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Long-term Outcomes and Sexual Satisfaction of Vaginoplasty Using Peritoneal Graft in Mayer-Rokitansky-Küster-Hauser Syndrome

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Abstract

Objectives: This study aimed to evaluate the outcomes of vaginoplasty using a peritoneal graft in terms of anatomy, sexual function, and satisfaction for patients with Mayer-Rokitansky-Küster-Hauser syndrome (MRKH) syndrome.

Materials and Methods: A retrospective analysis was conducted on 26 patients with complete vaginal agenesis from February 2012 to March 2022. Parameters such as neovaginal dimensions, granulation tissue, and stenosis were monitored during follow-up appointments. The primary outcome assessed was achieving both anatomical and functional success. The Female Sexual Function Index (FSFI) was used to evaluate sexual function, with a comparison made to 49 healthy women who completed the FSFI to gauge sexual function.

Results: The average neovaginal length was 7.76 ± 1.55 cm, with a width equivalent to two fingers. While women with neovaginal lengths ≥ 6 cm had higher mean FSFI scores (23.78 ± 3.65) than those with lengths <6 cm (19.15 ± 7.00), this difference was not statistically significant ($P=0.117$). We could not find any difference in FSFI domain scores after vaginoplasty according to the neovaginal lengths ($P > 0.05$). However, in MRKH syndrome patients, the "arousal" ($P=0.040$) and "lubrication" scores were higher than those of the control group ($P=0.004$). The full FSFI score was also significantly higher in the MRKH group compared to controls ($P=0.023$).

Conclusions: Vaginoplasty utilizing a peritoneal graft shows promise as a surgical treatment for vaginal agenesis in individuals with MRKH syndrome, though larger studies are needed to confirm its long-term efficacy and safety.

Keywords: Peritoneal Graft, Rokitansky syndrome, Sexuality, Vaginal agenesis

Introduction

A rare congenital disorder known as Mayer-Rokitansky-Küster-Hauser Syndrome (MRKH) affects the development of the female reproductive system, particularly the uterus and vagina. This condition has substantial effects on the physical, psychological, and social well-being of those who are afflicted. The substantial effects that MRKH syndrome has on the social, psychological, and physical health of those who are afflicted make it important (1). The emotional well-being and quality of life of young women with MRKH syndrome are significantly impacted by vaginal agenesis. Therefore, the primary objective of treatment is to create a functional vaginal canal to facilitate sexual activity, necessitating a multidisciplinary approach (1,2). Historically, a crucial component of treatment for MRKH syndrome has involved resolving vaginal agenesis by establishing a functional neo-vagina. Various surgical techniques exist, including the use of peritoneal grafts, skin flaps, bowel segments, and the McIndoe procedure. However, there is a lack of consensus on the optimal technique. Previous studies have mostly concentrated on assessing sexual function and well-being by measuring functional outcomes after neo-vaginal therapy using tools such as the Female Sexual Function Index (FSFI) and the Female Sexual Distress Scale-Revised (FSDS-R). However, there is limited research available directly comparing these surgical techniques and their long-term outcomes. Given the rarity of this syndrome, there is currently no comprehensive guideline for selecting the most suitable surgical approach and monitoring these patients postoperatively, highlighting the need for further research (3-10). This study, therefore, aimed to assess the long-term anatomical outcomes, sexual function, and satisfaction following vaginoplasty using a peritoneal graft in patients with MRKH syndrome.

Methods

Participants

The study population comprised 26 patients with complete vaginal agenesis who underwent surgery between February 2012 and March 2022. The surgeries were performed at the Urogynecology Department of Alzahra hospital, a tertiary

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hospital affiliated with Tabriz University of Medical Sciences. Inclusion criteria included women who were eligible for surgery due to being unwilling or unable to use dilation. All patients signed an informed written consent form. The diagnosis of vaginal agenesis as a symptom of MRKH syndrome was confirmed by urogynecologists for all patients. Data were retrospectively collected from medical records, operational files, postoperative records, and postoperative visits of patients.

Clinical Evaluation and Pelvic Ultrasound

During the preoperative evaluation, all cases underwent clinical examination and pelvic ultrasound. The data collected included demographic details, chromosomal analysis, operation dates, vaginal length and width, complications, postoperative care, and other congenital anomalies. To compare sexual function with healthy women, 49 voluntary women without gynecological problems completed the FSFI.

Vaginoplasty Using Peritoneal Graft

The pelvic peritoneum's posterior tissues were carefully dissected towards the bulging posterior wall, and a 4-5 cm transverse opening was made using scissors. The pelvic sidewall, bladder, and posterior rectum were gently separated from the pelvic peritoneum. The edges of the opened pelvic peritoneum were sutured to the introitus mucosa. Retractors were employed to open the vaginal area transperineally. The upper part of the vagina was fashioned by suturing the pelvic peritoneum at a level that allowed for optimal vaginal length. A dilator in the form of a 10 cm long and 3 cm wide fibril plaster mold, covered with two layers of a condom and tetracycline ointment, was inserted into the neo-vagina. Patients were discharged early once stable, typically within 48-72 hours post-operation, with instructions on recognizing warning signs like fever, foul discharge, bleeding, or other potential complications. The surgical procedure involved two surgeons simultaneously, one performing a mini-laparotomy from the abdomen and the other from the perineum. At the vestibule, a transverse incision of two to three centimeters was performed at the perineum above the posterior fourchette. The urethra and rectum were separated by blunt dissection, and the peritoneum was then opened.

Post-operative Assessment

One, three, and twelve months following surgery, each patient underwent evaluation. At every follow-up appointment, the neovagina was measured for length and width, and any stenosis or granulation tissue was noted. Anatomical and functional success were the primary outcome metrics. Anatomical success was declared when two fingers fit into the neovagina with ease and the length surpassed six centimeters within six months of the procedure. Six months post-operation, successful functionality was determined by the patient's satisfaction with their sexual performance. Functional results were evaluated through the FSFI, with sexually active individuals completing the FSFI questionnaire one year after the procedure.

Key Messages

- Peritoneal graft vaginoplasty provides satisfactory anatomical and functional outcomes for MRKH syndrome patients.
- Postoperative sexual function in key domains can be comparable to or better than healthy controls.

FSFI Questionnaire

The FSFI is a commonly used questionnaire to assess sexual function over the previous four weeks. Scores on the FSFI range from 2 to 36, with higher scores reflecting improved sexual function. In this study, patient results were compared to those of a control group consisting of 49 women of similar age (under 45 years old) and comparable educational and social backgrounds, who did not have gynecological concerns. Data from participants who had not been sexually active in the preceding month were omitted from the analysis, which resulted in the exclusion of one patient from the MRKH group (11).

Statistical Analysis

The chi-square test, Fisher's exact test, and Mann-Whitney U test were applied to analyze the data using SPSS 25.0 software (SPSS, Chicago, IL, USA). A significance level of 5% was considered statistically significant.

Results

The mean ± SD age of the patients was 28.11 ± 7.71 years at surgery (minimum 19 years and maximum 45 years). The mean ± SD neo-vaginal length of the women was 7.76 ± 1.55 cm (minimum 3 cm and maximum 10 cm), with at least two fingers in width after three and twelve months post-surgery. There were no bladder injuries reported. One patient developed a rectovaginal fistula due to the incorrect use of the mold by the patient and the pressure of the mold on the rectum. This complication led to a change in the mold preparation method to avoid similar issues. The fistula was small and was successfully treated with vaginal estrogen cream. Additionally, two cases experienced stenosis due to improper use of the mold and their single status. Figure 1 illustrates the anatomical outcomes in women with MRKH syndrome who underwent vaginoplasty using a peritoneal graft. The length of the neovagina was 7 cm or greater (except for two cases that had insufficient lengths of 3 cm and 5 cm) in most of the cases. One patient died in an accident, and data regarding her sexual performance were not available. However, her vaginal length was recorded as 8 cm in the

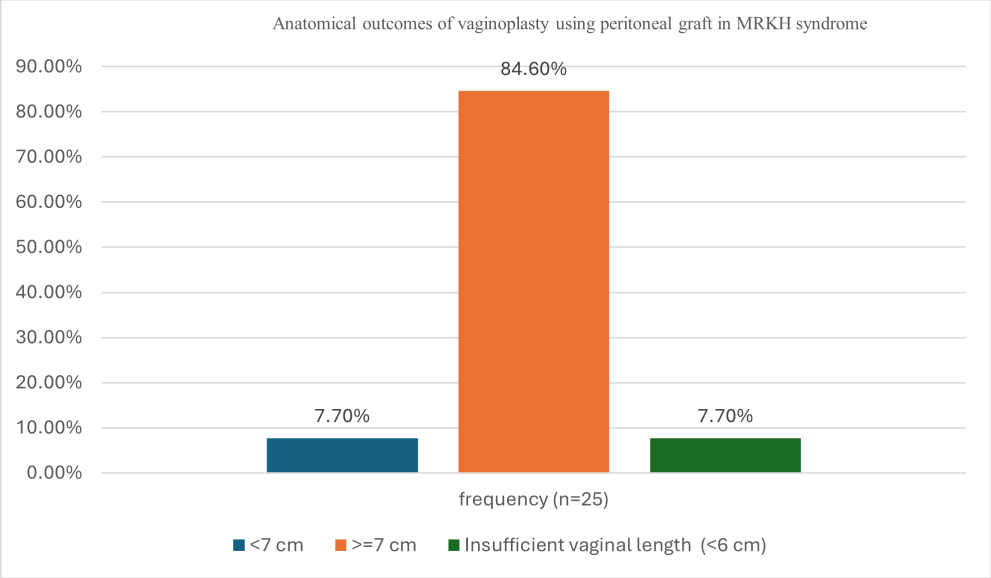

Figure 1. The Characteristics of Anatomical Outcomes in Women With MRKH Syndrome Who Underwent Vaginoplasty Using Peritoneal Graft.

postoperative visits.

Table 1 presents the results of sexual function assessed by the FSFI questionnaire in the included patients. The mean scores were as follows: desire 4.39 ± 1.13, arousal 4.66 ± 1.17, lubrication 3.58 ± 0.31, orgasm 3.95 ± 0.49, satisfaction 4.86 ± 1.33, and pain 1.95 ± 0.60. The results indicated that 65.5% of women had acceptable sexual function based on the FSFI scores.

The study compared the sexual function of women with neovaginal lengths below 6 cm and those above 6 cm. This 6 cm threshold was chosen based on common clinical benchmarks for anatomical success cited in prior literature (24). Although women with lengths of at least 6 cm tended to have higher FSFI scores, the difference was not found to be statistically significant ($P=0.117$). Furthermore, the majority of cases in the group with lengths of at least 6 cm had FSFI scores between 24-29 (94.1% vs. 5.9%), but this disparity was not statistically significant based on Table 2 ($P=0.547$). These results suggest that while a longer neovagina may be associated with better sexual function, the relationship in this cohort was not strong, and the 6 cm threshold should not be overinterpreted.

Table 1. Evaluation of Sexual Function in MRKH Syndrome Women After Vaginoplasty

Domain	Mean (SD)	Minimum	Maximum
Desire score	4.39 ± 1.13	2.40	6.0
Arousal score	4.66 ± 1.17	2.40	6.0
Lubrication score	3.58 ± 0.31	3.0	4.20
Orgasm score	3.95 ± 0.49	3.20	4.40
Satisfaction score	4.86 ± 1.33	2.0	6.0
Pain score	1.95 ± 0.60	1.20	3.20
Full FSFI score	26.5 ± 5.6	14.20	29.0
>30	0 (0.0)		
24–29	17 (65.5%)		
<23	8 (30.8%)		

Post-vaginoplasty, sexually active MRKH syndrome patients with neovaginal lengths below and above 6 cm did not show statistically significant differences in FSFI domain scores (all $P>0.05$) as shown in Table 3.

The research also examined the sexual function characteristics and results in women with MRKH syndrome who underwent peritoneal vaginoplasty by comparing their total FSFI and individual scores with a control group matched for age and frequency. According to the findings, the pain domain score was 1.95±0.60 for women with MRKH syndrome and 2.04±1.09 for healthy women. Overall, women with MRKH syndrome had higher scores, but statistically significant differences were only observed in the "arousal" ($P=0.040$) and "lubrication" ($P=0.004$) domains (Table 4).

Table 2. Sexual Function of the Women in Different Neovaginal Length

Neovagina length (cm)	<6 cm (n=2)	≥6 cm (n=23)	*P* value
Total FSFI score	19.15 ± 7.00	23.78 ± 3.65	0.117*
≥30	0	0	
24-29	1 (5.9%)	16 (94.1%)	0.547**
≤23	1 (12.5%)	7 (87.5%)	

*Mann-Whitney U; ** Chi-square.

Table 3. FSFI Values in Sexually Active MRKH Syndrome Patients After Vaginoplasty With Different Neovaginal Length

Neovagina Length (cm)	<6 cm (n=2)	≥6 cm (n=23)	*P* value*
Desire score	3.60 (1.69)	4.46 (1.09)	0.427
Arousal score	3.30 (1.27)	4.78 (1.11)	0.080
Lubrication score	3.45 (0.63)	3.60 (0.30)	0.807
Orgasm score	3.60 (0.56)	3.98 (0.48)	0.327
Satisfaction score	3.40 (1.97)	4.99 (1.24)	0.133
Pain score	1.80 (0.84)	1.96 (0.60)	0.807

*Mann-Whitney U.

Table 4. FSFI Values of the 25 Sexually Active MRKH Syndrome Patients After One Year Post-vaginoplasty Compared With 49 Healthy Individuals

	MRKH syndrome patients after vaginoplasty (n=25) (mean ± SD)	Healthy women (n=49) (mean ± SD)	*P* value*
Desire score	4.39 ± 1.13	4.02 ± 0.82	0.061
Arousal score	4.66 ± 1.17	4.27 ± 1.15	0.040
Lubrication score	3.58 ± 0.31	3.17 ± 0.80	0.004
Orgasm score	3.95 ± 0.49	3.77 ± 0.97	0.601
Satisfaction score	4.86 ± 1.33	4.59 ± 1.48	0.443
Pain score	1.95 ± 0.60	2.04 ± 1.09	0.981
Full FSFI score	23.41 ± 3.99	21.89 ± 4.64	0.023

*Mann-Whitney U.

Discussion

Our findings suggest that peritoneal vaginoplasty is a viable surgical option for individuals with MRKH syndrome, resulting in satisfactory anatomical and functional outcomes. The length of the neovagina was 7 cm or more, leading to satisfactory sexual function as indicated by FSFI scores. The study underscores the importance of correct mold utilization post-surgery to prevent complications like rectovaginal fistula and stenosis. The goal of treating MRKH syndrome patients is to establish a neo-vagina that enables fulfilling sexual activity and psychological well-being (12-18). When comparing the peritoneal graft technique to other methods, several factors must be considered. Non-surgical dilation, while less invasive, requires high patient motivation and can result in a shorter vagina (23). The McIndoe procedure (skin graft) can achieve good length but carries risks of graft site scarring and hair growth in the neovagina (20,22). Bowel vaginoplasty offers excellent depth and self-lubrication but is associated with potential long-term risks such as persistent discharge, colitis, and malignancy (19). In contrast, the peritoneal graft technique, as demonstrated in our study, creates a moist, extensible, and pink neovagina with satisfactory functional outcomes and a complication profile that appears favorable, though direct comparative studies are scarce. Our study revealed no significant differences in sexual function between individuals with neovaginal lengths below 6 cm and those above 6 cm, implying that vaginal length might not be the sole determinant of sexual function in MRKH syndrome patients, a finding consistent with some previous reports (23). This highlights the potential significant role of psychological and social factors, such as body image, partnership dynamics, and self-esteem, which were not directly measured in our study. The absence of this psychosocial data is a limitation, and future research should incorporate these dimensions to provide a more holistic understanding of post-surgical outcomes. Psychological or social factors may also affect sexual function. In a systematic review, Georgas et al (19) reported that using the intestine for vaginoplasty was associated with the development of a neo-vagina with sufficient length; however, this procedure had significant risks, including the development of colitis, cancer, and intestinal secretion. Based on the study by Ajmal et al., vaginoplasty using a skin flap led to the creation of a neo-vagina with a length of 9.2 cm in patients with vaginal agenesis (20). Akar et al reported that vaginoplasty using a jejunum flap resulted in satisfactory length and quality of the vagina in affected patients after 50 months of follow-up. Only one patient out of 34 developed a neo-vaginal obstruction. Vaginoplasty using sigmoid tissue resulted in a 13.63 cm length vagina in a 30-month follow-up (21). In another study, vaginoplasty using the modified McIndoe method could lead to the development of an 8.4 cm long vagina after 6 weeks of surgery (22). Although vaginal dilation creates a shortened vagina, Kang et al (23) demonstrated that patients treated with vaginal dilation had similar sexual satisfaction and quality of life as those treated with surgical methods. Anatomical success was characterized in a study by Callens et al as a neo-vaginal length longer than 7 cm, while functional success was defined as sexual satisfaction (24). Our results were consistent with their findings. Krisna et al. indicated that laparoscopic vaginoplasty was associated with shorter operation time, fewer complications, shorter hospitalization, and no external scars (25). The comparison of sexual function between MRKH syndrome and healthy controls is also noteworthy. Although women with MRKH syndrome had higher scores in most FSFI domains, the differences were only statistically significant in the arousal and lubrication domains. This suggests that women with MRKH syndrome may experience comparable or even better function in some aspects, which may be addressed through appropriate counseling and management. The rate of complications is an essential metric for evaluating specific treatment strategies. Vaginal dilation rarely results in minor side effects like lower urinary tract infections (24), occasional discomfort, and bleeding. Conversely, surgical complications, such as rectal or bladder injury during the operation, postoperative granulation tissue, and chronic discharge, ranged between 1% and 40.3% (9,24). Failure might result from patient noncompliance, particularly regarding mold treatment. Due to its major

drawback of necessitating long-term mold use, the Davydov treatment is reserved for soon-to-be-married individuals. The invasiveness of the surgical techniques, the requirement for anesthesia, the possibility of neo-vaginal strictures, and particular problems associated with various graft tissues are all considered drawbacks (24,26). It is important to remember that surgical techniques also require ongoing postoperative dilation using vaginal dilators or regular sexual activity to preserve favorable long-term results and reduce the rate at which strictures develop following surgery. In the amniotic graft method, sexual activity can be started earlier; however, the risk of infection transmission and immune reaction is considerable. In the skin graft approach, adhesion and closure of the neo-vagina are uncommon; however, the scar of the graft removal site and hair growth in the neo-vagina are its main disadvantages. Although an intestinal graft creates a suitable vaginal length with a lower chance of neo-vaginal closure and adhesion, neo-vaginal mucous secretion, colitis, and cancer are its main disadvantages. The present study focused on vaginoplasty using a peritoneal graft, which has been performed in a considerable number of patients over a ten-year period. In terms of producing a functioning neo-vagina that is pink, clean, moist, extensible, and has adequate sexual function, this technique showed promising results. Based on the FSFI score, the results showed that 65.5% of women had satisfactory sexual function. In light of our results and the observed complications (rectovaginal fistula, stenosis), the claim that peritoneal graft vaginoplasty is "safe and successful" should be tempered. While our experience over a ten-year period is promising, the small sample size and reported complications highlight the need for larger, multicenter studies to definitively confirm the safety and efficacy of this technique.

Limitations of the Study

This study has several limitations that should be acknowledged. The retrospective design and small sample size are inherent constraints. Importantly, no a priori power calculation was performed, which means the study may have been underpowered to detect statistically significant differences, particularly in the analysis of neovaginal length thresholds (e.g., P=0.117 for FSFI score by length). The findings, especially the lack of significant differences, should therefore be interpreted with caution.

Conclusions

The outcomes for our patients over the long term have shown encouraging results in terms of functional depth and sexual satisfaction. This method offers the benefits of establishing a vagina with a satisfactory average functional depth and the potential for sexual activity post-surgery.

Authors' Contribution

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Project administration: Parvin Bastani, Fatemeh Mallah.
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Supervision: Parvin Bastani, Fatemeh Mallah, Sakineh Hajebrahimi.
Validation: Parvin Bastan.
Visualization: Parvin Bastan.
Writing–original draft: Hanieh Salehi Pourmehr, Safura Hatami-Pourdehno.
Writing–review & editing: Parvin Bastani, Fatemeh Mallah, Sakineh Hajebrahimi.

Conflict of Interests

Authors declare that they have no conflict of interests.

Ethical Issues

The Research Ethics Committee of the Tabriz University of Medical Sciences approved the study (Code of ethics: IR.TBZMED.REC.1401.968). All participants provided written consent.

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