed cavity at the introitus. Both the flaps were raised and tunneled to the introitus. They were then sutured to each other at midline, starting at the posterior edge, to form a vaginal tube by keeping the skin side on the inside, Figure 2.

A tube was then inserted into the space previously created by the dissection between the rectum and urinary bladder. The furthest interior end was anchored by two absorbable sutures to the cervix and perivesical tissues. The lower end of this neovaginal tube was sutured to the mucocutaneous junction at the introitus. Hemostasis was secured at the flap donor sites which were then closed in two

layers. An inflated Foley catheter balloon was placed in the newly constructed tunnel for tamponade. The patient was advised to keep her hips adducted in the immediate postoperative period.

The immediate postoperative period was uneventful. On the third postoperative day, the inflated Foley catheter balloon was removed, the flap was examined, and the tunnel was irrigated with normal saline. Later, paraffin gauze with antibiotic ointment was used as a splint. On the fifth postoperative day, it was discovered that the patient had a hematoma on her left donor area which was evacuated and left to heal. The neovagina was gradually dilated using a lubricator after two months postoperatively. The flaps survived completely and peri-vaginal examination revealed the area to be sensate and the neovagina itself able to accommodate two fingers. The size of the neovagina was 12 cm deep and 4 cm wide. The first post-operative menstrual flow was uneventful; however, the patient developed a hematometra on her subsequent period for which dilation under anesthesia was done. Paraffin gauze with antibiotic medicated gauze was used regularly. The result was satisfactory up to one year following surgery with good patency of neovagina.

Table 1. Types of vaginal defect and methods of reconstruction

Defect Type	Description	Treatment Options
Type IA	Partial thickness defect affecting the anterior or lateral vaginal wall. Small to moderate volume and surface area defects.	<ul style="list-style-type: none"> • Singapore flaps
Type IB	Partial thickness defect affecting the posterior wall. Often affects the entire hemi-circumference of the posterior vagina. Can be due to posteriorly invading colorectal cancer	<ul style="list-style-type: none"> • Pedicled rectus myocutaneous flap • Pedicled rectus musculoperitoneal flap • Muscle-sparing rectus myocutaneous flap
Type IIA	Circumferential defect of upper $\frac{2}{3}$ of vaginal canal	<ul style="list-style-type: none"> • Vertical rectus abdominis myocutaneous flaps (VRAM flap)
Type IIB	Total circumferential defect of entire vaginal canal and frequently the introitus.	<ul style="list-style-type: none"> • Gracilis myocutaneous flaps • Singapore flaps • Pedicled jejunal flap • Sigmoid vaginoplasty

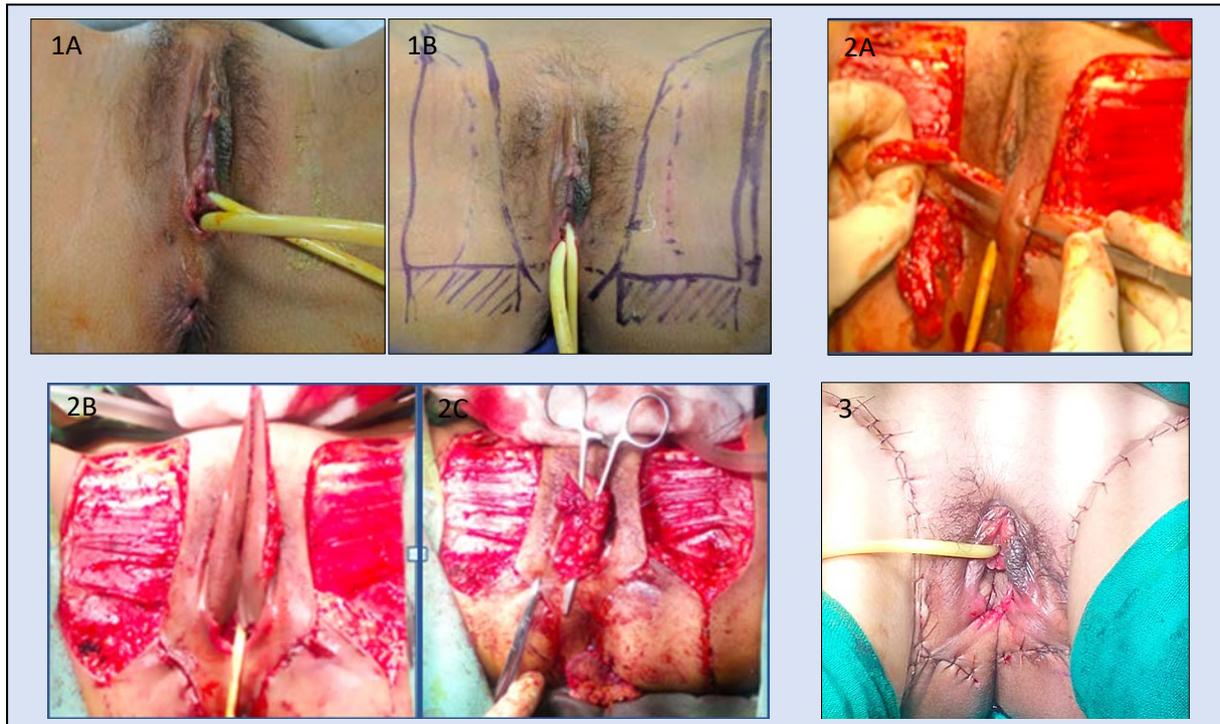


Figure 2. Neovaginoplasty with pudendal thigh flap A) Undermining of flaps; B, C) Formation of vaginal tube
Figure 3. Postoperative after neovaginoplasty with pudendal thigh flap

Discussion

Reconstruction of neovagina utilizing the Pudendal Thigh Flap (or Singapore Flap) had successful post-operative results in a 13-year-old female with congenital vaginal atresia. The vagina has been described as “essentially a distensible cylindrical pouch”. The normal length is 6–7.5 cm along the anterior wall and 9 cm along the posterior wall. The diameter is narrowest at the introitus, then expands in the middle segment, before constricting once more while approaching the cervix. It is normally tilted posteriorly forming a 90° angle with the uterus.¹² During follow-up at 1-y the size of the neovagina in our case was 12 x 3.5 cm.

Successful reconstruction of the vagina is contingent upon carefully recreating these anatomic normalities as well as addressing other goals of care such as promoting effective wound healing, decreasing pelvic dead space and fluid loss, improving metabolic demand and infection risk, restoration of the pelvic floor to prevent herniation and small-bowel

fistula, as well as meeting body image and sexual function requirements.^{1,10,11,13}

Patient selection for eligible surgical candidates involves a multidisciplinary approach, and the treatment team can include oncologic and reconstructive gynecologic surgeons, plastic surgeons, as well as psychiatrists, and sex therapists. In our case, we were in constant communication with our team members (which consisted of gynecologists, plastic surgeons, psychiatrists, and psychologists both virtually and physically). The selection of the procedure is based on the type of defect as well as the treatment goals for the patient. Defects in the vagina can be characterized into the following categories and recommended treatment modalities for each type, Table 1.

Complications of the Singapore flap method stem from poor tissue vascularity, dead space, or loss of pelvic support. Early complications are infection, delayed wound healing, and flap loss. Later complications of the flap include inadequate or excessive vaginal secretions, inadequate or excessive vaginal size, flap

prolapse, vaginal or donor site dysesthesia, urinary or bowel complaints, and poor wound healing. Singapore flaps are susceptible to apical necrosis, with complete flap loss in up to 15% of procedures.¹⁴ Complications for VRAM flap is the lowest, followed by Singapore, then Gracilis myocutaneous flaps.¹⁵

Conclusion

We report a case of congenital vaginal atresia in a 13-y female with successful surgical reconstruction utilizing the Pudendal Thigh Flap (or Singapore Flap) method with good post-operative results.

Conflict of Interest

None

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None

Author Contribution

Concept, design, planning: ALL; Literature review: KKN, PG, AL; Data collection: KKN, PG, AL; Data analysis: KKN, PG, AL, GD, SR; Draft manuscript: KKN, PG; Revision of draft: KKN, PG, AL, GD, SR; Final manuscript: ALL; Accountability of the work: ALL.

Reference

1. Chakrabarty S, Mukhopadhyay P, Mukherjee G. Sheares' method of vaginoplasty - our experience. *J Cutan Aesthetic Surg*. 2011 May;4(2):118–21. | DOI | PubMed | Google Scholar | Full Text |
2. Rawat J, Ahmed I, Pandey A, Khan TR, Singh S, Wakhlu A, et al. Vaginal agenesis: Experience with sigmoid colon neovaginoplasty. *J Indian Assoc Pediatr Surg*. 2010 Jan;15(1):19–22. | DOI | PubMed | Google Scholar | Full Text |
3. Mhatre P, Mhatre J, Sahu R. New laparoscopic peritoneal pull-through vaginoplasty technique. *J Hum Reprod Sci*. 2014 Jul;7(3):181–6. | DOI | PubMed | Google Scholar | Full Text |
4. Chen ZJ, Chen MY, Chen C, Wu N. Vaginal reconstruction with an axial subcutaneous pedicle flap from the inferior abdominal wall: a new method. *Plast Reconstr Surg*. 1989 Jun;83(6):1005–12. | DOI | PubMed | Google Scholar | Full Text |
5. McCraw JB, Massey FM, Shanklin KD, Horton CE. Vaginal reconstruction with gracilis myocutaneous flaps. *Plast Reconstr Surg*. 1976 Aug;58(2):176–83. | DOI | PubMed | Google Scholar | Full Text |
6. Selvaggi G, Monstrey S, Depypere H, Blondeel P, Van Landuyt K, Hamdi M, et al. Creation of a neovagina with use of a pudendal thigh fasciocutaneous flap and restoration of uterovaginal continuity. *Fertil Steril*. 2003 Sep 1;80(3):607–11. | DOI | Google Scholar | Full Text |
7. Frank RT. The formation of an artificial vagina without operation. *Am J Obstet Gynecol*. 1938 Jun 1;35(6):1053–5. | DOI | Google Scholar |
8. Karim RB, Hage JJ, Dekker JJ, Schoot CM. Evolution of the methods of neovaginoplasty for vaginal aplasia. *Eur J Obstet Gynecol Reprod Biol*. 1995 Jan;58(1):19–27. | DOI | PubMed | Google Scholar | Full Text |
9. Tobin GR, Day TG. Vaginal and pelvic reconstruction with distally based rectus abdominis myocutaneous flaps. *Plast Reconstr Surg*. 1988 Jan;81(1):62–73. DOI | PubMed | Google Scholar | Full Text |
10. Wee JT, Joseph VT. A new technique of vaginal reconstruction using neurovascular pudendal-thigh flaps: a preliminary report. *Plast Reconstr Surg*. 1989 Apr;83(4):701–9. | DOI | PubMed | Google Scholar | Full Text |
11. Joseph VT. Pudendal-thigh flap vaginoplasty in the reconstruction of genital anomalies. *J Pediatr Surg*. 1997 Jan 1;32(1):62–5. | DOI | PubMed | Google Scholar |
12. Cordeiro PG, Pusic AL, Disa JJ. A classification system and reconstructive algorithm for acquired vaginal defects. *Plast Reconstr Surg*. 2002 Sep 15;110(4):1058–65. | DOI | PubMed | Google Scholar |
13. Ohmaru Y, Sakata K, Hashiguchi S, Tanaka H, Rikimaru H, Kiyokawa K. A new modified Pudendal Thigh Flap of vaginoplasty including reconstruction of vaginal vestibule. *Case Rep Plast Surg Hand Surg*. 2017 Mar 10;4:21–6. | DOI | PubMed | Google Scholar | Full Text |
14. Gleeson NC, Baile W, Roberts WS, Hoffman MS, Fiorica JV, Finan MA, et al. Pudendal thigh fasciocutaneous flaps for vaginal reconstruction in gynecologic oncology. *Gynecol Oncol*. 1994 Sep;54(3):269–74. | DOI | PubMed | Google Scholar |
15. Salgado CJ, Chim H, Skowronski PP, Oeltjen J, Rodriguez M, Mardini S. Reconstruction of acquired defects of the vagina and perineum. *Semin Plast Surg*. 2011 May;25(2):155–62. | DOI | PubMed | Google Scholar | Full Text |