Vaginoplasty using the Singapore flap for congenital vaginal atresia: A case report

Kamundi Reuben Kangangi M.D.
Michael Ongas M.D.
Khisa Weston Wakasiaka M.D.
Ferdinand Nan'gole Wanjala M.D.
Stanley Ominde Khainga M.D.

Nairobi, Kenya

Case report

Plastic Surgery

OPEN ACCESS

Background
Congenital vaginal atresia is a rare condition in which the vagina does not fully form during fetal development. It can cause symptoms such as pain during menstruation, absent menses, and difficulty engaging in sexual activity. Possible treatments include vaginal dilatation, surgical reconstruction, and tissue flaps. Here we present a case of a 23-year-old female with congenital vaginal atresia who underwent successful vaginoplasty using the Singapore flap technique. Prior to the Singapore technique, the patient had had 5 surgeries that had attempted to recreate the vaginal canal, however, no flap reconstruction was done and hence the surgeries were not successful. Imaging revealed atresia of the cervix and upper two-thirds of the vagina, with a patent, shallow, blind-ending lower vagina. After diagnostic tests, the patient underwent vaginoplasty utilizing the Singapore flap approach, with successful results despite wound sepsis. This case report affirms that the Singapore flap procedure is a viable treatment option for patients with vaginal atresia, although further research is necessary to investigate the long-term effects of the procedure.

Keywords: Congenital vaginal atresia, Vaginal atresia, Vaginoplasty, Singapore flap technique, Surgical reconstruction

Congenital vaginal atresia is an uncommon disorder in which the vagina is either missing or poorly developed at birth. It is a congenital defect of the female reproductive tract that results from the failure of canalization of the paramesonephric ducts or urogenital sinus (1). The proximal two-thirds of the vaginal canal, the cervix, and the uterus develop from Müller's ducts embryologically, whereas the urogenital sinus is what differentiates into the distal third of the vagina. This disorder affects roughly 1 in 4,000-10,000 females and usually can be connected with a number of certain other genital and reproductive abnormalities (2). Anomalies of the vagina, including the hymen, may impede with menstruation, sexual intercourse, fertility, or parturition: these complications commonly develop after adolescence (3). Individuals with congenital vaginal atresia typically present with primary amenorrhea may suffer cyclic pelvic pain and pain during sexual intercourse (1). While reconstructive surgery can improve symptoms and life satisfaction for these patients, the ideal surgical technique depends on the particular anatomic aspects of the specific disorder (4).

This case report shows the complications of caring patients with congenital vaginal atresia and the significance of a multidisciplinary approach to care. We hope that the favorable outcome of this surgical strategy will provide significant information for other clinicians addressing similar instances.

Case report

A 23-year-old lady presented to our clinic with a history of congenital vaginal atresia. The patient had been born with an atretic uterus and one functional ovary and had never experienced menstruation. At the age of 16, the patient began to express concern about her lack of menses and was initially put on family-planning medication, which were not successful in inducing menstruation. The patient underwent multiple ultrasound imaging tests and three diagnostic laparoscopies before an MRI revealed atresia of the cervix and upper two-thirds of the vagina, with a patent, shallow, blind-ending lower vagina. The patient had a small uterus lying at the right iliac fossa and a functional right ovary with follicles but a not well-visualized left ovary. There were no associated urinary tract anomalies.

The patient had developed normal female secondary sexual characteristics, including pubic hair growth at 12 years and noticed breast growth at the same time. Her estrogen levels were normal, and she had never been on hormone replacement therapy. The patient had never had sexual intercourse and had become concerned about this when she turned 16 years

From the Department of Plastic Reconstructive and Aesthetic Surgery, University of Nairobi. Nairobi, Kenya. Received on April 9, 2022. Accepted on April 18, 2023. Published on April 22, 2023.

DOI 10.5281/zenodo.7854621

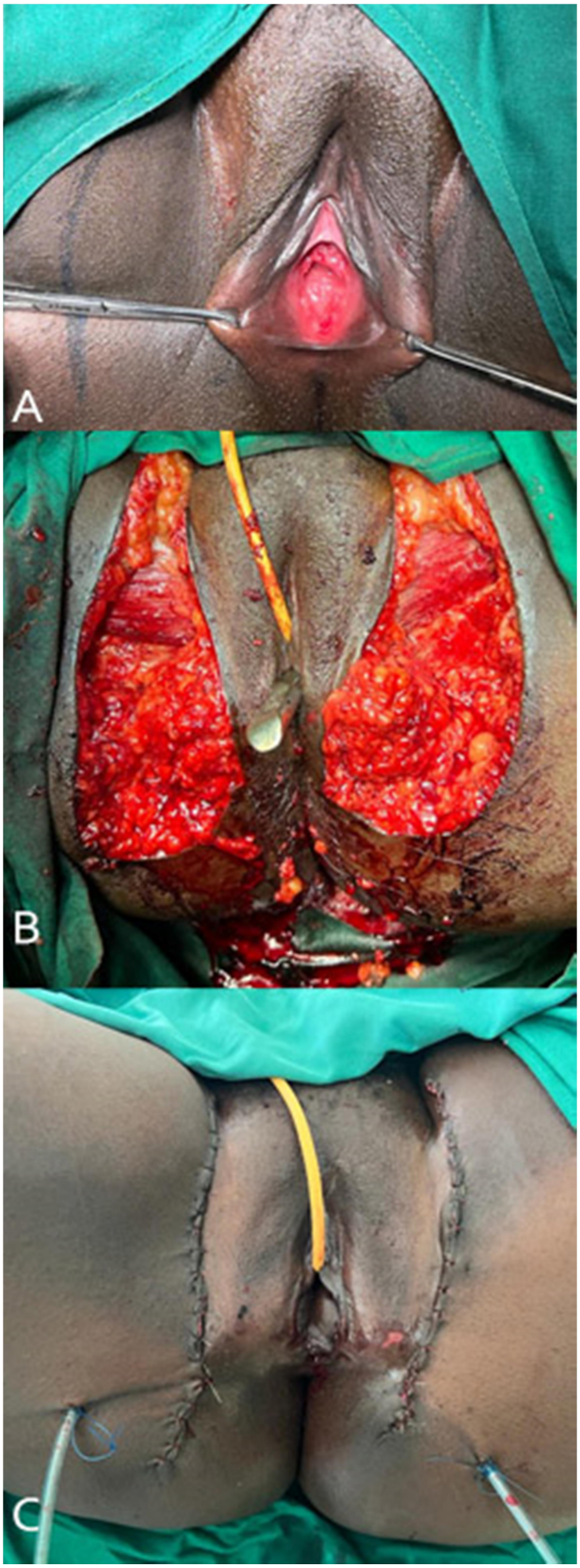

Figure 1. A. Pre-operative image showing shallow blind ending vagina characteristic of congenital vaginal atresia. B. Intra-operative image showing the donor flap sites in the inner thigh for the Singapore flap technique. C. Post-operative image after the Singapore flap vaginal reconstruction for congenital vaginal atresia

old. She turned 23 years old last year and expressed interest in having a potential sexual partner. The patient had a history of asthma and had been admitted to the hospital multiple times for this condition. There was no history of substance use, alcohol, or smoking. Examination revealed that the patient had normal external genitalia, a well-formed vestibule, and a urethra in its position and well-formed. The vagina was 2cm long and ended in a blind pouch. The patient was seronegative for HIV. There was no family history of congenital genitourinary tract abnormalities, although the patient's 28-year-old sister had a history of hormonal imbalance and had experienced a miscarriage.

After a multidisciplinary team consultation, an obstetrician-gynecologist and plastic surgeon worked together to perform a vaginoplasty using the Singapore flap technique. Prior to the Singapore technique, the patient had had 5 surgeries that had attempted to recreate the vaginal canal, however, no flap reconstruction was done and hence the surgeries were not successful. The Singapore flap technique involves creating a neovagina by raising a sensate flap of skin from the inner proximal thigh, based on branches of internal pudendal vessels and branches of the pudendal nerve. This technique has been shown to have a high success rate with low complication rates and is well-suited for patients with congenital vaginal atresia. The procedure was performed under spinal anesthesia and sedation, with the patient in the lithotomy position. The gynecologist created a pouch for the neovagina, and the plastic surgeon raised the flaps, identified the pedicles, tunneled the flaps toward the neovagina, tubularized the flaps, left the distal end open, inset the flaps into the pouch, and secured them with sutures. The donor sites were closed primarily and dressed with sterile dressings consisting of gauze impregnated with soft paraffin and 0.5% chlorhexidine (Bactigras) and adhesive dressings with breathable non-woven top layers and a low-adherent absorbent pad (Primapore). Vaginal dilation was done post-operatively.

The patient had a relatively good postoperative outcome with no complications such as wound dehiscence or fistula formation. However, the patient developed wound sepsis at the surgical site, which was controlled by cleaning and dressing. The patient experienced frequent episodes of spotting five months after the vaginoplasty but had a normal cervical discharge. The patient became sexually active approximately three months after the surgery.

Overall, the successful use of the Singapore flap technique in this patient emphasizes the importance of a multidisciplinary approach involving obstetricians, gynecologists, and plastic surgeons in the management of congenital vaginal atresia. Further studies are needed to evaluate the long-term outcomes

DOI 10.5281/zenodo.7854621

of this technique and to identify potential risk factors that could affect its success.

Overall, the patient's surgical outcome was successful, and she experienced an improvement in her quality of life. However, the development of wound sepsis and postoperative spotting highlights the importance of close monitoring and follow-up care for patients undergoing vaginoplasty.

Discussion

The patient in this case study underwent effective vaginal reconstruction utilizing the Singapore sensate flap technique for congenital vaginal atresia. Prior to or following puberty, about 7% of girls will be identified with a reproductive tract anatomical anomaly (5). One in 4,000 to 10,000 female children will be born with congenital vaginal atresia alone (2). It is a consequence of the inadequate fusion of the lower Müllerian ducts or the urogenital sinus during embryonic development, and it is linked to other genitourinary anomalies such as atresia of the cervix, uterus, and fallopian tubes (1). The cervix can be atretic or normal. Fibrous tissue usually takes the place of the vagina in these patients (6).

A girl in her pubertal years who seeks medical attention for primary amenorrhea and chronic cyclical pelvic pain, and whose normal hormonal character (based on physical examination) is obvious from an examination that reveals normally developed secondary sexual characteristics, presents the typical clinical picture of congenital vaginal atresia (7). After presenting with primary amenorrhea at the age of 16, the patient in this case was diagnosed with congenital vaginal atresia. Primary signs and symptoms of vaginal outlet obstruction, particularly when caused by vaginal atresia or agenesis, have been documented to include intermittent abdominopelvic pain, primary amenorrhea, and a pelvic mass (8). A normal morphotype, good breast development, normal distribution of axillary and pubic hair, and completely formed external genitalia are also usually discovered during the clinical examination (7).

Absence of the proximal two-thirds of the vagina, as well as an atretic uterus and one functional ovary, were discovered after the patient had a number of imaging tests, including ultrasound, laparoscopy, and MRI. The diagnosis is typically confirmed by pelvic ultrasonography (7). Related urinary malformations are typically checked using renal ultrasonography or intravenous urography. Since MRI is better than ultrasound and CT at determining height and extent of vaginal aplasia, it is recommended as the test of choice prior to surgical repair in order to choose the best surgical method (9,10). Imaging tests may reveal malformative uropathies like unilateral renal agenesis, ectopia, malrotation, or renal dystrophy as being related with vaginal atresia (7).

Surgery is frequently used to treat people with congenital vaginal atresia (4,6). The Singapore flap technique for vaginoplasty, which involves raising bilateral sensate flaps from the inner proximal thigh based on the internal pudendal arteries and tunneling them to create a neovagina, was used on the patient in this case (11). The goal of surgical intervention is to restore a normal utero-vaginal pathway to enable the evacuation of monthly blood and cervical secretions in addition to creating a neovagina that would allow for satisfying sexual interaction (7).

In the literature, it has been demonstrated that the Singapore flap procedure has high success rates and minimal rates of complications (11). Using this method, it is possible to create a neovagina that is the right length, depth, and caliber while reducing the chance of necrosis or stenosis. Given its dependability, safety, ease of dissection, and minimum requirement for additional stenting, the Singapore flap procedure is beneficial (12). The use of bilateral flaps can prevent asymmetry and enhance cosmetic results because the pedicle of the flap offers a sufficient blood supply to the neovagina (11,13). Regardless of the surgical approach, the goal will be to restore the utero-vaginal tract's integrity and enable these patients, whose psychological experience is particularly challenging, to have a fulfilling sexual life (4,6).

The patient experienced periods of spotting after the procedure, which is a frequent result of vaginoplasty. Topical estrogen therapy or silver nitrate cauterization can be used to treat spotting, which is thought to be caused by the development of granulation tissue at the surgical site (14). Hormonal abnormalities may also be at blame. It could be necessary to further assess and manage her hormonal condition in order to resolve this problem.

Ethical considerations and patient written informed consent were sought before this case report and any related photographs were published. All patient identifiers were removed from the case description and photographs during editing.

Conclusion

Congenital vaginal atresia is a rare yet crippling disorder that influences a woman's quality of life and reproductive health. Prior to the Singapore technique, the patient had had 5 prior operations that attempted at recreating the vaginal canal, however, no flap reconstruction was done. In this case report, a patient with congenital vaginal atresia was successfully treated with the Singapore sensate flap technique for vaginal reconstruction. A team of skilled surgeons can use the approach in a safe and effective way to provide patients with vaginal atresia a

DOI 10.5281/zenodo.7854621

functional neo-vagina. More research is required to evaluate long-term results and patient satisfaction with the procedure.

Conflicts of interests

All sources of financial support for this research, if any, have been disclosed, and there are no actual or potential conflicts of interest in connection with this study.

Acknowledgements

We would like to express our heartfelt gratitude to the patient who generously gave her consent to participate in this study and share her medical history. We acknowledge her bravery and cooperation during the data collection process. We hope that her experience will help others with similar conditions seek appropriate medical care and treatment. We would also like to extend our gratitude to Noel Odero of the Department of Human Anatomy, University of Nairobi, for providing invaluable consultation on the anatomical aspects of this case report. His expertise and insights were crucial to the accuracy and precision of the information presented in this report.

References

1. Saxena AK. Vaginal Atresia: Practice Essentials, Anatomy, Pathophysiology [Internet]. 2021 [cited 2023 Mar 10]. Available from: https://emedicine.medscape.com/article/954110-overview
2. ACOG Committee on Adolescent Health Care. ACOG Committee Opinion No. 355: Vaginal agenesis: diagnosis, management, and routine care. Obstet Gynecol. 2006 Dec;108(6):1605–9.
3. Laufer MR. Congenital anomalies of the hymen and vagina [Internet]. UpToDate. 2023. Available from: https://www.uptodate.com/contents/congenital-anomalies-of-the-hymen-and-vagina
4. Miller RJ, Breech LL. Surgical correction of vaginal anomalies. Clin Obstet Gynecol. 2008 Jun;51(2):223–36.
5. Dietrich JE, Millar DM, Quint EH. Obstructive reproductive tract anomalies. J Pediatr Adolesc Gynecol. 2014 Dec;27(6):396–402.
6. Michala L, Cutner A, Creighton SM. Surgical approaches to treating vaginal agenesis. BJOG Int J Obstet Gynaecol. 2007 Dec;114(12):1455–9.
7. Slaoui A, Benzina I, Talib S, Etber A, Zeraidi N, Lakhdar A, et al. Congenital vaginal atresia: about an uncommon case. Pan Afr Med J. 2020;37:69.
8. Mei L, Zhang H, Chen Y, Niu X. Clinical features of congenital complete vaginal atresia combined with cervical aplasia: A retrospective study of 19 patients and literature review. Congenit Anom. 2021 Jul;61(4):127–32.
9. Hugosson C, Jorulf H, Bakri Y. MRI in distal vaginal atresia. Pediatr Radiol. 1991;21(4):281–3.
10. Xu S, Zhang J, Wang S, Yang L, Qian J, Yue S, et al. MRI features and differential diagnoses of congenital vaginal atresia. Gynecol Endocrinol Off J Int Soc Gynecol Endocrinol. 2019 Sep;35(9):777–81.
11. Fein LA, Salgado CJ, Pearson JM. Singapore Flap (Pudendal Thigh Fasciocutaneous Flap) for Vaginal Reconstruction. In: Anh Tran T, Panthaki ZJ, Hoballah JJ, Thaller SR, editors. Operative Dictations in Plastic and Reconstructive Surgery [Internet]. Cham: Springer International Publishing; 2017 [cited 2023 Mar 10]. p. 617–9. Available from: https://doi.org/10.1007/978-3-319-40631-2_152
12. Pope RJ, Brown RH, Chipungu E, Hollier LH, Wilkinson JP. The use of Singapore flaps for vaginal reconstruction in women with vaginal stenosis with obstetric fistula: a surgical technique. BJOG Int J Obstet Gynaecol. 2018 May;125(6):751–6.
13. Okello A, Khainga S. Island Singapore Flap Vaginoplasty. Ann Afr Surg. 2019;16(1):40–1.
14. Steinberg BJ, Mapp T, Mama S, Echols KT. Surgical Treatment of Persistent Vaginal Granulation Tissue Using CO2 Laser Vaporization Under Colposcopic and Laparoscopic Guidance. JSLS. 2012;16(3):488–91.

Kamundi Reuben Kangangi
Department of Plastic Reconstructive and Aesthetic Surgery
University of Nairobi
Nairobi, Kenya

 DOI 10.5281/zenodo.7854621