# Long-term results of vaginal construction with the use of Frank dilation and a peritoneal graft (Davydov procedure) in patients with Mayer-Rokitansky-Küster syndrome

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**Objective:** To describe long-term outcomes after nonsurgical and surgical treatment of vaginal agenesis in a cohort of girls and women with Mayer-Rokitansky-Küster (MRK) syndrome.
**Design:** Retrospective cohort study using a standardized case record form.
**Setting:** University hospital.
**Patient(s):** All girls and women with vaginal agenesis due to MRK syndrome, presenting during a 40-year period (1962–2012).
**Intervention(s):** Frank dilation and surgical treatment (with the use of a peritoneal graft, i.e., the Davydov method) for vaginal agenesis.
**Main Outcome Measure(s):** Functional vaginal depth and complications.
**Result(s):** Two hundred fifty-four women with MRK visited the department. Urinary tract anomalies were found in 72 patients (31%), and other congenital anomalies in 59 (32%) of the patients with available data. One hundred sixty women were treated for vaginal agenesis. The mean follow-up time was 90 months (range 0–560 months). Sixty-eight patients had surgical treatment for vaginal agenesis with the use of a peritoneal graft (Davydov method) and reached a functional depth of the vagina of 7.8 cm (range 1–13 cm) Surgical therapy preceded by nonsurgical Frank dilation and/or attempted sexual intercourse did not result in more functional depth of the neovagina. The formation of granulation tissue (23%) and the tendency to obliterate (12%) were the major problems when using a peritoneal graft.
**Conclusion(s):** Long-term results of both Frank dilation and Davydov neovagina procedure in experienced hands were good. The use of a peritoneal graft may be regarded as a good alternative to other widely used neovagina techniques using a graft, such as split-thickness skin graft or sigmoid neovagina. (Fertil Steril® 2015;103:220–7. ©2015 by American Society for Reproductive Medicine.)
**Key Words:** Mayer-Rokitansky-Küster, Frank nonsurgical method, Davydov, neovaginoplasty, peritoneal graft

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Congenital absence and atresia of vagina and uterus was first described by Aetios in the 6th century A.D. (1). In the majority of cases this absence is associated with the Mayer-Rokitansky-Küster (MRK) syndrome (2). It is a fairly rare disorder occurring approximately once in every 5,000–10,000 female births (3). Many controversies remain regarding the origin of this müllerian dysgenesis (4, 5). Patients with the MRK syndrome have normal external genital organs, normal ovaries, and a normal female karyotype. It has been reported that in 6%–10% of the patients, endometrial activity in the muscular buds was present, causing cyclic abdominal pain (6). The diagnosis of a congenital absence of the vagina is usually made in adolescence and is frequently followed by psychologic problems concerning the feeling of being

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incomplete as a woman, the inability to have sexual intercourse, and the inability to carry a pregnancy (7–10).

Vaginal agenesis has been diagnosed in ~15% of patients with primary amenorrhea (2) at the age of 16.5 years. The depth of the introital dimple at presentation is usually 1–2 cm; very rarely the depth of the vagina is normal at presentation. Concomitant urinary tract anomalies have been reported to occur in 20%–50% of the patients, as well as other anomalies (10%–20%), of which the bony skeleton accounts for 50%–75% (11–13). The most common treatment techniques are the nonsurgical method based on impression of a mold on the introital dimple, first described by Frank in 1938 (14). Dupuytren (1817) has been given the credit of being the first surgeon attempting to repair vaginal agenesis (1). Since then, many techniques for constructing the vagina have been developed (15). The choice should always be a compromise between the individual needs of each patient and the surgeon's expertise. Emotional stability is a precondition, because the patient's cooperation is thought to be of great importance in achieving success (14). Some surgical methods are based on the hypothesis that the epithelium of the vagina originating from the urogenital sinus, has great proliferative capacities (16). Epithelialization of the artificial vagina can be accomplished with the use of a graft such as vagina (17), amnion (18), or peritoneum (19), or without the use of any graft (16). Others use segments of the intestines to form a neovagina (20) or split-skin grafts (21), and the creation of a vulvovaginal pouch is another option (22). Each of these methods has pros and cons, but the available literature is nonstandardized and heterogeneous. There is one randomized controlled trial that compared laparoscopic bowel neovaginoplasty and laparoscopic Davydov procedure, finding less intraoperative blood loss, shorter operative time, and decreased hospital stay in the laparoscopic Davydov approach (23). Postoperatively, the mean vaginal length was similar, but there was less abdominal discomfort and foul vaginal secretions during intercourse in the Davydov vaginoplasty group.

The present study reports on the long-term outcome in a large cohort of women undergoing nonsurgical therapy (Frank) and surgical repair (Davydov) for vaginal agenesis.

## MATERIAL AND METHODS

All consecutive girls and women presenting with MRK syndrome during the years 1962–2012 at the Gynecology Department of the Radboud University Medical Center, Nijmegen, the Netherlands, were registered in a patient list. In this study we describe the congenital anomalies in this total group. The women who were treated for vaginal agenesis at the department were included in the follow-up part of the study. Approval from the Institutional Medical Ethics Committee, stating that the women should not be contacted for individual approval, was obtained under number 2014/082.

The MRK syndrome was defined according to Schmid-Tannwald and Hauser (24), based on findings at physical examination, imaging (intravenous urography, ultrasound, computerized tomographic scan [CT], or, preferably, magnetic resonance imaging [MRI]) or laparoscopy. The patients were diagnosed as having the classic MRK syndrome in case of symmetric noncanalized muscular uterine buds, normal fallopian tubes, and vaginal agenesis, or the partial form in case of an aplasia of one or both buds, one bud smaller than the contralateral bud, and with or without dysplasia of one or both fallopian tubes (25).

### Nonsurgical Procedure

MRK patients wishing a neovagina were advised to start the nonsurgical dilation method described by Frank (14). The timing was always individualized, and over the time of inclusion in this study, the pediatric psychologists were more frequently asked to counsel patients during the process. The patient was instructed how to use the mold. The concept involves progressive stretching of the vaginal dimple, first in a downward (toward the sacrum) and inward direction, with a small tube of outside diameter 0.8 cm, performed 3 times a day for one-half hour, for at least 1 week. The direction is important to prevent lesions to the urethral opening (14). When some depth has been reached, the direction of impression may be changed to more cranial, parallel to the future axis of the vagina. The small tube is now changed for a tube with an outside diameter of 2 cm. Stretching is done 2 times a day for one-half hour, for 2–4 weeks. During this period a depth of ~7 cm can be reached. The patient is seen on a regular basis, to support and encourage the patient to continue. Some local anesthetic gel may be applied a few minutes before the start of dilation.

### Surgical Procedure

At our center, the two-stage method according to Davydov, using peritoneum as a graft, was first performed in 1962. This method was first described by Ott (1897), followed by others: Robert (1955) (26) and Davydov and Zhvitiashvili (1974) (27). This technique relies on epithelialization of the vagina with the use of a peritoneal graft. The patient is placed in modified lithotomy position to permit simultaneous access to both abdomen and the vulvar area. The steps of the procedure are presented in Figure 1. The first abdominal step consists of dissection and mobilization of the peritoneum from the pouch of Douglas by the abdominal surgeon. Simultaneously the vaginal surgeon creates space between urethra, bladder, and rectum until the peritoneum is reached. This dissection is easiest when the exact midsagittal plane is avoided at first. When the peritoneum is reached, the tissue bridge in the midline is cleaved. The mobilized peritoneal sac is opened at the deepest point, pulled downwards with 4 Vicryl sutures, and connected to the vaginal epithelium. Only four sutures are used to prevent constriction due to more sutures. To prevent a prolapse of the vault of the neovagina, it is recommended to attach the top of the neovagina to the rudimentary uterine buds and the sigmoid. The most suitable mold size was used: a 2.4 cm or, in the majority of cases, a 3.2 cm diameter mold with 11 cm length. The peritoneum is closed with one or two absorbable pursestring sutures over the vaginal mold by the abdominal surgeon. The mold brought in the newly formed vagina stays in place for 1 week with the use of labial sutures.