Short Communication

Satisfactory Outcome of Various Novel Modified Laparoscopic Neovaginoplasty Using Autologous Peritoneal Graft

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Abstract

Management of vaginal agenesis in Mayer–Rokitansky–Küster–Hauser syndrome patients is by creating functional neovagina through surgical or nonsurgical route. Surgical repair using minimally invasive technique is a favorable option in creating neovagina. In this study, the patients underwent neovaginoplasty. Clinical follow-ups were done at 3, 6, and 12 months postoperatively. The primary outcomes were anatomic and functional successes; anatomical success was defined as a ≥6 cm-long neovagina that allows for easy introduction of two fingers, and functional success was defined with Female Sexual Function Index FSFI-6 questionnaire score above 19. Modified neovaginoplasty using autologous peritoneal graft was performed on the patients (n = 6). Follow-up showed mean vaginal lengths of 8.16 cm, mean surgery time of 175 min, mean blood loss of 59.17 ml, and mean duration of hospital stay of 2 days, with an average FSFI-6 score of 25,2. Therefore, we concluded that laparoscopic approach using modified technique of autologous peritoneal graft provides satisfactory result.

Keywords: Laparoscopic neovaginoplasty, Mayer–Rokitansky–Küster–Hauser syndrome, vaginal agenesis

Introduction

Mayer–Rokitansky–Küster–Hauser (MRKH) syndrome, also known as Müllerian aplasia, is a rare congenital disorder characterized by agenesis or aplasia of the uterus and upper vagina in women with a normal karyotype.[1] The external genitalia appears normal. Patients usually have normal reproductive endocrine function and show normal signs of thelarche and pubarche.[1,2] There are two types of MRKH syndrome: the first is characterized by the absence of the proximal (2/3) of the vagina and agenesis of the uterus with normal development of the renal and ovarian systems. This type is found in 44% of cases of MRKH syndrome. The second type is similar to the first type but with congenital defects including cardiac, vertebral, renal, auditory, and vertebral malformations. This type was found in 56% of patients.[3]

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Management of MRKH syndrome is by forming a functional neovagina using various surgical and nonsurgical routes.[1] Davydov's laparoscopic procedure might be a more compelling way in making a neovagina, since the method permits the making of a more drawn-out neovagina.[4] This paper will report on the management of MRKH syndrome with modified Davydov method and the postoperative follow-up.

Methods

From December 2018 to March 2021, a total of 6 patients aged 19–35 years diagnosed with MKRH syndrome underwent neovaginoplasty using Davydov procedures. All of the patients

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were referred to our hospital with the chief complaint of primary amenorrhea. They underwent a physical examination, bimanual rectal toucher examination, and pelvic and abdominal ultrasonography (US) before surgery. All patients were found to have normal female chromosomes of 46, XX, normal estrogen levels, secondary sexual characteristics, Tanner stage, and normal external urethral meatus, labia majora and labia minora. Five of the patients showed no vaginal opening and one patient had a short vagina (4 cm) [Figure 1]. They had no noted comorbidities.

The modified Davydov procedures were done through laparoscopy after careful examination of the pelvic cavity. Initially, the round ligament was cut to increase the vaginal depth. A peritoneal cut formed "U" is made lateral to the infundibulopelvic ligament on each side and over the bladder to facilitate pulling down of the loosest, most dependent, deep cul-de-sac peritoneum to the vaginal introitus and to make a fold and laparoscopic rectovesical access. A rectal test is utilized to recognize a right analyzation plane.

All six patients were only hospitalized for a short while and discharged 1–3 days after surgery. The neovagina was then maintained with the use of a vaginal dilator.

Clinical follow-up was planned at 3, 6 and 12 months after surgery. The primary outcomes were anatomic and functional success. Anatomic success was defined as a ≥6-cm long neovagina that allows for the easy introduction of two fingers 6 months after surgery.[5] Functional outcomes were assessed using a standardized Female Sexual Function Index-6 (FSFI-6) questionnaire, an internationally validated test for assessing female sexual function quality. Sexual dysfunction is considered present if the score is lower than 19.[6] All patients were required to complete the questionnaire after surgery.

Results

Table 1 shows a clinical summary and surgical outcome of the six patients who underwent modified Davydov laparoscopic neovaginoplasty surgery in our center from 2018 to 2021. The surgeries were performed successfully in all patients without any major complications. There were no intraoperative complications and no ureteric, bladder, or rectal injuries from the procedures. The time for surgery varied from 135 to 265 min (mean: 175 min), with estimated blood loss of about 10–150 ml (mean: 59 ml).

The postoperative vaginal length ranged from 7 to 9 cm. One patient had a postoperative vaginal length of 7 cm, four had a postoperative length of 8 cm, and two had a postoperative length of 9 cm [Figure 2]. The width of the vagina allowed the insertion of two fingers during follow-up examinations in the outpatient clinic. Postoperative recovery was swift, and patients were ambulating by the first or second postoperative day. The duration of the hospital stay inclusive of the operation day ranged from 2 to 5 days. On discharge, the vaginal wound was clean and dry.

Follow-ups after surgery were performed. The average vaginal length at discharge in six subjects was 8.17 cm. FSFI questionnaire postsurgery was obtained in five subjects, as one subject was sexually inactive, with an average score of 25.2. Most of the patients had normal body mass index (BMI), with an average of 19.93 kg/m^2, with exception of patient 6 who was underweight (BMI: 16.3 kg/m^2).

Discussion

MRKH syndrome is a disorder that affects mainly the reproductive system. It is typically characterized by underdeveloped or even absent vagina and uterus at birth. Adolescent patients show primary amenorrhea and normal growth and development. The main problems of MRKH syndrome are sexual intercourse difficulty and infertility.[1] The etiology of this syndrome is unknown; however, several researchers have confirmed genetic involvement, demonstrating autosomal dominant inheritance.[1,3]

Patients usually complained of primary amenorrhea in adolescence. The MRKH syndrome is reported in about 16% of patients with primary amenorrhea and is considered to be a cause of ovarian failure. Müllerian aplasia is usually associated with extragenital malformations, particularly of the skeleton and kidney.[1] The prevalence of MRKH syndrome is 1 in 5000 female live births. Other estimates say 1 in 4000–

Table 1: Patients' characteristics on Davydov procedure

Characteristics	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Mean
Age (years)	28	27	35	28	22	19	26.5
BMI (kg/m^2)	18.7	19.5	21.6	20.2	23.3	16.3	19.93
Blood loss (mL)	75	50	20	10	150	50	59.17
Duration of surgery (min)	160	135	135	265	205	150	175
FSFI score	24	28	29	24	N/A	21	25.2
Discharged from hospital after surgery (day)	1	2	3	2	2	2	2
Total vaginal length (cm)	8	9	8	7	9	8	8.16

N/A: Not available, FSFI: Female Sexual Function Index, BMI: Body mass index

20,000.[1,2] The etiology of MRKH syndrome is still unclear.[1] From the genetic aspect, MRKH syndrome is known to have familial cases in the form of autosomal dominant.[3]

Patients with primary amenorrhea should be referred to a gynecologist with experience in pediatric/adolescent gynecology or disorders in sex development for evaluation to diagnose MRKH syndrome.[7,8] The examination of MRKH syndrome includes physical examination (pelvic examination), radiologic examination (pelvic and renal scan), biochemical analysis, and chromosomal analysis.[1]

Depending on the patient's age, a physical examination may include checking the patient's external genitalia and introitus/vagina. Transabdominal US is used to detect the presence of ovaries but not the uterus. When available, magnetic resonance imaging of the internal genitalia should always be used to diagnose uterovaginal agenesis.[7,8] To confirm a normal female karyotype, chromosomal analysis by G/Q-banding is frequently used (46, XX).[9] Other laboratory assessments include FSH, LH, androgens, and estradiol, which are typically regarded as normal in MRKH syndrome.[10]

In patients with primary amenorrhea accompanied with cyclic abdominal pain, a differential diagnosis of Herlyn–Werner–Wunderlich syndrome, also known as OHVIRA (obstructed hemivagina and ipsilateral renal anomaly), is also worth considering. OHVIRA syndrome presents as uterine didelphys along with renal agenesis, which is the most common renal anomaly associated with this syndrome. Due to the close relationship between the development of urinary and reproductive systems, female patients with reproductive structural anomalies may benefit from evaluation later in life for renal malformations and vice versa.[11]

It is necessary to point out that patients with MRKH syndrome need careful preoperative analysis and very often a personal planning of a surgical operation.[12] The aim in creating a neovagina is to establish an adequate passageway for intercourse with the form and function of a natural vagina with minimal morbidity and fast recovery. Laparoscope-assisted surgery is less invasive and is considered especially suitable for young women, due to reduced likelihood for intraperitoneal adhesions following surgery, which may contribute to fertility potential in the future.[13] The most used surgical procedures are the following: McIndoe, Williams, Vecchietti, Davydov, Baldwin, and nonsurgical Frank technique.[12]

The laparoscopic Davydov procedure is by far the easiest, safest, and fastest surgical technique for this kind of case out of all those that are currently available. The fundamental objective of Davydov procedure is to form a neovagina using the peritoneum as covering.[4,12] Compared to other surgical techniques, intraoperative and postoperative complications are uncommon.[5,9] Skin grafts have problems of donor site scarring and graft stenosis. Bowel grafts often involve a laparotomy and risks from bowel surgery. Traction methods often cause pain, and manual dilation methods rely on a prolonged period of patient motivation for success.[14]

In patients with MRKH syndrome, Fedele *et al*.[5] compared the Vecchietti and Davydov laparoscopic techniques for constructing a neovagina. A neovagina was surgically created in 15 patients using the Vecchietti procedure and 30 patients using the Davydov procedure. They claimed that the lengthened neovagina produced by the Davydov procedure was the discernible difference.[5,15]

A meta-analysis of randomized controlled trials conducted by Prionggo and Kurniawati[16] comparing neovaginal success with the Vecchietti and Davydov laparoscopic resulted in average vaginal length (mean difference [MD]: −0.70; 95% confidence interval [CI]: −0.99–−0.41) ($P < 0.00001$) and FSFI scores (MD: −1.34; 95% CI: −1.71–−0.96) ($P < 0.00001$). Davydov laparoscopic method is superior in terms of postoperative vaginal length and sexual satisfaction (FSFI scores).[17,18]

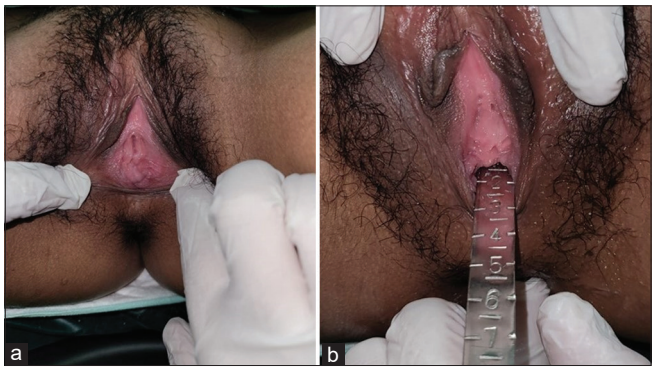

Figure 1: The patients before to modified Davydov laparoscopic procedure (a) No formed vagina (b) Short vagina

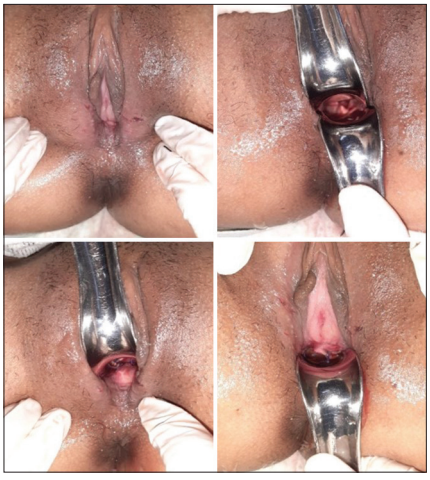

Figure 2: Post modified Davydov procedure

A variation of Davydov procedure was introduced by Lee *et al*. in MRKH syndrome patients with rudimentary uterine horns. In Lee *et al*.'s neovaginoplasty, the rudimentary horn serosa is used as grafts combined with pelvic peritoneum as in laparoscopic Davydov. The advantage of Lee's neovaginoplasty is that the use of uterine serosa allows a smaller area of the peritoneum to be harvested, hence reducing the risk of injury to the surrounding organs. Uterine serosa also adds tougher and stronger tissue to the peritoneum. The duration of the hospital stay inclusive of the operation day ranged from 5 to 9 days, with an average of 6.6 ± 1.6 days, relatively longer than the postoperative stay period after our modified Davydov laparoscopic procedures. This was because the vaginal stent was kept *in situ* for 3–5 days, and patients were observed for a few more days to ensure healing of the vaginal wound before being sent home.[14]

In our reported cases, we performed the laparoscopic Davydov procedure in six patients with MRKH syndrome. The mean surgery time was 175 min, with a mean blood loss of 59.1 mL. Several studies have reported that the vaginal length after the surgery ranges from 7.2 to 11.3 cm.[19,20] In this report, the average vaginal length is 8.17 cm. The average of FSFI scores in all patients is considered good, although the FSFI score seems lower in shorter neovaginal length (<7 cm).[17]

The decrease in neovaginal length after surgery appeared to drop significantly with the duration of wearing molds postoperatively. All six patients have short length of stay, discharged 1–3 days after surgery. Short duration in hospital gives an advantage in certain condition such as COVID-19 pandemic.

Conclusion

MRKH syndrome is a rare congenital disease and often delays diagnosis in patients. Management of the patients could use invasive and noninvasive methods. The Davydov method is a safe and effective surgical technique that has been used for a long time. Davydov technique provides adequate postoperative vaginal length, sexual satisfaction, and short length of stay postoperatively.

Ethics approval

This study was approved by the appropriate research ethics committee (Institutional Review Board KET-101/UN2.F1/ETIK/PPM.00.02/2022).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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