Compilation

Creation of a Neo-Vagina in Mullerian Agenesis by Three Different Method and Literature Review

Melike ASLAN[1,a], Şeyda YAVUZKIR[1], Miyase MİRZAOĞLU[2], Şehmus PALA[1], Remzi ATILGAN[1]

[1]*Fırat University Faculty of Medicine, Department of Gynecology and Obstetrics, Elazığ, Turkey*
[2]*Fethi Sekin City Hospital, Gynecology and Obstetrics Clinic, Elazığ, Turkey*

ABSTRACT

Creation of a Neo-Vagina in Mullerian Agenesis by Three Different Method and Literature Review

Mullerian agenesis is a rare malformation and there are several non surgical and surgical techniques to treat. We aimed to present 3 different neovagina creation techniques that we applied to women with Mullerian agenesis who applied to our clinic and to review the literature.
Twelve patients diagnosed with Mullerian agenesis and underwent neovagina creation procedure between 2016 and 2021 were included in the study. One of the neovagina techniques, the McIndoe procedure was applied to 2 patients, the Frank method to 4 patients, and the Laparoscopic Davydov vaginoplasty to 6 patients. Pre- and postoperative vaginal lengths, time of sexual intercourse, pain during intercourse, and operation complications were recorded.
The 12 patients who underwent neovagina reconstruction were aged 18–31 years (mean 24.4 years). Physiologic vaginal length was achieved in all patients (mean length 7.9 cm). Vaginal hair growth was observed in both patients who underwent McIndoe. In a patient who underwent Davydov, 1 unit of erythrocyte suspension was administered owing to intraoperative bleeding during vesicorectal dissection.
Neovagina techniques applied to optimize sexual life in women with Mullerian agenesis should be individualized according to the patient.

Keywords: *Mullerian Agenesis, Neovagina, Frank, Davydov, Mc-Indoe.*

ÖZ

Mülleriyan Agenezili Hastalarda Üç Farklı Metodla Neovajina Oluşturulması ve Literatür Derlemesi

Mülleriyan agenezi nadir görülen bir malformasyondur ve tedavide pek çok cerrahi ve cerrahi olmayan teknik vardır. Kliniğimize başvuran Mülleriyan agenezili kadınlara uyguladığımız 3 farklı neovajina oluşturma tekniğini sunmayı ve literatürü gözden geçirmeyi amaçladık.
2016-2021 yılları arasında Mülleriyan agenezi tanısı alan ve neovajina oluşturma prosedürü uygulanan 12 hasta çalışmaya dahil edildi. Neovajina tekniklerinden 2 hastaya McIndoe prosedürü, 4 hastaya Frank yöntemi ve 6 hastaya Laparoskopik Davydov vajinoplasti uygulandı. Ameliyat öncesi ve sonrası vajinal uzunluklar, cinsel ilişki zamanı, ilişki sırasında ağrı ve ameliyat komplikasyonları kaydedildi.
Neovajina rekonstrüksiyonu yapılan 12 hasta 18-31 yaşlarındaydı (ortalama 24.4 yıl). Tüm hastalarda fizyolojik vajinal uzunluk elde edildi (ortalama uzunluk 7.9 cm). McIndoe uygulanan her iki hastada da vajinal kıllanma gözlendi. Davydov yapılan bir hastaya vezikorektal diseksiyon sırasında intraoperatif kanama nedeniyle 1 ünite eritrosit süspansiyonu uygulandı.
Mülleriyan agenezili kadınlarda cinsel yaşamı optimize etmek için uygulanan neovagina teknikleri hastaya göre bireyselleştirilmelidir.

Anahtar Sözcükler: *Mülleriyan Agenezi, Neovagina, Frank, Davydov, Mc-Indoe.*

Bu makale atıfta nasıl kullanılır: Aslan M, Yavuzkır Ş, Mirzaoğlu M, Pala Ş, Atılgan R. Müllerian Agenezili Hastalarda Üç Farklı Metodla Neovajina Oluşturulması ve Literatür Derlemesi. Fırat Tıp Dergisi 2024; 29(2): 63-67.

How to cite this article: Aslan M, Yavuzkir S, Mirzaoglu M, Pala S, Atilgan R. Creation of a Neo-Vagina in Mullerian Agenesis by Three Different Method and Literature Review. Firat Med J 2024; 29(2): 63-67.

ORCID IDs: M.A. 0000000297874980, Ş.Y. 000000018937442, M.M. 0000000214162663, Ş.P. 0000000223764244, R.A. 0000000326357158.

Mullerian agenesis (MA) is a rare congenital disorder of the female reproductive system characterized by the absence of the uterus, cervix, and/or upper 2/3 part of the vagina. MA is estimated to affect 1 in 4,000-5,000 women. It is also defined as Mayer-Rokitansky-Küstner-Hauser (MRKH) syndrome (1).

MA pathology includes a defect in the development of the caudal end of the paramesonephric ducts. Patients are typically first identified by a gynecologist at ages 14-15 years with the complaint of absence of menstruation. Generally, these patients have normal ovaries, secondary sexual characteristics, normal chromosome number (46, XX), and external genitalia. Owing to the absence of the uterus, menstruation does not occur at an average age; however, ovulation occurs regularly (2).

In these cases, it is necessary to construct a new vagina (neovagina) to help the patients in leading a a regular sexual life. More than 100 techniques have been defined in relation to this procedure. The most applied techniques are given in figure 1 (3, 4).

[a]Yazışma Adresi: Melike ASLAN, 1Fırat University Faculty of Medicine, Department of Gynecology and Obstetrics, Elazığ, Turkey
Tel: 0424 233 3555 e-mail: mlkbaspinar@hotmail.com
Geliş Tarihi/Received: 20.10.2022 Kabul Tarihi/Accepted: 24.07.2023
* This study was presented as an poster presentation at 10th Gynecological Endoscopy Congress (07-11 September 2022, İstanbul).

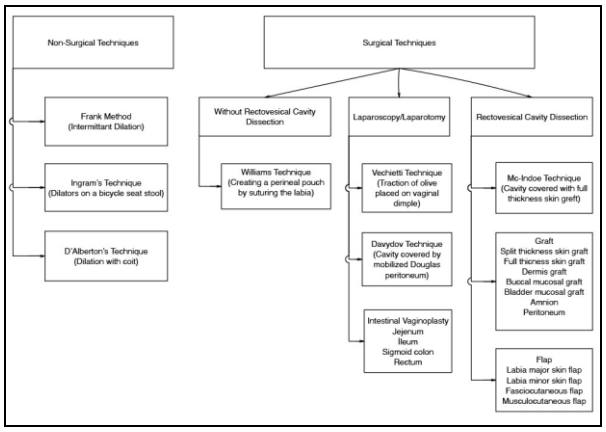

Figure 1. *Definition of Neo-vagina techniques.*

The present study aimed to describe the experiences of the patients with pre- and post-procedural conditions who were admitted to our clinic with the complaint of MA and for neovagina reconstruction.

The patients diagnosed with MA and who underwent neovagina reconstruction procedures between 2016 and 2021 were included in the study. The written informed consent form was obtained from all patients. Pelvic examinations of the patients and transabdominal pelvic ultrasound was performed.

Karyotype analysis and pelvic MRI were ordered from all patients. The patients were given detailed information about neovagina techniques at the time of admission. The detailed information on neovagina techniques was clearly explained to all patients at admission.

All of the patients had previously been diagnosed and had now applied for neovagina creation. One of t The neovagina techniques of the McIndoe procedure were used in 2 patients, the Frank method in 4 patients, and the laparoscopic modified Davydov procedure in 6 patients.

In the McIndoe procedure, urinary catheterization was performed in the lithotomy position under general anesthesia. A horizontal incision was made on the blind vagina, creating a vesicorectal space up to the Douglas peritoneum via sharp dissection, and hemostasis was achieved. A total thickness skin graft was harvested from the inguinal region by a plastic surgeon. The handmade mold was covered with the skin graft and placed in the vesicorectal space. The graft was fixed to the vaginal entrance in 4-6 places with 2.0 vicryl. On the postoperative fourth day, the mold was removed, the vagina was washed with physiological saline, and a new mold covered with a condom was inserted. The patient was advised to wear tight underwear and was taught mold care, removal, and reinsertion. On the postoperative seventh day, the urinary catheter was removed, and postoperative antibiotic treatment was administered for one week. Patients were recommended to wear the mold continuously for one month and only at nights for the following two months. The patient was called for regular checkups in months 1, 3, and 6. Sexual intercourse was recommended after the third3rd month. Patients were instructed to use the mold at night until the sixth month, then mold usage frequency was left to the patient's discretion.

The Frank technique is the process of creating a vesicorectal cavity by invagination of the blind vagina with intermittent pressure. For this procedure, borosilicate glass rigid dilators in 3 sizes, i.e., 3×3, 3×5, and 3×8 were used. After the patient was taught how to use the dilator, she was advised to relax the perineal muscles and push them out of the introitus for 30 minutes twice daily. As the vagina lengthened, the patient was instructed to use a larger-sized dilator. She was called for a check-up every two weeks.

In the modified Davydov procedure, under general anesthesia, an incision was made on the vagina in the lithotomy position, creating a vesicorectal space up to the Douglas peritoneum via sharp dissection. A gauze pad was placed after hemostasis. Then, laparoscopy was started. The bladder peritoneum and the Douglas peritoneum were released. An incision was made on the gauze pad and the vesicorectal space was opened. The bladder peritoneum was pulled through vagina and fixed to the anterior intraoitus, and the Douglas peritoneum to the posterior introitus at 2-4 places with 2.0 vicryl. The vaginal dome was formed by laparoscopically suturing the bladder peritoneum, bilateral round ligament, and rectal peritoneum with a mesh string (2.0 Prolene, Ethicon, NJ, USA). A mold was placed in the vagina. During the postoperative 48th hour, the urinary catheter and the mold were removed. The patient was taught mold care and insertion and removal. It was recommended to wear the mold continuously for one month and only at nights for the following twomonths. In months 1 and 3, the patient was called for a regular checkup. Sexual intercourse was recommended on the third month. In the absence of regular intercourse twice a week, it was recommended to keep the mold inserted at night for six months. In the sixth month, the patient was called for a checkup.

Patient ages; vaginal length at admission, at the end of the procedure, using the Frank method, and at the postoperative sixth month in operative procedures; and frequency of sexual intercourse, complaints, and complications were recorded.

The 12 patients who underwent neovagina reconstruction with the diagnosis of Mullerian agenesis were aged 18-31 years (mean 24.4 years). The preoperative vaginal lengths of the patients were 1-5 cm (mean length 2.1 cm). The postoperative vaginal lengths of the patients were 7-10 cm (mean length 7.9 cm). All four patients who underwent the Frank method were single, one of them was divorced and one was planning to marry in four months. A patient who underwent the modified Davydov procedure was divorced and was planning her second marriage; all the other patients were married.

All patients had bilateral ovaries, and their karyotype was 46+XX. One patient had cross ectopia and fusion anomaly in the kidney. All patients used the administered molds regularly and came to their follow-up visits regularly. In the follow-ups, hair growth was observed

in the vagina in both patients who underwent McIndoe. In a patient who underwent Davydov, 1 unit of erythrocyte suspension was given due to intraoperative bleeding during vesicorectal dissection. Fistula, stricture, and keloid scar infection were not observed in the operated patients. Patient ages, pre- and post-operative vaginal lengths, kidney anomalies, sexual intercourse status, and complications are shown in table 1.

Table 1. *Neovagina procedures we performed and pre-postoperative conditions of the patients.*

				Vagina length		Sexual intercourse		
	Age	Marriage	Kidney anomaly	Preop (cm)	Postop cm/month	Coitus after procedure (m)	Dyspareunia	Complication
Modified McIndoe	18	Married	No	2	7/6	3	Mild	Hair growth in the vagina
	26	Single	No	1	9/6	4	No	Hair growth in the vagina
Frank Method	25	Single*	No	4	8/3	-	-	-
	30	Single	No	1	7/3	1	No	-
	20	Single	No	2	7/4	-	-	-
	22	Single	Cross ectopia/ Fusion	2	7/3	-	-	-
Modified Davydov Procedure	28	Married	No	2	7/6	3	No	-
	28	Single*	No	5	9/6	3	No	-
	22	Married	No	2	9/6	3	No	-
	31	Married	No	2	10/6	3	No	-
	22	Married	No	2	8/6	3	No	Intraoperative bleeding
	21	Married	No	2	7/6	3	No	-

**divorced from their first marriage.*

The main reason for neovagina creation in cases of MA is to make it possible for these patients to engage in sexual intercourse (5, 6).

The fact that many techniques are described confirms that no single technique is a perfect answer to this complex problem. Ideally, the creation of a neovagina should be simple, safe, and most importantly, allow satisfactory sexual intercourse (7). The timing of the surgery depends on the patient's anatomical condition and the presence or absence of functional endometrial tissue. Opinion differs depending on when this correction should be introduced.

The Frank method is the most common nonoperative technique. The back of the blind vagina is loose fibroareolar tissue and can be stretched easily. This technique is based on the principle of increasing the vaginal length and width via the daily self-administration of rigid vaginal dilators. Treatment should only be started when the patient is mature enough and expresses a desire to try because the patient may stop dilating or not accept this method from the beginning due to pain and fear (8, 9).

We applied the Frank method to 4 patients who accepted the procedure. All were single and one patient planned to marry in four months. All patients could tolerate the dilatation and consequently opted for surgical intervention. We think that the preference for this method by single individuals is influenced by the need to use the vaginal mold for a long time in operative techniques, in the absence of regular sexual intercourse.

Other dilatation methods described in the literature are dilatation with dilators mounted to a bicycle stool (Ingram) (10) and dilatation with coitus (d'Alberton) (11). D'Alberton reported a 95% success rate for neovagina dilated via coitus. Complications of this method are urethral coit and vaginal prolapse. Two of the patients who applied to us had dilatation with coit during their divorced marriages. They had vaginal lengths of 4 and 5 cm when they applied. Since one of them was planning for a second marriage, she preferred operative vaginoplasty. Dilatation was performed on the other patient using the Frank method.

The American College of Obstetricians and Gynecologists (ACOG) recommends dilatation as a first-line treatment because of the generally good results and low risk of complications (12).

Operative vaginoplasty can be performed with various techniques when dilatation fails or at the request of the patient.

Bainster and McIndoe first described the McIndoe technique in 1938 (13). This technique has been the preferred method for many clinicians. The low complication rate and relative simplicity, as well as the reduced surgical risk as it does not require a transabdominal approach, are the advantages of this technique. However, it has disadvantages such as scar tissue formation in the grafted area, keloid formation, stricture formation, risk of infection, and hair growth in the vagina. Squamous cell carcinoma has been reported in neovagina (7, 14).

Hair growth was observed in the vagina in the two patients who underwent the McIndoe procedure. However, it has been reported that this troubling condition subsided over time due to follicle atrophy and cutaneous metaplasia (15, 16).

In this technique, As with most surgical procedures, the first operation is probably the most successful in this technique. Compared with secondary operations performed after unsuccessful surgery, it is relatively

easy to create a suitable area and protect it after the operation with a cooperative patient in the first operation (7). Therefore, regular and adequatepostoperative dilatation performed by the patient is the most criticalfactor affecting the operational success. We use a borosilicate glass rigid dilator for postoperative dilatation. Molds made of soft materials can also be used after surgery. However, there are not enough studies in the literature comparing the results of soft and hard molds. Regardless of which mold is used, regular and effective use under the supervision of a doctor is required (14).

The method that does not require dilatation after surgery is vaginoplasty, in which intestinal grafts are used. However, this method prevents it from being the first choice due to the need for laparotomy and the risks of severe infection, intestinal stenosis, dehiscence, and fistula formation. In addition, there is a risk of vaginal discharge with intense mucus content in the vagina and rarely malignancy in this method (14).

Another surgical approach to treat vaginal agenesis is to create a new vagina using a peritoneal flap. Davydov first used this approach in 1969 (17).

This approach can be done laparoscopically or via laparotomy. However, there is a risk of damage to the bladder and/or ureter, peritonitis, and vesicovaginal fistula formation (18). One patient for whom we applied this technique, was given a 1U erythrocyte suspension due to excessive bleeding during vesicorectal dissection.

In the postoperative vagina examination of 51 patients who underwent the modified Davydov procedure, a positive Schiller test was observed after the sixth month, adequate mucosal thickness and differentiation and glycogen storage were observed in light microscopy in biopsies, and an ultrastructural surface appearance close to normal was observed in electron microscopy (19).

It is noteworthy that six patients to whom we applied the modified Davydov procedure had sufficient vaginal length, did not have dyspareunia, and the technique was easy to apply. This technique also requires the use of a postoperative dilator.

Another method applied laparoscopically is the Vachietti procedure. This method is based on the traction of the threads attached to the bead (olive) placed in the vaginal dome, through the abdominal route and a tension device (5). Disadvantages are the long hospital stay, long-term bladder catheterization, the tension set used, and the high cost of the operation due to the length of hospital stay. In addition, the traction of the vaginal dome can be very painful and may not be tolerated by the patient. A postoperative dilator is also necessary for this method (14, 20).

As a result, most of the literature consists of non-comparative single-center case series. Therefore, the best treatment of vaginal agenesis in terms of outcome and complication rate remains controversial. Neovagina techniques applied to optimize sexual life in women with Mullerian agenesis should be individualized according to the patient. Non-operative methods should be the first method to be recommended as they provide information about the use of dilators and the procedure. The McIndoe procedure is simple and effective method, but it should be kept in mind that hair may grow in the vagina, and the use of postoperative molds is essential for the formation of an appropriate vagina length in both McIndoe and Davydov procedures.

REFERENCES

1. Oppelt P, Renner SP, Kellermann A et al. Clinical aspects of Mayer-Rokitansky-Kuester-Hauser syndrome: Recommendations for clinical diagnosis and staging. Hum Reprod 2006; 21: 792-7.
2. Rock JA, Azziz R. Genital anomalies in Childhood. Clin Obstet Gynecol 1987;30:682-96.
3. Ulaganathan P. “Flaps versus skin grafts in neovagina creation for vaginal agenesis.” Int Surg J 2020; 7: 2586-92.
4. Rock JA, Breech LL. Surgery for anomalies of the Mullerian ducts. In: Rock JA, Jones III HW, eds. TeLinde’s Operative Gynecology. 50th ed. New York Lippincott-Raven 1997: 687-729.
5. Sendag F, Akdemir A, Akman L, Oztekin MK. Mayer-Rokitansky-Küster-Hauser Syndome and Laparoscopic Assisted Creation of Neovagina (Modified Vecchietti). J Turk Soc Obstet Gynecol 2013; 10: 260-6.

6. Karateke A, Haliloğlu B, Parlak O, Cam C, Coksuer H. Intestinal vaginoplasty: seven years' experience of a tertiary center. Fertil Steril 2010; 94: 2312-5.
7. Mehta CS, Mehta G. Modifications and innovations in Mc Indoe vaginoplasty for better outcomes. IP Int J Aesthet Health Rejuvenation 2020; 3: 60-7.
8. Lodovici O, Horibe K, Gemperli R. BB de Mendonça. Construction of the vagina by a non-surgical method. Rev Hosp Clin Fac Med Sao Paulo 1989; 44: 40-2.
9. Frank RT. The formation of an artificial vagina without operation. Am J Obstet Gynecol 1938; 35: 1053-5.
10. Ingram JM. The bicycle seat stool in the treatment of vaginal agenesis and stenosis: a preliminary report. Am J Obstet Gynecol 1981; 140: 867-73.
11. D'Alberton A, Santi F. Formation of a neovagina by coitus. Obstet Gynecol, 1972; 40: 763-4.
12. ACOG Committee on Adolescent Health Care. ACOG Committee Opinion No. 355: vaginal agenesis: diagnosis, management, and routine care. Obstet Gynecol 2006; 108: 1605-9.
13. Banister JB, McIndoe AH. Congenital absence of the vagina, treated by means of an indwelling skin-graft. Proc R Soc Med 1938; 31: 1055-6.
14. Bastu E, Akhan SE, Mutlu MF, Nehir A, Yumru H, Hocaoglu E, Gungor-Ugurlucan F. Treatment of vaginal agenesis using a modified McIndoe technique: Long-term follow-up of 23 patients and a literature review. Can J Plast Surg 2012; 20: 241-4.
15. Lanza H, Balestrelli J, Pastoni D, Molero JF. Vaginoplasty technique using vulvoperineal flaps. Aesthetic Plast Surg 2014; 38: 164-8.
16. Giraldo F, Solano A, Mora MJ, Smith V. Hair growth in the vagina after reconstruction with pudendal thigh flaps in congenital vaginal agenesis. Plast Reconstr Surg 1998; 102: 924-5.
17. Davydov SN. Colpopoeisis from the peritoneum of the uterorectal space. Akush Ginekol 1969; 45: 55-7.
18. Giannesi A, Marchiole P, Benchaib M, Chevret-Measson M, Mathevet P, Dargent D. Sexuality after laparoscopic Davydov in patients affected by congenital complete vaginal agenesis associated with uterine agenesis or hypoplasia. Human Reprod 2005; 20: 2954-7.
19. Origoni M, Fedele F, Parma M, Di Fatta S, Bergamini V, Candiani M, Fedele L. The Peritoneal Neovagina after Davydov's Laparoscopic Procedure in Mayer-Rokitansky-Küster-Hauser Syndrome: Morphology and Ultrastructure Investigation of the New Epithelium. J Minim Invasive Gynecol 2021; 28: 1795-9.
20. Fedele L, Bianchi S, Tozzi L, Borruto F, Vignali M. A new laparoscopic procedure for creation of a neovagina in Mayer- Rokitansky-Kuster-Hauser syndrome. Fertil Steril 1996; 66: 854-7.