Case Report

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Nazik Neovagina Technique: A Case Series

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ABSTRACT

Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome is the congenital absence of the vagina and uterus. The aim of this case series is to evaluate the anatomical and functional outcomes of a new vaginoplasty technique called the Nazik Neovagina Technique. Nine women with MRKH syndrome between the years of 2018-2024 were included in the study. The women underwent laparoscopic surgery using the Nazik Neovaginal Technique. The mean vaginal length was 9.78±1.39 cm at the first month after surgery and 8.56±1.13 cm at the sixth month. None of the patients developed complications. Vaginal epithelialization was complete in all patients. Six of the nine patients were sexually active at six months after surgery. The other three patients were not active because they did not yet have a partner. Two women who were sexually active developed vaginal infections. The Nazik Neovagina Technique is considered an easy-to-learn and easy-to-use surgical treatment option with less vaginal stricture.

Keywords: Mayer-Rokitansky-Küster Hauser syndrome, laparoscopic vaginoplasty, neovagina

INTRODUCTION

Vaginal agenesis, also known as Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome, is indeed a complex condition that requires a multidisciplinary approach to diagnosis and treatment. It affects the development of the vagina and uterus, creating unique challenges for individuals, particularly in terms of sexual health and reproductive options.[1] The incidence of this condition is quite low, varying from 1/4000 to 10000.[2] These patients have secondary sexual characteristics like other females during puberty.

Patients usually present with primary amenorrhea and may not be aware of their condition until adolescence when they realize that they are not menstruating.[3] Diagnostic imaging is essential to evaluate potential urinary anomalies, particularly because Müllerian agenesis can be associated with other congenital malformations.[4]

There are several treatment options available, vaginal dilators are usually the first choice for non-surgical treatment. They help in gradually stretching the vaginal canal, promoting a functional vaginal length, which is vital for sexual activity. Each surgical method has its pros and cons, and the choice of technique often depends on the individual's specific circumstances, including their anatomy and any associated abnormalities. However, there is no consensus among gynecologists, pediatric surgeons, pediatric urologists, and plastic surgeons on the ideal method for creating a functional vagina.[5] Functional sexual success has been defined as vaginal acceptance of the largest dilator without discomfort or a vaginal length of 6 or 7 cm.[6,7]

The Nazik Neovagina Technique is an innovative approach that builds on previous models to provide better structural support and reduce the risk of vaginal stenosis by mimicking the cervix and ligaments. In the commonly used McIndoe technique, uses a skin graft to create the vaginal canal but involves significant morbidity due to extensive skin removal.[8] The Intestinal Graft Method can be performed laparoscopically, but concerns include the potential for foul-smelling discharge and complications associated with bowel surgery.[9] The Vechietti procedure allows vaginal stretching using a neovaginal set but requires continuous tension and can be cumbersome.[10] The original neovaginal technique described by Davydoy used parietal peritoneum for the vaginal wall. However, it has the disadvantage of placing a circular suture over the bladder, sigmoid colon, and ureter to create the vaginal dome. An important addition to this technique in the Uncu modification is the use of Müllerian remnants and parietal peritoneum to create the vaginal dome.[11]

The Nazik neovaginal technique described in this article was developed based on the Dayvdoy neovaginal technique and the Uncu modification. In this technique, the vaginal dome was redesigned using Müllerian remnants to mimic the cervix and ligaments to prevent vaginal stricture, which is the main problem of neovaginal surgical techniques. The Mold has been

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modified to be more flexible and softer to increase functional sexual success.

METHODS

In this case series, laparoscopic-assisted neovaginal surgery, which we defined as Nazik Neovagina Technique, was performed in 9 patients between 2018-2024 years. It was planned to determine the duration of surgery, hospital stay, complications to evaluate the surgical technique, and anatomical and functional vaginal length, vaginal width, vaginal epithelialization, and postoperative sexual activity status to evaluate the functional outcomes throughout the study. The inclusion criteria of the patients were to have Müllerian agenesis, vaginal and uterine agenesis, no previous neovagina surgery, both ovaries and Müllerian remnants detected. Patients with rudimentary uterus, transwomen patients, and those who received previous dilatation treatment were excluded from the study.

Preoperative Preparation

Patients were preoperatively evaluated with a complete clinical examination, sonography, and magnetic resonance imaging for genitourinary and pelvic renal abnormalities. Detailed informed consent forms were obtained from the patients.

Surgical Technique

The stages have been numbered for a better understanding of the surgical technique.

The first stage was to prepare the patient on the operating table. All patients were operated in the dorsolithotomy position and under general anesthesia. Both vaginal and laparoscopic approaches were used in combination. After positioning the patient, the laparoscopic approach was performed first. The aim was to facilitate the opening of the vaginal tunnel from below under laparoscopic observation (Figure 1). For this purpose, a 10-mm trocar was inserted through the umbilicus and two 5-mm trocars were inserted into the abdomen from the left side. In patients with MRKH syndrome, the ovaries can be observed in both fossa ovarica or outside the pelvis. Remnants of Müllerian ducts were observed in and around both ovaries in all patients. Pelvic kidneys were seen in two patients. In cases where the pelvic kidney is located at the base, it becomes very difficult to create a vaginal dome. In one of these patients, the kidney had to be suspended from the abdominal wall during surgery (Figure 2).

Second stage, after laparoscopic observation, vaginal approach was performed. Before opening the rectovesical space, a ureteral catheter was placed in all patients to reduce urinary injury. Then, the dome of the vaginal mucosa was opened transversely with a sharp dissection using scissors, monopolar cautery or bipolar instrument with a diameter of 3 cm. After cutting the mucosa, blunt dissection was performed with a finger or dilator to reach the rectovesical space. Once this space is reached, it is found to be easily dissected with blunt dissection.

At this point, sharp dissection should be avoided as much as possible to reduce the possibility of rectal or urinary injury. Therefore, when a depth of approximately 6-7 cm was reached, a 70 Shore a silicone mold was placed. The mold was held in a pressurized position by the assistant and the laparoscopic procedure was repeated (Figure 3).

In the third stage, the silicone mold was pressed with the help of an assistant to expose the surgical area from the inside. To avoid injury to the bladder and rectum, a vertical incision was made using a harmonic scalpel under the guidance of this mold. As shown in Figure 4-1, the Müllerian remnants on the sides of both ovaries were connected transversely with a thin fibrous tissue in the middle. The bladder margin begins

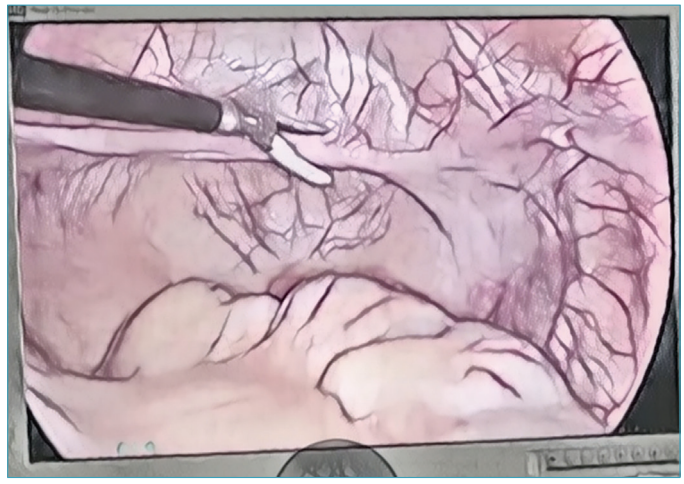

Figure 1. Laparoscopic observation of the pelvis

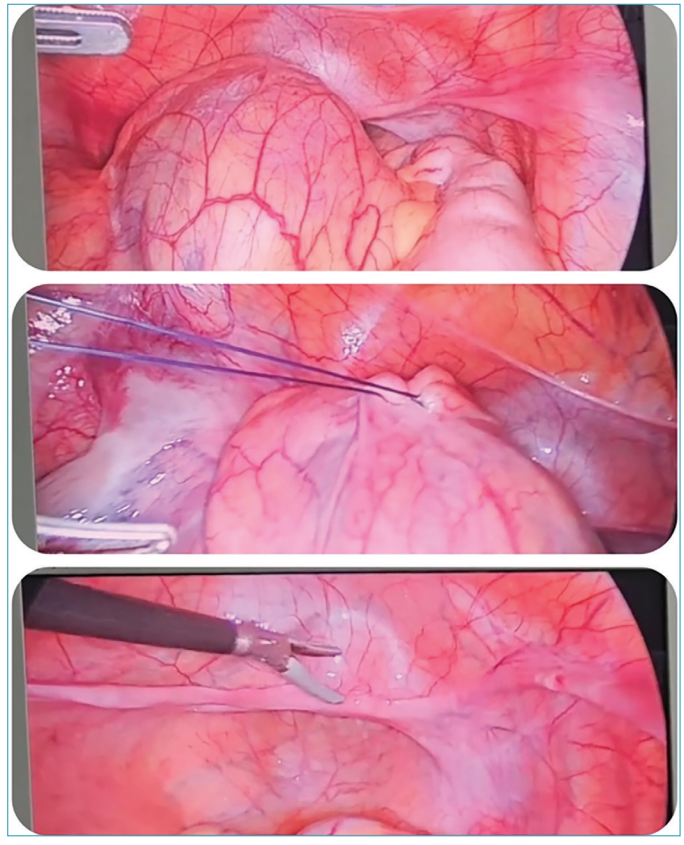

Figure 2. Pelvic kidney suspension

just above this fibrous tissue. This Müllerian fibrous tissue is of great help in determining the bladder boundary. If this fibrous tissue is exceeded by more than 1 cm, the likelihood of bladder injury may increase. The tunnel was completed with controlled surgery under the guidance of the mold. At this point, a tunnel was created in the rectovesical space. To prevent future stenosis of this tunnel, fibrous tissue consisting of Müllerian remnants was excised approximately 1 cm around the mold (Figure 4).

The fourth stage, the goal of this stage is to pull the peritoneum into the tunnel and fix it to the vaginal entrance. This requires dissection and release of the peritoneum. After completion of the tunnel, three sutures are placed from the intra-abdominal end of the tunnel at 2, 6, and 10 o'clock with a 40 mm needle and 0 Vicryl. A peritoneal suture is not placed at the 12 o'clock position because this is the exit point of the urethra. If this is done, the urethra and urinary axis will be altered. These sutures were removed vaginally with a clamp in a U shape without knotting the ends and without cutting the needle. If the peritoneum is knotted, it will cause difficulty in entering the vagina when using a mold after surgery. These sutures should not be sutured immediately to the vaginal entrance. At this stage, they should only be fixed to surgical drapes at the vaginal entrance, again symmetrically to the points inside. After the peritoneum around the tunnel is released intra-abdominally, the sutures should be fixed to the vaginal entrance. In this way, the peritoneum can be easily pulled to the vaginal entrance (Figure 5).

Fifth stage, peritoneal dissection is not performed immediately at this point. First, the Müllerian remnants on the lateral wall were brought closer to the midline to form the vaginal dome. For this purpose, they were detached from the lateral walls with blunt and sharp dissection and joined in the midline with a number 1 permanent suture. In this way, the Müllerian ducts were positioned in the midline similar to the cervix. To avoid peritoneal contact, the Müllerian remnants should be centralized by suturing them from the lateral points in the midline as much as possible. This will create a soft tissue support in the dome approximately the size of the cervix. The dome should not end in a funnel shape. This will increase the possibility of stricture due to peritoneal contact. To prevent this stricture, a vagina should be constructed with a cylindrical structure and a dome similar to the cervix (Figure 6).

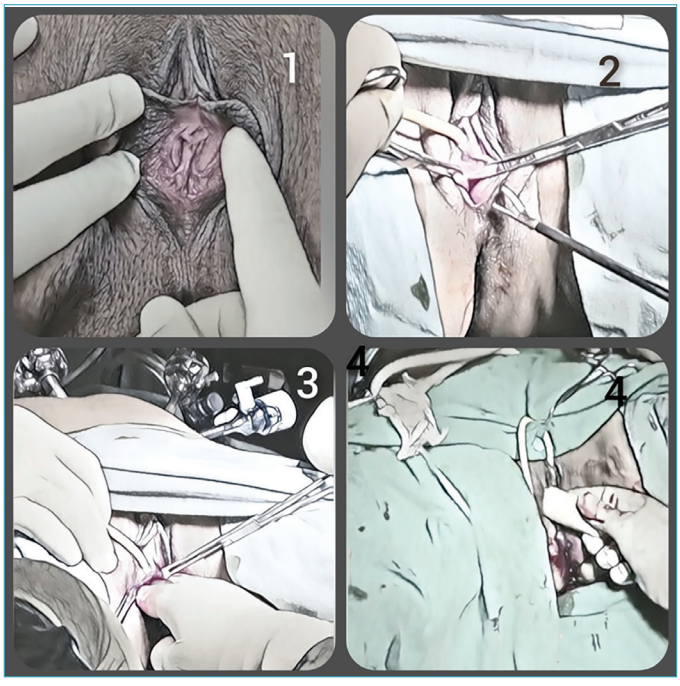

Figure 3. Vaginal tunnel opening

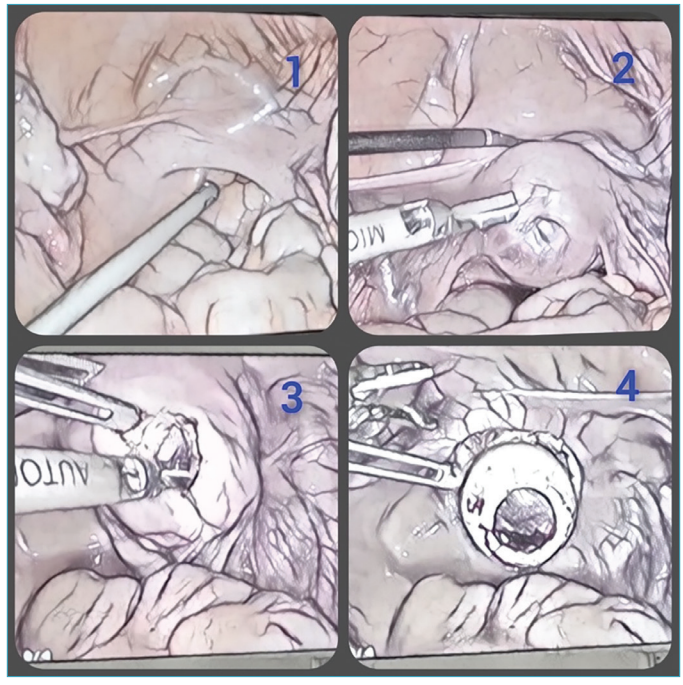

Figure 4. Completing the vaginal tunnel with mold

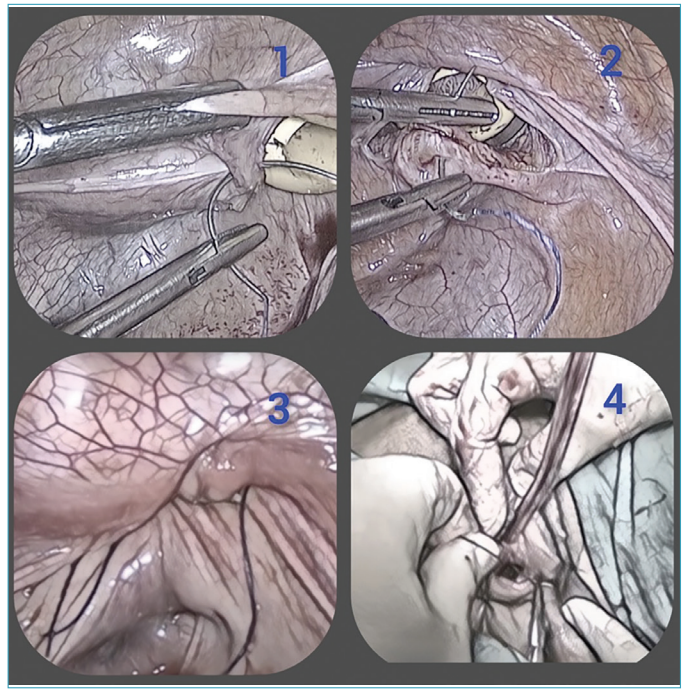

Figure 5. Retraction of the peritoneum into the vaginal tunnel

In the sixth stage, the peritoneal surface required to cover the anterior and posterior vaginal walls is identified. The peritoneum to be used for the anterior and posterior vaginal walls will be less because the Müllerian remnants meet in the midline. Peritoneal dissection was not performed circularly over the rectum. Dissection was performed parallel to the ureters from the medial aspect of both ureters to form the posterior wall of the dome. Inverted V peritoneal dissection should be performed up to the tunnel. Then, both peritoneal leaves were joined in the midline with the visceral part facing the inside of the tunnel. The created peritoneal posterior wall was sutured to the posterior part of the dome (Figure 7).

In the seventh stage, the anterior vaginal wall peritoneum was dissected over the bladder. Excessive dissection should be avoided at this point. The peritoneum was dissected to a size that would cover the anterior wall of the dome and released. After dissection, the peritoneal anterior vaginal wall was sutured to the dome. The anterior vaginal wall was then sutured to the created dome with 2/0 Vicryl. At this point the tunnel was completed (Figure 8).

When connecting the Müllerian remnant to the midline, the round ligament remnant should be dissected as little as possible. In this way, both the infundibulopelvic ligament and the round ligament provide support for the midline dome, similar to the uterus. At the end of the operation, after the anterior and posterior peritoneum of the dome have been released, the sutures taken out vaginally should be fixed at the

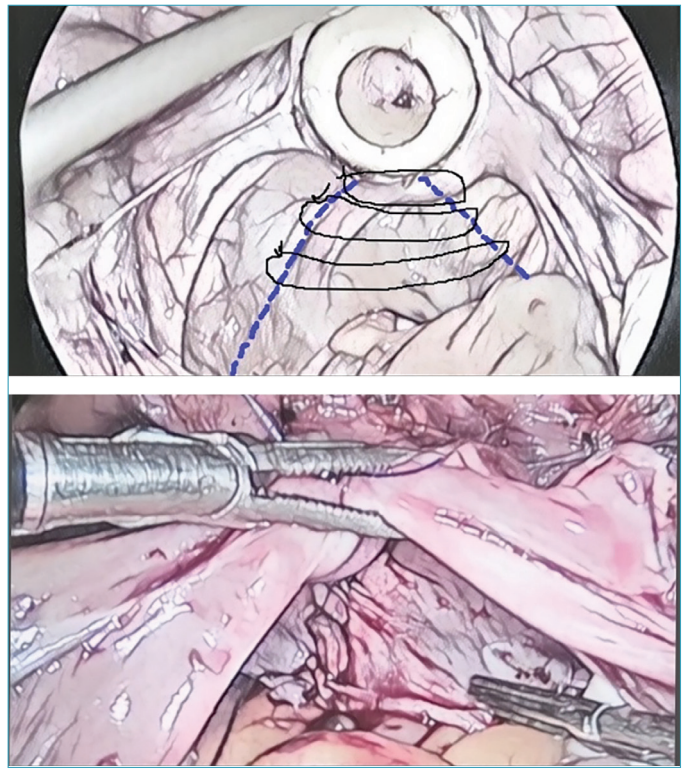

Figure 7. Creation of the posterior vaginal wall

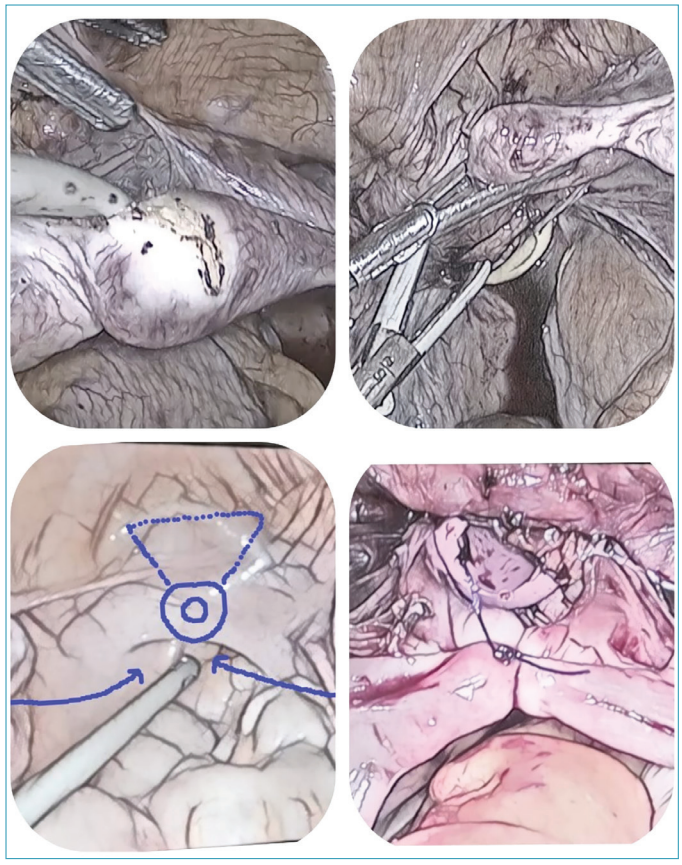

Figure 6. Creation of a cervix-like vaginal vault with the help of Müllerian rests

Figure 8. Formation of the anterior vaginal wall

2, 6, and 10 o'clock positions by pulling the peritoneum well toward the vaginal opening (Figure 9).

Vaginal Mold

The mold placed vaginally during surgery is 3 cm in diameter and 10-12 cm long. In most cases, a length of 12 cm is sufficient. A 10 cm long mold was used in one patient because of a pelvic kidney and in another patient because the patient was very short. A 70 Shore silicone mold was used during surgery, while a softer and more flexible 30 Shore mold was used on the third postoperative day. Harder molds should not be preferred because they make it difficult for the patient to sit and move. There is a 1.5 cm diameter hole in the center. This hole allows blood and fluids to drain from the inside and speeds up the healing process. In addition, this hole is wide enough to allow the patient's index finger to easily insert and remove the mold from the vagina. Stainless steel hooks are located on the back of the mold at 3 and 9 o'clock. These hooks help to secure the mold to the vaginal entrance with no. 1 Vicryl after surgery. The fixed mold was kept for 48 hours in the postoperative period. During this time, a urinary catheter was placed to allow the patient to urinate comfortably (Figure 10).

Postoperative Follow-up

Fourty-eight hours after surgery, patients were transferred to the gynecology table. First, the urinary catheter was removed. Then the fixation sutures at the 3 and 9 o'clock positions were removed and the mold was slowly removed. A cream containing 10% lidocaine was applied to the vagina so that the patient would not feel any pain. After waiting approximately two minutes, a soft hookless mold was placed. The patient was then instructed on how to insert and remove the mold at the correct angle. Depending on the patient's compliance and learning process, the patient was followed in the hospital for another day.

During this time, the patient was advised to remove the mold only when going to the bathroom and then reapply the mold in bed. The patient was advised to wear two tight underwear on top of each other. It was advised to place a thick pad between the mold and the underwear. Adequate pressure is important to prevent vaginal shortening. The patient was discharged with the advice to remove the mold only when going to the toilet for 40 days after surgery (Figure 11). Patients were advised to visit for follow-up on day 7, month 1, and month 6. After day 40, patients were allowed to have sexual intercourse.

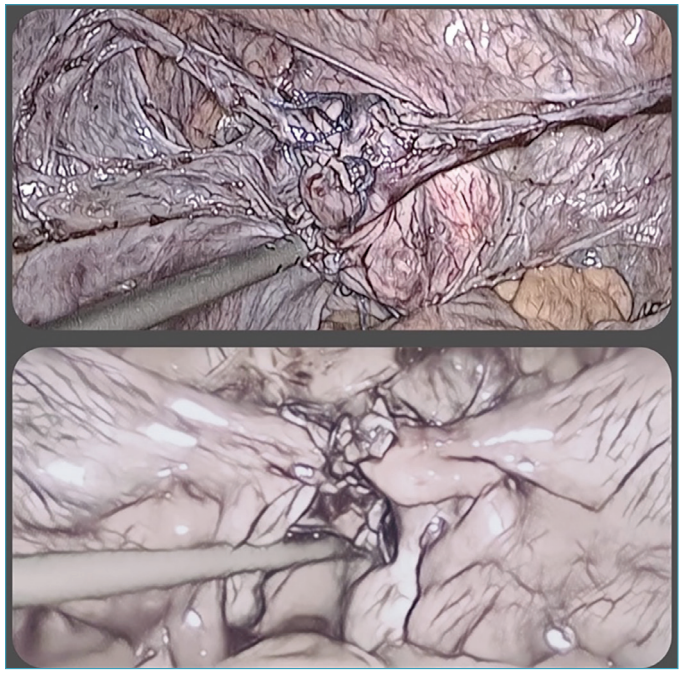

Figure 9. Final dome appearance supported by round and infundibulopelvic ligament

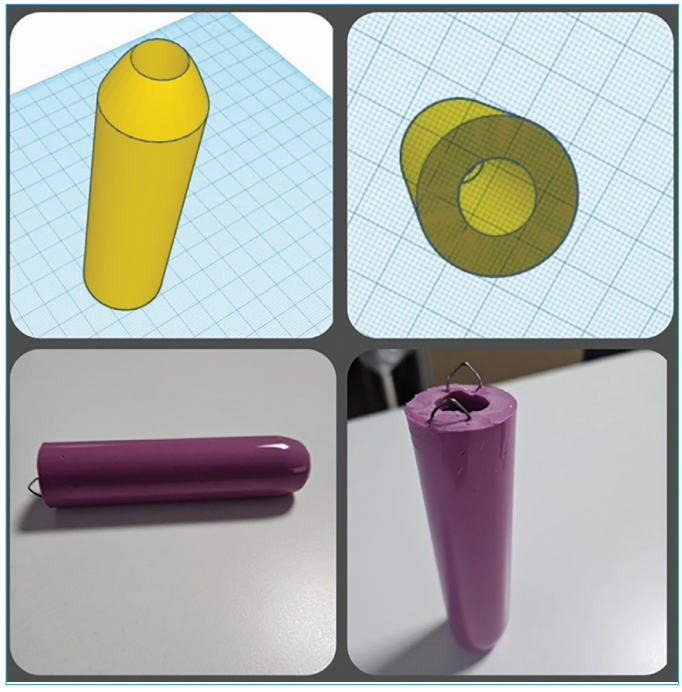

Figure 10. Silicone mold with a hole in the center

Figure 11. Soft silicone mold

Statistical Analysis

The SPSS 20 package program (SPSS Inc, Chicago, Illinois, USA) was used for statistical analysis of the data obtained in the study. Patient demographics and categorical variables such as descriptive characteristics were summarized as numbers (n) and percentages (%). Descriptive statistics related to continuous variables are summarized as mean ± standard deviation.

RESULTS

A total of 9 women with MRKH syndrome were operated with the Nazik Neovagina Technique. The mean age of the women was 23.33±4.09 years and the mean body mass index was 21.78±2.44 kg/m^2. Three of the women were married and six were single. None of the women had any previous treatment or surgery. Two patients had pelvic kidney as a congenital malformation. All patients had normal external genitalia and complete vaginal agenesis. All women had bilateral Müllerian ducts and ovaries.

The mean duration of surgery was 128.89±29.97 minutes. There were no surgical complications in any patient. A urinary catheter was placed in all patients. When the rigid mold was removed at 48 hours postoperatively, the urinary catheter was removed. All patients were discharged on postoperative day 3.

The mean vaginal length at discharge was 11.55±0.88 cm (10-12). In addition, the vaginal diameter of all patients was three centimeters wide as compatible with the mold. At the first postoperative month, the mean vaginal length was 9.78±1.39 cm and at the sixth postoperative month, the mean vaginal length was 8.56±1.13 cm. At the first month evaluation, vaginal epithelialization was complete in all patients. All patients had vaginal discharge that changed color from red to transparent for approximately 6 weeks. At the sixth month after surgery, 6 of 9 patients were sexually active. The other three patients were actively using their molds. Two women who were sexually active developed vaginal infections. These patients were treated for vaginitis.

DISCUSSION

Patients with MRKH syndrome have combined agenesis of the uterus, cervix, and upper vagina. On the other hand, the phenotypes, endocrinologic status, and external genitalia of these patients are normal. The main goal of MRKH syndrome vaginoplasty is to create a new anatomically adequate and functional vagina. The ideal vaginoplasty should have sufficient width, length, axis, and lubrication function. The best surgical technique is still controversial.[12]

Reconstruction of the vagina using dilators of increasing diameter and length was described by Frank in 1938. The time required to reconstruct the vagina varies from four months to several years, depending on patient compliance. Ingram's modification of the Frank procedure involves the use of a bicycle seat mounted on a stool to create pressure for vaginal dilation.[13] Although successful results have been reported with this technique, patient compliance, anxiety, and the fact that patients find the treatment extremely uncomfortable have been reported as disadvantages.[14]

Surgery is an option for women who have failed dilators or who choose surgery after counseling. It is extremely important for the patient to know that she will need to use a vaginal dilator postoperatively to prevent stricture or stenosis with surgical procedures. Each surgical procedure has its advantages and disadvantages, and there is no "perfect" option.

The Mcindoe technique is one of the most commonly used surgical procedures. It is a neovagina technique in which a mold wrapped with a skin graft taken from the patient's body is placed after blunt dissection of the space between the rectum and bladder. The mold is left in the vagina for 7 days postoperatively. While no abdominal access and low morbidity are considered advantages, poor cosmetic results at the graft site, the need to use a dilator after surgery, stenosis in the newly created vagina, and the need to use a lubricant during sexual intercourse are considered disadvantages.[15]

Intestinal vaginoplasty is a technique to create a new vagina using a segment of the rectum, sigmoid colon, or ileum. To create a neovagina, one end of the resected segment is pulled toward the introitus and the other end is closed to create a blind pouch. An end-to-end reanastomosis is performed to reconstruct the GI tract. According to McIndoe, the advantage of this procedure is that no dilators are required. The disadvantages are that women complain of chronic vaginal discharge and malodor. There is also a risk of adenocarcinoma developing in these grafts.[16]

In the modified Vecchietti procedure, a neovagina is created by traction using an acrylic "olive" placed in the vaginal dimple. This olive is attached to the abdominal device by laparoscopically placed subperitoneal sutures. Sufficient traction is applied to the olive to produce vaginal elongation of approximately 1.0 cm per day, creating a neovagina in approximately seven days. Once the neovagina is created, active dilation is required until regular sexual activity can be resumed.[16] An advantage of this technique over the Frank technique is that continuous traction is applied. In addition, prolonged hospitalization is not required. A study of 52 women reported 100 percent anatomic success and 98.1 percent functional success.[17]

Another laparoscopic approach is an adaptation of the Davydov procedure. The Davydov technique is a three-stage procedure that involves dissection of the rectovesical space, abdominal mobilization of the peritoneum to create vaginal fornices, and ligation of the peritoneum to the introitus.[18] In the Davydoy Neovagen technique, the vaginal vault is created by attaching a purse-string peritoneal suture to the pelvic floor. The use of peritoneum eliminates the disadvantages of other graft materials such as skin or intestine and allows epithelialization of the new vagina without excessive secretions and hair growth. Another advantage of this technique is the absence of scarring and granulation tissue formation. The Dovydoy neovagina technique was modified by Uncu et al.[11] In this technique, a paramesonephric remnant supported laparoscopic double layer peritoneal pull-down vaginoplasty was performed. In this technique, the pelvic peritoneum is first circularly dissected

and then connected to the midline with a purse-string suture. The Müllerian remnants are then brought closer to the midline and provide support for the peritoneal dome. It is claimed that this modification reduces the possibility of vaginal stricture and herniation. In our technique, to reduce vaginal stricture, the Müllerian remnants are first brought closer to the midline in a manner that mimics the cervix, then the anterior and posterior peritoneal walls are dissected and connected to the midline. This prevents contact between the anterior and posterior peritoneal walls. The reduction of peritoneal contact reduces vaginal stricture.

The Uncu modification uses a 360 degree peritoneal incision to create a vaginal dome. This extensive dissection prolongs the surgery and also creates a large area of dissection on the rectum and bladder. In our technique, the Müllerian structures are first dissected from the abdominal sidewall and attached to the midline. Thus, less peritoneum is dissected for the anterior and posterior vaginal walls. This technique shortens the duration of surgery and reduces the possibility of complications.

In the Nazik Neovagina Technique, the uterus is simulated by leaving the round and infundibulopelvic ligaments as support to prevent prolapse of the dome. In this way, the dome is supported and the vagina can remain cylindrical. In the Uncu modification, a rigid and imperforate acrylic mold was used. The mold design was changed in our method. The most important way to prevent vaginal stricture is to use the vaginal mold for a long time. For this purpose, we used a hard mold for the first 48 hours and then a soft silicone mold. The silicone mold was manufactured with a longitudinal hole in the middle. This facilitates the drainage of serohemorrhagic fluid and accelerates wound healing. There was no hook for suture fixation in the mold used in the Uncu modification. The mold we designed has stainless steel hooks at the end. In addition, a 30 Shore soft silicone mold is used on the third postoperative day to increase patient compliance. One of the limitations of the study is that the sample size was limited to 9 patients. Our results should be supported by future multicenter studies with a larger sample size. In addition, vaginal length measurements presented at 6 months should be reported at 1 year.

While the Uncu modification achieved a vaginal length of 7.5 cm at the end of one year, our technique achieved a vaginal length of 8.6 cm at the end of 6 months. Most authors consider 6 cm to be an adequate length for satisfactory intercourse.[19]

CONCLUSION

In the case series described in this article, the Dayvdoy Neovagina Technique and Uncu modification was developed. In this technique, Müllerian remnants were used to redesign the vaginal dome to mimic the uterine cervix and ligaments to prevent vaginal stricture, which is the main problem of neovaginal surgical techniques. This prevents peritoneal contact and reduces vaginal stenosis. With this technique, the operating time is shortened because less peritoneal dissection is required. The mold has been modified to be more flexible and softer to increase functional sexual success. In particular, although the number of patients in our report is limited to 9, the anatomical and functional vaginal length ratios are sufficient, six of the patients are satisfied with their sexual experience, and the operation is easy to apply.

Footnote

Informed Consent: Detailed informed consent forms were obtained from the patients.

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