Comparison of Three Surgical Procedures for Colpopoiesis in Patients with Mayer–Rokitansky–Küster–Hauser Syndrome

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ABSTRACT

Mayer–Rokitansky–Küster–Hauser (M–R–K–H) syndrome is a rare congenital anomaly of the female genital tract. A number of techniques have been described for the formation of a neovagina, however, a standardized treatment does not yet exist. To evaluate three surgical procedures for colpopoiesis in patients with M–R–K–H syndrome, we design a retrospective study based on record of clinical data in our university hospital. Eighteen patients with M–R–K–H syndrome were performed colpopoiesis by Ruge’s, McIndoe’s, and laparoscopically assisted Davydov’s procedures. We compare with three surgical procedures in terms of operative success rate, operation time, total bleeding loss during operation, perioperative complication rate, and long-term complications. The postoperative vaginal depth showed no significant difference among the three procedures. Operation success rate was 50.0% in Ruge’s procedure, 88.9% in McIndoe’s procedure, and 100% in laparoscopically assisted Davydov’s procedure. The duration of McIndoe’s and laparoscopically assisted Davydov’s procedure was significantly shorter than that of Ruge’s procedure. The total bleeding loss in McIndoe’s and laparoscopically assisted Davydov’s procedure was significantly less than that in Ruge’s procedure. The duration of hospitalization for Ruge’s and McIndoe’s procedure was significantly longer than that for laparoscopically assisted Davydov’s procedure. With regard to long-term complications, two cases that underwent Ruge’s procedure had severe neovaginal prolapse, and one case that underwent McIndoe’s procedure had mild stenosis. One case that underwent laparoscopically assisted Davydov’s procedure had mild granulation. In conclusion, laparoscopically assisted Davydov’s procedure is comparatively successful and safe for colpopoiesis of M–R–K–H patients (J GYNECOL SURG 19:19)

INTRODUCTION

Mayer–Rokitansky–Küster–Hauser (M–R–K–H) syndrome, a rare congenital anomaly of the female genital tract, is estimated to occur in 1 of every 4000 to 5000 female patients. This syndrome is due to an early failure in the development of the Müllerian duct system. The typical patient with M–R–K–H
syndrome has a normal female karyotype, normal ovaries and feminine secondary sex characteristics, has no vagina and is either lacking a uterus or has a rudimentary one.

A number of techniques have been described for the formation of a neovagina, however, a standardized treatment does not yet exist. The surgical method consisted of forming a blind tunnel in the vesico-rectal space and lining it with a variety of grafts from sources such as the intestine described by Ruge,\textsuperscript{2} split-thickness skin described by McIndoe,\textsuperscript{3} and the peritoneum described by Davydov.\textsuperscript{4} Vecchietti\textsuperscript{5} described a modified Frank, continuous pressure method in 1965, which involved drawing an acrylic olive into the vaginal groove and applying a special tension device on the anterior abdominal wall. Ruge’s, Davydov’s, and Vecchietti’s procedure need a laparotomy, but have been modified by the incorporation of laparoscopy.\textsuperscript{6–8}

We have experience with three surgical procedures for M–R–K–H syndrome; Ruge’s, McIndoe’s, and laparoscopically assisted Davydov’s procedure. In our hospital, Ruge’s procedure was performed until 1983. The procedure was changed to McIndoe’s procedure in 1984 because Ruge’s procedure was highly invasive. The McIndoe’s procedure had a comparatively high success rate, but required the harvesting of skin grafts from other body sites. Therefore, we changed from McIndoe’s procedure to the laparoscopically assisted Davydov’s procedure for colpopoiesis in 1996, as a result of its cosmetic effect and minimal invasion.

Many reports on colpopoiesis have appeared, but few reports have included a comparison of treatment procedures. We describe here a comparison of these three colpopoiesis procedures. To our knowledge, this is the first report to compare these three procedures.

**MATERIALS AND METHODS**

Eighteen patients with M–R–K–H syndrome were treated with surgical colpopoiesis at our hospital (from April 1982 to July 2000). All patients had primary amenorrhea. Criteria for the diagnosis of M–R–K–H syndrome were normal external genitalia, pubic and axillary hair, no vagina and absence of uterus or rudimentary uterus by rectal finding, and no cystic swelling due to retained menstrual blood. Each patient underwent pelvic ultrasonography, karyotyping, and magnetic resonance imaging (MRI) or computed tomography (CT) for diagnosis. The urinary system was checked by intravenous pyelography. After diagnosis individual and family counseling for each patient was instituted by the attending physician to discuss this condition and treatment. The treatment was postponed until the time of marriage or a structured steady relationship in most cases.

The total number of patients who underwent surgery was 18. Ruge’s procedure (using sigmoid colon graft) was performed on the initial four patients. McIndoe’s procedure (using lower abdominal split thickness skin graft) was performed on the next nine patients. Laparoscopically assisted Davydov’s procedure (using peritoneum graft) was performed on the last five patients. For surgery, the patient was put in the lithotomy position on the table under general anesthesia. The vaginal tunnel was made in almost the same manner in all three procedures. An incision was made in the perineum between the anus and the urethra. Through this incision a plane was created by sharp or blunt dissection. Dissection was continued to the peritoneum, and in McIndoe’s procedure, dissection was finished before reaching the peritoneum. In Ruge’s and laparoscopically assisted Davydov’s procedures, dissection was continued to the channel between the bladder, and the rectum was large enough to admit two fingers with ease. In Ruge’s procedure, celiotomy was performed by lower abdominal median incision. The anatomy of the internal genital organ and the length and integrity of the sigmoid colon were checked. Then the graft was prepared. An adequately long segment of sigmoid was selected above the rectosigmoidal junction. The length of this segment depended on the length of the vagina to be replaced. The pedicle of the segment was isolated and branches were clamped and ligated. Immediate bowel continuity was restored by a colocolonic end-to-end anastomosis with interrupted suture. The distal part of the graft was closed with a running suture. While blood flow was being confirmed, the proximal end of the graft was mobilized downward to the perineum. The colonic graft was sutured to the vaginal entrance in a single layer of interrupted suture. This procedure did not need a mold. In McIndoe’s procedure, diagnostic laparoscopy was performed with two or three puncture techniques before the main operation was performed in the usual manner. Internal genital organ findings were checked and Müllerian remnant was resected, if necessary. The split thickness skin graft was taken horizontally from
the patient’s lower abdominal region in most cases (in one case, the graft was taken from the femoral region because the surgery was a second operation). The skin-covered plastic mold was sutured and left in the vaginal canal for an average of 10 days, after which it was replaced by an acrylic mold customized to fit the patient. The patient was discharged as soon as she was able to insert and remove the mold alone. In laparoscopically assisted Davydov’s procedure, three puncture techniques, including one infraumbilical and two 5-mm supra pubic trocar incisions, were used. The anatomy of the internal genital organ and the pelvic peritoneum’s looseness were checked. Relieving peritoneal incisions were then made with a YAG laser between the bladder and rectum and the loosest, most dependent deep cul-de-sac peritoneum was pulled down to the vaginal canal. The peritoneum was fixed with Vicryl® (Ethicon, Sommerville, NJ) suture to the entrance of the vaginal canal, and the vault was made by laparoscopically suturing. A temporary vaginal mold was inserted into the previously prepared vaginal space. This mold was left in the vaginal canal for an average of 7 days, after which it was replaced by an acrylic mold customized to fit the patient. The patient was discharged after instruction on mold usage.

The attending physician made clinical follow-up for each patient. The physician was permitted on the patient to perform coitus using with artificial vagina when the vagina had achieved adequate depth and condition.

We used the multiple test (Scheffé’s F exact test) for categorical comparisons of the data. p Value < 0.05 was considered to indicate statistical significance. All statistical analyses were performed on a personal computer with the statistical package StatView® for Macintosh (Version 4.5 StatView, Abacus Concepts, Inc., Berkeley, CA).

RESULTS

Table 1 shows the clinical summary for all 18 patients. The mean age of the patients was 20.3 years at the time of diagnosis (range 15 to 26 years) with a mean age of 21.8 years at the time of surgery (range 18 to 27 years). The mean ages at diagnosis for patients undergoing Ruge’s, McIndoe’s, and laparoscopically assisted Davydov’s procedure’s were 19.8 (range 17 to 22) years, 21.9 (range 18 to 26) years, and 18.2 (range 15 to 22) years, respectively. The mean surgical ages of patients undergoing Ruge’s, McIndoe’s, and laparoscopically assisted Davydov’s procedure’s were 21.8 years (range 19 to 25), 22.5 years (range 18 to 27), and 21 years (range 18 to 23), respectively. There was no significant difference in the mean age at surgery. Sigmoid colon perforation occurred during Ruge’s procedure in patient No. 4, and colocolonic anastomosis was performed, so the sigmoid colon was of insufficient length for Ruge’s procedure. The patient has not wished to undergo any other procedure for colpopoiesis still now. Therefore, patient No. 4 was not included in the statistics on operation time, total bleeding loss, duration of hospitalization, and postoperative vaginal depth. The success of the procedure was evaluated based on whether there were any major perioperative complications. The success rate was 83.3% (15 of 18 patients) for all three procedures. Fifty percent (50%) (2 of 4 patients) successfully underwent Ruge’s procedure, 88.9% (8 of 9 patients) successfully underwent McIndoe’s procedure, and 100% (5 of 5 patients) successfully underwent laparoscopically assisted Davydov’s procedure. In the group undergoing Ruge’s procedure, complete failure occurred in one patient (above mentioned), and graft colon necrosis and postoperative vaginal stenosis occurred in patient No. 2. This stenosis was not solved by the nonoperative dilation method, and the vaginal depth was only 4 cm. The patient was able to engage in intercourse and had no wish for a subsequent operation. In the group undergoing McIndoe’s procedure, detachment of a skin graft and bleeding was occurred in patient No. 8. McIndoe’s procedure was re-performed, and a graft was taken from the femoral region. This re-operation data was not included in the statistics because this surgical procedure was not our standardized McIndoe’s procedure. In the group undergoing laparoscopically assisted Davydov’s procedure, no patient had perioperative complications. Statistical analyses were shown in Table 2. The mean duration of operation was 285.0 ± 36.1 min for Ruge’s procedure, 154.4 ± 20.7 min for McIndoe’s procedure, and 187.6 ± 34.5 min for laparoscopically assisted Davydov’s procedure. A significant difference was observed in Ruge’s vs. McIndoe’s procedure (p < 0.001), and in Ruge’s vs. laparoscopically assisted Davy- dov’s procedure (p = 0.001). No significant difference was observed in McIndoe’s versus laparoscopically assisted Davydov’s procedure (p = 0.137). The mean total volume of intraoperative bleeding loss was 877.6 ± 99.4 mL in Ruge’s procedure, 246.9 ± 201.9 mL in McIndoe’s procedure, and 58.4 ± 52.3 mL in laparoscopically
<table>
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<th>The age of operation (years)</th>
<th>Operation time (min)</th>
<th>Total bleeding (mL)</th>
<th>Duration of hospitalization (day)</th>
<th>Retro Hymenal dimple (cm)</th>
<th>Post operative vaginal depth (cm)</th>
<th>Success or not</th>
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<th>Long period complications</th>
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<tr>
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<tr>
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<td>LD</td>
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<td>3</td>
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R, Ruge’s procedure; M, McIndoe’s procedure; LD, laparoscopically assisted Davydov’s procedure.
Complete success is shown by “S,” perioperative complication is shown by “P,” complete failer is shown by “F.”
assisted Davydov’s procedure. A significant difference was observed in Ruge’s versus McIndoe’s procedure ($p < 0.001$), and in Ruge’s versus laparoscopically assisted Davydov’s procedure ($p < 0.001$). No significant difference was observed in McIndoe’s versus laparoscopically assisted Davydov’s procedure ($p = 0.143$). The mean duration of hospitalization was 40.7 ± 10.6 days in Ruge’s procedure, 32.9 ± 6.6 days in McIndoe’s procedure, and 10.6 ± 1.1 days in laparoscopically assisted Davydov’s procedure. A significant difference was observed in Ruge’s versus laparoscopically assisted Davydov’s procedure ($p < 0.001$), and in McIndoe’s versus laparoscopically assisted Davydov’s procedure ($p < 0.001$). No significant difference was observed in Ruge’s versus McIndoe’s procedure ($p = 0.229$). The mean depth of the neovagina after operation was 6.0 ± 1.73 cm in Ruge’s procedure, 7.1 ± 0.9 cm in McIndoe’s procedure, and 7.2 ± 0.4 cm in laparoscopically assisted Davydov’s procedure. No significant difference was observed in Ruge’s versus McIndoe’s procedure ($p = 0.274$), in Ruge’s versus laparoscopically assisted Davydov’s procedure ($p = 0.284$), or in McIndoe’s versus laparoscopically assisted Davydov’s procedure ($p = 0.987$). With regard to long-term complications, there were two cases of prolapse of the neovagina (50% of cases) in the Ruge’s procedure group. In both of these patients, the neovagina was totally inverted, and reconstructive operation was performed at 18 years after colpopoiesis surgery in patient No. 3. The details are described another case report by Yokomizo et al.9 In the group undergoing McIndoe’s procedure, stenosis of the neovagina occurred in one patient (11.1% of cases in this group). This patient No. 9 returned to our hospital 2 years after colpopoiesis surgery. Nonoperative dilation method was successful for treatment of the stenosis. In the group undergoing laparoscopically assisted Davydov’s procedure, a granulation occurred in one patient (20% of cases in this group). This patient, patient No. 18, returned to our hospital 1 year after colpopoiesis surgery with post-coitus bleeding. A cauterization with silver nitrate resolved this complaint.

### DISCUSSION

A number of colpopoiesis procedures for M–R–K–H syndrome were developed by gynecologists during the last century. Many reports on colpopoiesis have appeared, but few reports have included a comparison of treatment procedures. Over the past two decades, we have had experience with three such procedures; Ruge’s, McIndoe’s, and laparoscopically assisted Davydov’s. To our knowledge, this is the first report to compare these three procedures. We changed the procedure of colpopoiesis twice to minimize invasion and
achieve improved cosmetic effect, in consideration of the fact that M–R–K–H syndrome is not a fatal disease and most patients with M–R–K–H syndrome are young women.

The Ruge’s procedure is a highly effective method that does not require postoperative dilation with a mold, and stenosis occurs at low frequency. This method is still performed in some hospitals despite the fact that it is highly invasive. In our study, patients undergoing this procedure experienced more perioperative complications than patients undergoing other procedures. Ruge’s procedure had a high rate of the severe complication of neovaginal prolapse. Furthermore, in our experience, the depth of the neovagina did not differ significantly among the procedures.

The McIndoe’s procedure is the most widespread method to treat vaginal absence. This method has a comparatively high success rate and does not require a laparotomy (we always used laparoscopy for diagnosis prior to performing this operation). Comparatively, this procedure is less invasive and of the shortest duration. However, McIndoe’s procedure often results in scar formation at the skin graft site, and stenosis of the neovagina occurred at a comparatively high rate.

The original Davydov’s procedure requires laparotomy and is highly invasive, whereas our modified method using laparoscopy is minimally invasive. This laparoscopically assisted Davydov’s procedure is slightly longer than McIndoe’s procedure in duration of operation, but the difference between them was not significant. Further, the laparoscopically assisted Davydov’s procedure had the lowest bleeding volume during operation, and the shortest duration of hospitalization. In our experience, this procedure had a perfect success rate, and no perioperative complications. Only one patient had minor trouble granulation and postcoital bleeding, which resolved by ambulatory cauterization. In general, postoperative stenosis is remarked to be one disadvantage of this procedure. We have had no experience with stenosis, perhaps because of careful patient instruction on usage of the mold for prevention of stenosis.

In conclusion, we recommend the laparoscopically assisted Davydov’s procedure for colpopoiesis in our experience, based on the findings it is the least invasive; results in the shortest hospitalization; has the highest success rate, the lowest occurrence of postoperative complications, and good cosmetic effect. This procedure requires refined techniques of laparoscopy, and careful education of the patient. If laparoscopically assisted Davydov’s procedure is not possible for some reason (e.g., peritoneal adhesion, large Müllerian remnant, poor techniques of laparoscopy, and so on), we recommend the McIndoe’s procedure. The Ruge’s procedure is comparatively highly invasive and in our experience, results in the severe complication of neovaginal prolapse. For these reasons, we do not recommend this procedure for the treatment of vaginal agenesis.

REFERENCES


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