

Successful correction of the transverse vaginal septum with a pinhole vaginal foramen using Y—V plasty: A case report

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ARTICLE INFO

Keywords:

Transverse vaginal septum
Y-V plasty
Y-plasty
Müllerian duct anomaly
Vaginal stenosis
Sexual dysfunction

ABSTRACT

The transverse vaginal septum, a rare Müllerian duct anomaly, presents diagnostic and therapeutic challenges owing to its variable location, thickness, and potential association with uterine malformations. Therefore, an accurate diagnosis and selection of an appropriate treatment are important. Herein, the case of a 28-year-old nonpregnant woman with sexual dysfunction attributable to a transverse vaginal septum is presented. The septum, approximately 5 mm thick, was situated low on the vaginal wall near the urethral opening, with a small central aperture. Employing Y—V plasty, full extension of the posterior and lateral vaginal walls was achieved while minimizing the manipulation of the anterior wall to avoid urethral injury. Postoperatively, the patient achieved sexual function without vaginal stenosis. Y—V plasty is a minimally invasive and effective approach for preventing postoperative stenosis in the treatment of a thin transverse vaginal septum located low on the vaginal wall.

1. Introduction

During embryonic development, the Müllerian duct forms the upper part of the vagina, cervix, body of the uterus, and fallopian tubes. Transverse vaginal septum (TVS) is a type of Müllerian anomaly that can occur as an isolated abnormality or in conjunction with uterine malformations [1,2]. The incidence of TVS is reported to be 1 in 70,000 [3] and it can be found at almost any level of the vagina, although most frequently in the upper and middle thirds [4].

The standard treatment for TVS involves surgical opening of the obstructed vagina, which is traditionally performed through a simple incision [5,6] or skin grafting [7,8]. However, due to narrowing of the vaginal wall, various techniques have been used to extend the skin graft, including utilization of the septum itself, such as Z-plasty [9] and Y-plasty [10,11].

Herein, a case is reported of TVS in the lower part of the vaginal wall, diagnosed following presentation for sexual dysfunction. To mitigate the risk of urethral injury associated with surgical manipulation of the anterior vaginal wall, Y—V plasty [12] on the posterior wall of the

vagina was opted for, which successfully preserved vaginal wall function.

2. Case Presentation

A 28-year-old nulligravid unmarried woman presented with regular menstrual cycles since menarche at the age of 14 years. Her medical history included neonatal labial adhesion release surgery, the details of which were unknown. The patient complained of an inability to engage in sexual intercourse and was evaluated by a gynecologist. Genital examination revealed normal external genitalia with a small vaginal orifice (5 mm diameter) located approximately 1 cm posterior to the urethral meatus (Fig. 1a), which allowed the insertion of a cotton swab approximately 7 cm into the vagina. Pelvic magnetic resonance imaging (MRI) revealed a normal-sized uterus and adnexa with a sufficiently wide vaginal canal on the dorsal side of the urethra (Fig. 1b). However, a low-intensity structure, consistent with the T2-weighted MR image, was observed in the middle and lower regions of the vaginal canal (Fig. 1c). Computed tomography of the kidneys, ureters, bladder, and adrenal

Abbreviations: MRI, magnetic resonance imaging; TVS, transverse vaginal septum.

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<https://doi.org/10.1016/j.crwh.2024.e00598>

Received 14 March 2024; Received in revised form 23 March 2024; Accepted 25 March 2024

Available online 27 March 2024

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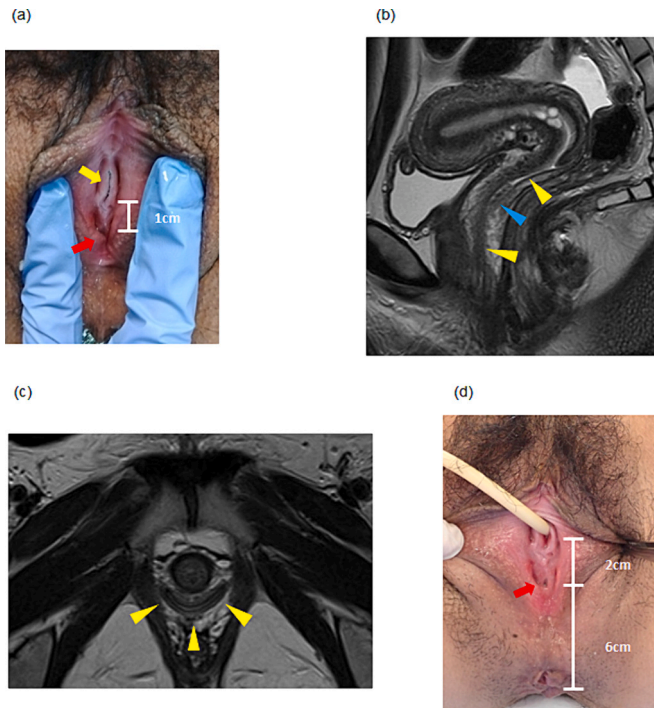


Fig. 1. Preoperative examination images.

(a) Vulvar visual examination: The urethral opening (yellow arrow) is slightly wider vertically, with the vaginal introitus (red arrow) approximately 1 cm below it.

(b) MRI sagittal section: Normal uterus and continuous vaginal canal of sufficient length (triangles). In the blue triangles, the T2 high signal area of the vaginal discharge was partially disrupted, suggesting that there may be some structure in the vaginal canal apart from the entrance.

(c) MRI axial section: A U-shaped vaginal canal formed on the dorsal side of the urethra (triangles).

(d) Visual examination of the vulva under general anesthesia: Membrane formation was observed at the vaginal inlet, and a small vaginal foramen (red arrow) of approximately 5 mm was observed near the center of the membrane. The distance from the vaginal foramen to the urethral opening was 2 cm, and to the anus was 6 cm.

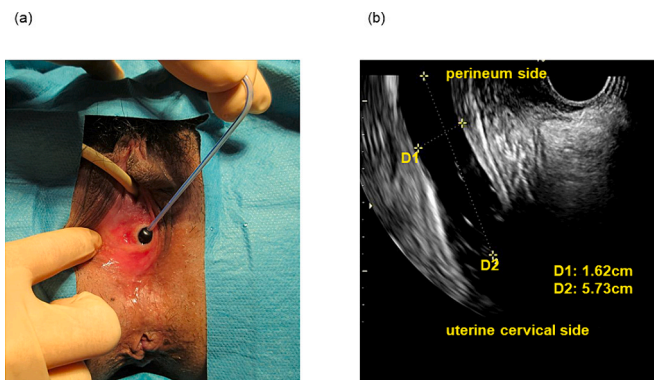


Fig. 2. Intraoperative examination.

(a) A 6F silicone Foley catheter was inserted into the vaginal canal and the thickness of the vaginal septum was measured by inflating the balloon and applying traction; it was about 5 mm thick.

(b) Saline was injected into the vaginal cavity and transrectal ultrasound was used to confirm the widening of the vaginal cavity and the absence of any other septum or septal wall in the vaginal cavity.

glands revealed no abnormalities, and cystoscopy revealed no abnormalities in the urethra or bladder.

Based on these findings, a transvaginal septum (TVS) was suspected, and the patient was assessed under general anesthesia. Membrane formation was observed at the level of the hymen, with a 5 mm vaginal foramen in the center. The distance from the urethral meatus to the vaginal foramen was 2 cm, and that from the vaginal foramen to the anus was approximately 6 cm (Fig. 1d). Using a 6F silicone Foley catheter, a balloon was inflated within the vaginal cavity to provide traction, revealing a 5 mm-thick membrane-like structure (Fig. 2a). Based on these findings, a diagnosis of TVS of the vaginal orifice was made. Saline injection into the vaginal cavity and transrectal ultrasound confirmed the expansion of the vaginal cavity to a space of approximately 1.6 cm × 5.7 cm (Fig. 2b).

Vaginoplasty was performed under local infiltration of 0.5% lidocaine with epinephrine. Full-thickness incisions were made at the 2 o'clock and 10 o'clock positions to avoid urethral injury. The edges were sutured with an absorbable suture. On the posterior wall, skin incisions were made at the 4 o'clock and 8 o'clock positions on the front surface of the septum to create a V-shaped mucosal flap. Additionally, a median incision was made on the back surface of the septum (Y-shaped incision). A V-shaped mucosal flap was then advanced to the center and sutured with an absorbable suture (Y-V plasty), resulting in a vaginal width of approximately 2 finger widths (Figs. 3, 4).

The patient recovered uneventfully and was discharged two days postoperatively. At one-month follow-up, the surgical site had healed well, allowing easy insertion of one finger (Fig. 5a). At 2.5-month follow-up (Fig. 5b), the vaginal entrance comfortably accommodated two fingers and the patient reported successful sexual intercourse.

3. Discussion

Variability in the position, thickness, and orientation of a transverse vaginal septum (TVS) poses diagnostic and therapeutic challenges. The septa can vary from complete occlusion to foramina of 1–5 mm diameter. Accurate assessment of the characteristics of the septum, including its location (low, intermediate, or high), thickness (thin or thick), and presence of foramina, is crucial for selecting the appropriate treatment. While MRI is useful, the use of a balloon catheter filled with saline during ultrasound examination has been reported to effectively evaluate the thickness of the TVS and the internal vaginal structure when an foramen is present [13,14]. In this case, a 6F silicone Foley catheter was inserted through the foramen, and saline was infused via transrectal ultrasound to confirm that no other structural abnormalities were present and that the septum was relatively thin (approximately 5 mm thick).

The management of TVS typically requires vaginal surgery; however, an abdominal approach may be necessary in cases of uterine anomalies, complete occlusion, or thick septa [15]. Given the low position and 5 mm thickness of the TVS in this case as well as the presence of a foramen, a vaginal approach was chosen. Simple excision increases the risk of vaginal stenosis; thus, flap techniques are increasingly used. Z-plasty is straightforward and offers the advantages of easy incision planning and stable blood flow to the flaps without raw surfaces; however, it may lead to uneven tension and twisting of the suture line. The Y-V plasty and Y-flap methods employed in this case maintained the advantages of Z-plasty while allowing easier adjustment of incision lines and ensuring even tension and stable blood flow.

Recently, the Y-flap method has emerged as an effective approach for managing TVS, with a few reports of postoperative vaginal stenosis or shortening. This technique leverages the dual-layer structure of the septum, incorporating both the front and back layers in the reconstruction, to create a more natural vaginal foramen. Postoperative care involved the application of chlorhexidine gluconate cream and a sponge-type hemostatic agent inside the vagina to prevent adhesion and promote healing. Additionally, the use of vaginal dilators and moisturizers

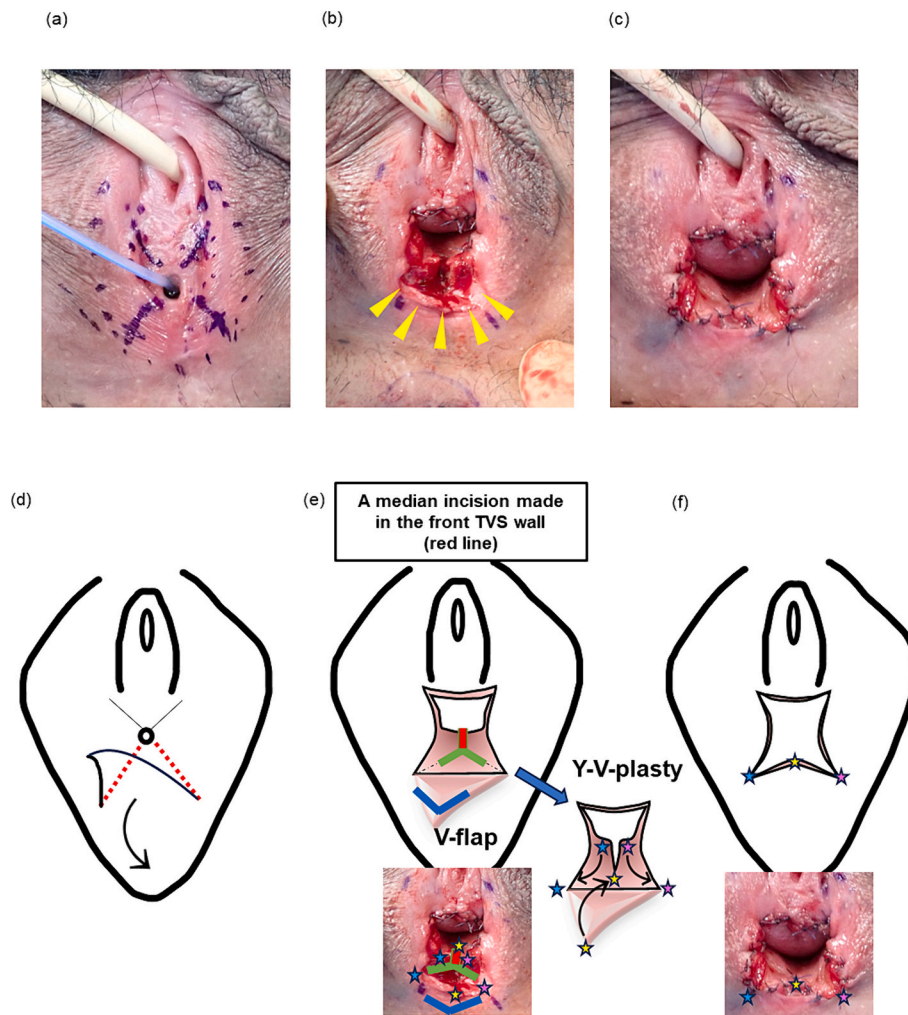


Fig. 3. Intraoperative images of the Y–V plasty and schematic diagram.

(a) Incisions were marked at 2, 4, 8, and 10 o'clock centered on the vaginal foramen.

(b) Full-thickness incisions at 2 and 10 o'clock were made with a single ligature suture above the TVS with an absorbable suture. Skin incisions on the front surface of the septum were made at 4 and 8 o'clock to create a V-shaped mucosal flap (yellow triangle). An incision on the back surface of the septum was made in the direction of the median longitudinal depth (Y-shaped incision).

(c) The V-shaped mucosal flap was ligated and sutured with an absorbable suture advancing the V-shaped mucosal flap to the tip of the Y (V–Y advancement).

(d) Below the vaginal foramen, a V-flap was made on the front surface of the vaginal septum.

(e) An incision was made in the direction of the median longitudinal depth on the back surface of the septum (red line). Each apex (marked with a star) was shifted and aligned with the flap so that stars of the same color were attached to each other.

(f) The vaginal foramen was freed to allow insertion of two fingers.

helps to maintain patency. Notably, Arkoulis et al. examined eight cases treated with the Y-flap method and demonstrated no complications related to vaginal stenosis or the need for reoperation within a six-month follow-up. This study included cases of successful vaginal delivery, highlighting the efficacy and safety of the Y-flap method, particularly in women with TVS and those with septa measuring 1–3 cm in thickness [10].

In this case, the decision to opt for Y–V plasty was influenced by several factors. First, due to its proximity to the urethral opening, Y–V plasty was deemed more suitable than the Y flap technique for the TVS. Additionally, the TVS, which was only 5 mm thick, posed challenges in creating a three-dimensional image with depth, which is typically achieved with the Y-flap method. Thus, to minimize the manipulation of the anterior vaginal wall and achieve sufficient extension of the posterior wall of the vagina, the Y–V plasty technique was deemed more appropriate. The Y–V plasty technique is effective in preventing postoperative vaginal stenosis, especially in cases involving a thin TVS, as observed in this case. This approach offers advantages in managing cases

with a thin TVS by reducing postoperative complications while ensuring satisfactory outcomes.

An appropriate surgical approach effectively diagnosed and treated a rare congenital anomaly, a transverse vaginal septum (TVS), enabling sexual intercourse without complications and enhancing the patient's quality of life. Although no previous reports have specifically mentioned the use of Y–V plasty for TVS, the case reported here suggests that this technique holds promise for similar cases involving low and thin septa and offers improved functionality with minimal invasiveness. Individualized surgical approaches tailored to the characteristics of the septum and patient-specific factors are crucial in TVS management, with the selection of either Y–V plasty or Y-flap based on the patient's condition to prevent postoperative complications and achieve normal physiological function. Further research and case series are warranted to refine treatment strategies and enhance outcomes in women affected by this rare yet impactful condition.

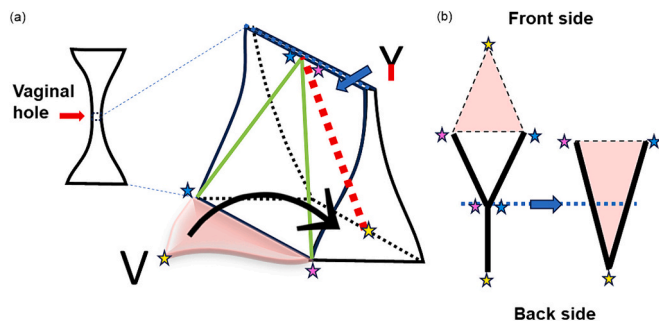


Fig. 4. Schematic diagram of Y–V plasty in three- and two- dimensions. (a) Schematic view of TVS from the side. The back side of the TVS left after the V-flap was created, which, when viewed from above in three dimensions, formed a Y shape. Y–V plasty was completed by fusing V and Y. (b) Schematic two-dimensional view from above. Each apex (marked with a star) was shifted and aligned with the flap so that stars of the same color were attached to each other. Y–V plasty was completed by fusing Y and V.

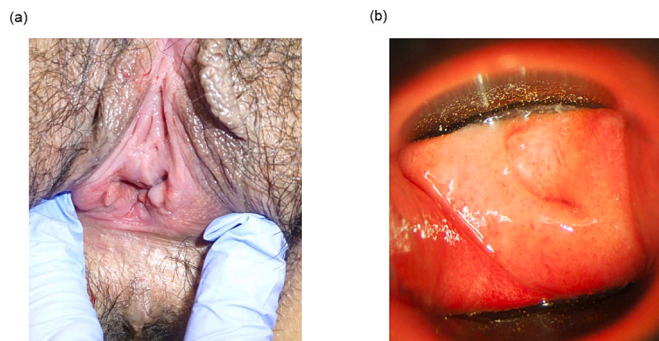


Fig. 5. Postoperative course. (a) One and a half months postoperatively, the wound had healed well. (b) Observation of the cervix with a vaginal speculum revealed no specific abnormalities.

Contributors

Misako Yamamoto contributed to patient care, conception of the case report, acquiring and interpreting the data, undertaking the literature review and drafting the manuscript.

Shunsuke Kawahara contributed to conception of the case report, acquiring and interpreting the data, undertaking the literature review, drafting the manuscript and revising it critically for important intellectual content.

Ryusuke Murakami contributed to patient care, conception of the case report and drafting the manuscript.

Ayano Honda contributed to patient care, drafting the manuscript, and revising the manuscript for important intellectual content.

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Mana Taki contributed to drafting the manuscript and revising the manuscript for important intellectual content.

Koji Yamanoi contributed to drafting the manuscript and revising the manuscript for important intellectual content.

Ken Yamaguchi contributed to drafting the manuscript and revising the manuscript for important intellectual content.

Junzo Hamanishi contributed to drafting the manuscript and revising the manuscript for important intellectual content.

Masaki Mandai contributed to drafting the manuscript and revising

the manuscript for important intellectual content.

All authors approved the final submitted manuscript.

Funding

This work did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and the use of accompanying images.

Provenance and peer review

This article was not commissioned and was peer reviewed.

Acknowledgments

The authors thank the patient, who agreed to allow us to publish the clinical data. We would like to thank Editage (www.editage.jp) for English language editing.

Conflict of interest statement

The authors declare that they have no conflict of interest regarding the publication of this case report.

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