Comparison of modified McIndoe and Davydov vaginoplasty in patients with MRKH syndrome in terms of anatomical results, sexual performance and satisfaction

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Abstract

Introduction: To compare the modified McIndoe versus Davydov vaginoplasty techniques in terms of anatomical results, sexual performance, and satisfaction. Methods: From September 2019 to June 2021, a comparative study was conducted on 20 patients with MRKH syndrome who underwent either McIndoe vaginoplasty (McIndoe group, 10 cases) or Davydov vaginoplasty (Davydov group, 10 cases) in a university-based tertiary care hospital (Imam Khomeini Hospital) in terms of anatomical results, sexual performance, and satisfaction. Functional results were assessed using the Female Sexual Function Index (FSFI). Results: All surgical procedures (n = 20) were performed successfully. Patients in the modified McIndoe group were similar to those in the Davydov group in terms of hospital stay and intraoperative complications. However, postoperative complications were higher in the McIndoe group. There were no significant differences in the neovaginal length and width of the two groups at the 6-month follow-up (P > 0.05). Other parameters (duration of mold use and blood transfusion) were similar for all patients in the two groups. At 12 months after surgery, all patients had regular sexual activity. No significant differences were found in either group. Conclusions: In terms of anatomical results, sexual performance, and satisfaction, the two techniques were similar.

Keywords: Davydov, McIndoe, MRKH syndrome, sexual function, vaginoplasty

Introduction

Mayer–Rokitansky–Küster–Hauser (MRKH) syndrome includes vaginal agenesis with variable development of the uterus accompanied in some cases by renal, skeletal, and auditory abnormalities, with an incidence of 1 in 4000–5000 live-born females.¹⁻³ The defining feature of this condition is the congenital absence of a uterus and vagina in association with normal ovarian function, a normal female karyotype (46, XX), normal external genitalia, and secondary sexual characteristics.²

About 7%–10% of patients also have functional uterine remnant horn, which can cause cyclic pain.¹⁻³ Treatment of MRKH syndrome involves constructing a neovagina with
appropriate longitudinal and horizontal size to enable satisfactory intercourse. Both the nonsurgical and surgical modes of creating a vagina are described. Different surgical techniques and their outcomes, complications, and even pitfalls have been described to create neovagina, including McIndoe and Davydov procedures.

The McIndoe procedure consists of performing a careful dissection between the bladder and the rectum, thus producing a cavity that will be formed by inserting a vaginal mold covered with a skin graft. The skin is usually obtained from the buttocks. One of the major disadvantages of the classic McIndoe method is that it creates a visible scar at the origin of the skin graft, which is often unacceptable to young women. Davydov's operation is now performed laparoscopically through the patient's peritoneum. The Davydov procedure requires mobilization of a segment of the peritoneum to the introitus, following which spontaneous squamous epithelization of the neovagina occurs by 6 months. This method can be difficult in patients with prior abdominal surgery in which accessibility to appropriate peritoneum may be restricted.

As there is no standardization of treatment, the surgical approach is decided according to the surgeon's preference and patient condition. Both the procedures have benefits and disadvantages; thus, we designed a comparative study of these techniques in terms of their effectiveness and outcomes.

**Materials and Methods**

**Patients**

Twenty patients with MRKH syndrome underwent either McIndoe vaginoplasty (McIndoe group/10 cases) or Davydov's technique (Davydov group/10 cases) in Imam Khomeini Hospital between September 2019 and June 2021. The study was approved by the Institutional Review Board of the Obstetrics and Gynecology Institute, and informed consent was obtained from all patients. For all cases, MRKH syndrome was established using gynecological examination, abdominal ultrasound, hormone profile, karyotype testing, and magnetic resonance imaging, and they were divided into two groups. The ethics code is: IR.TUMS.IKHC.REC.1399.178.

**Surgical procedure**

Both surgical procedures were performed by FMRS SURGEONS with board certification. Patients were positioned in lithotomy and general anesthesia was done. After insertion of the foley catheter, one of the two techniques was performed.

**Davydov vaginoplasty**

To create a vaginal space between the bladder and the rectum, the surgeon made a 2-cm transverse incision on the vaginal vestibulum. A vaginal cavity was then created by sharp and blunt dissection between the bladder and rectum and then the surgeon worked forward with blunt dissection reaching up to the pouch of Douglas. The assistant kept her middle finger in the rectum guiding the dissection.

Our approach was laparotomic. After laparotomy and exploration of the entire abdominal and pelvic cavity, the strand that connects the bilateral rudimental uterine horns was lifted, and the peritoneum immediately below was incised transversely for a 5-cm section. The assistant's middle finger in the rectum helped surgeons to identify the correct dissection plane. Peritoneal margins were pulled down to the edge of the incised vaginal vestibulum, and six points were sutured with 2-0 Vicryl.

Purse-string suture was done by consecutively transfixing the round ligament. Finally, the dilator (mold) was inserted into the neovagina. Before use, the mold was made of vibrill plaster, which was 10 cm length and 3 cm in width and was covered by two layers of condom and tetracycline ointment. Lidocaine hydrochloride and povidone-iodine cream were applied to the dilators to cause less pain and to help prevent infections. After insertion of the mold, labia minora was sutured.

**McIndoe vaginoplasty**

The procedure began with a 2 cm transverse incision in the perineum; blunt dissection of a cavity between the bladder and the rectum was done. After creating a vaginal cavity like in the Davydov technique, a hand-made mold of a soft material as described before was used. The mold was kept in place by suturing the labia minora. In this technique, no skin graft was used.

**Postoperative care**

All patients in two groups were re-examined in the operating room 7 days after the initial surgery. The catheter and mold were removed, and neovagina was inspected and washed with normal saline solution. The patients were then taught to apply a soft mold that was 10-cm long and 2.8-cm wide to maintain the length and width of the neovagina. Before use, the mold was washed with soap and water. Dilatation was performed continuously for the first 3 months after surgery and during the night thereafter until the patient had regular sexual activity. Conjugated equine estrogens were given once per day.

All patients were followed up at 1, 3, 6, and 12 months after surgery. At each follow-up visit, the width, length, granulation tissue, and stenosis of the neovagina were examined and recorded. The primary outcomes were the achievement of anatomical and functional success. Anatomical success was defined as a neovagina in which two fingers could be inserted easily and with a length greater than 6 cm within 6 months after surgery. Functional success was defined as when the patient was satisfied in sexual action from 6 months after surgery. Functional outcomes were assessed by the Female Sexual Function Index (FSFI). Patients who had commenced sexual activity completed the FSFI questionnaire at 12 months after surgery.

**Statistical analysis**

Statistical analysis was performed using SPSS 15.0 software (SPSS, Chicago, IL, USA). Student's t test was used for quantitative variance analysis. The Chi-squared test and Fisher's exact test
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Results

The mean age of patients in the SPF group and the Davydov group was 24.70 years (range: 20–32 years) and 26.70 years (range: 20–45 years), respectively. All patients had normal external genitalia, secondary sexual characteristics, primary amenorrhea, and normal ovarian function. All patients had normal female karyotype (46, XX). Three patients in the McIndoe group had anomalies (two patients with ectopic pelvic kidney and one patient with unilateral renal agenesis) versus one patient in the Davydov group (skeletal abnormalities).

All surgical procedures (n = 20) were performed successfully. Table 1 describes the various parameters of patients in the two groups. Patients in the McIndoe group were similar to those in the Davydov group in terms of hospital stay and intraoperative complications. There were no significant differences in the neovaginal length and width of the two groups at 10 days and at the 6-month follow-up (P > 0.05). Other parameters (duration of mold use and blood transfusion) were similar for all patients in the two groups.

The chronic use of painkillers in the McIndoe group was significantly more than that in the Davydov group (P = 0.001). One case in the Davydov group had minimal vaginal bleeding 30 days after surgery that resolved with vaginal estrogen ointment.

Mucous production was similar in the two groups and did not change to infectious discharge. No vaginal vault prolapse was noted during follow-up in any patients in either group. As noted in Table 2, only irritabile discharges and dyspareunia had no significant difference in either group, and other complications were lower in the Davydov group (P = 0.001). Two patients in the McIndoe group did not use the mold continuously and thus exhibited fibrotic stenosis at the vaginal introitus within 2 months of surgery. This problem was solved by reassuring the patient and encouraging her to use the mold continuously.

Granulation tissue was found in only one patient in the McIndoe group, which was mild in the vaginal orifice of neovagina during the first 3 months after surgery, which was completely treated with vaginal estrogen. At the 6-month follow-up, all patients had a soft, smooth neovagina that was two fingers in width and greater than 6 cm in length with no painful points or patient discomfort in the vaginal exam.

After 1-year, neopelium of the vagina was found with no difference in appearance with those with a normal vagina. At 12 months after surgery, all patients had regular sexual activity. Table 3 presents variable sexual function factors in two groups. No significant differences were found in either group. Partner satisfaction score was similar in the two groups. Four patients in the McIndoe group and two patients in the Davydov group had moderate dyspareunia after surgery, which was treated with lubricant and recommendation for continuing sexual intercourse.

Discussion

MRKH syndrome is the second most common cause of primary amenorrhea due to vaginal agenesis. The incidence is about 1 in 4000–5000 live female births. Vaginal agenesis has serious implications on the sexual life of women. Many techniques have been described for vagina reconstruction.

The first nonsurgical technique was Frank’s method, which requires using a mold by the patient against a vaginal dimple or pouch to create neovagina by continuity. If this method fails, then various surgical techniques are recommended to create a neovagina. Among the various techniques used for vaginoplasty, McIndoe and Davydov are more common procedures in our hospital. The McIndoe technique does not require a transabdominal approach, which mitigates surgical risk. Another surgical approach to treat vaginal agenesis is to create a new vagina by using a peritoneal flap.

This approach was first used by Davydov in 1960. This approach can be performed laparoscopically or laparatomically. We prefer to do it laparatomically. There is another technique named Vechietti. This technique requires traction rather than dilation to create the neovagina. Although it is usually performed laparoscopically rather than laparatomically, in both methods, the complication rate is high. In addition, traction of the “olive” at the vaginal dimple can be very painful and may not be

| Parameter                                | MCINDOE group (n=10) | DAVYDOV group (n=10) | P    |
|------------------------------------------|----------------------|----------------------|------|
| Duration of hospital stay (days)          | 5.70                 | 6.30                 | 0.85 |
| Length of neovagina at 10 day (cm)       | 9.1                  | 9.2                  | 0.542|
| Length of neovagina at 6-month follow-up (cm) | 6.6                  | 6.7                  | 0.75 |
| Width of neovagina at 10 days (cm)       | 3.0                  | 3.0                  |      |
| Width of neovagina at 6-month follow-up (cm) | 2.7                  | 2.8                  | 0.91 |
| Duration of mold use (months)            | 2.5                  | 2.4                  | 0.58 |
| Blood transfusion                        | 0.0                  | 0.0                  |      |
| Use of chronic pain killer               | 3.0                  | 2.0                  | <0.001|
| Total                                    | 10.0                 | 10.0                 |      |
Another approach is vaginoplasty. In this procedure, innovative surgical procedure comprising disposable plastic syringe mold wrapped with interceed was more useful and patient’s compliance was also satisfactory.[17] Yasmin used the 20-cc disposable plastic syringe mold wrapped with sofra-tulle and found it economical and innovative with reduced operative time and morbidity.[18] In this study, we did not cover the mold with any graft or any layer. As we described before, we used mold made of vibril plaster 10 cm in length and 3 cm in width and was covered by two layers of condom with tetracycline ointment on it. In our study, all patients had functional vagina with satisfaction in their sexual activity. Moreover, because of not using skin graft in our technique, disadvantages including scarring in the grafted area, keloid formation, pain in the grafted area, and infection risk do not exist.

Various nonoperative and operative procedures to create a neovagina have been reported; however, the best surgical option has not yet been described. The optimal vaginoplasty technique is chosen based on patient condition and surgeon skill for creating a neovagina with adequate length and width with minimal complications, optical cosmetic outcomes, more patient comfort, and satisfactory sexual function. Yasmin found that Davydov had more complications compared to McIndoe, which was not compatible with our study.[19] Takahashi et al.[10] found that laparoscopic Davydov procedure seems to be a safe and effective surgical treatment, which was compatible with our study.

Some limitations of our study should be mentioned. First, the sample size of each group was small due to the rarity of this syndrome. Second, because we did Davydov laparatomically, we could not match our data with existing studies because of their approach (laparoscopic). The advantages of our study are (1) performing vaginoplasty with any graft, including skin or chemical substances, which lead to more pain or complication in the grafted area, and (2) reduced cost for each patient.
Conclusions

Modified McIndoe vaginoplasty and laparotomic Davydov vaginoplasty, which have similar anatomical and functional outcomes, are safe and effective approaches for vaginal reconstruction. However, postoperative complications appear to be higher in the McIndoe group than in Davydov. Long-term use of painkillers was higher in the McIndoe group than in the Davydov group. Larger studies are recommended to accurately compare these two techniques in the future.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/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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Conflicts of interest

There are no conflicts of interest.

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