

# Creation of a neovagina in Rokitansky patients with a pelvic kidney: comparison of long-term results of the modified Vecchietti and McIndoe techniques

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**Objective:** To evaluate perioperative data and long-term results of Rokitansky patients with a pelvic kidney that underwent the McIndoe and modified Vecchietti procedures.

**Design:** Retrospective descriptive study.

**Setting:** A tertiary referral center for the study and treatment of Rokitansky syndrome.

**Patient(s):** Eleven patients with Rokitansky syndrome.

**Intervention(s):** Two and nine patients, respectively, underwent the McIndoe and Vecchietti modified techniques.

**Main Outcome Measure(s):** Anatomic success was defined as a neovagina  $\geq 6$  cm long allowing easy introduction of two fingers within 6 months postoperatively. Functional success was considered achieved when the patient reported satisfactory sexual intercourse starting from 6 months postoperatively.

**Result(s):** Surgery was performed with no complications in all 11 patients. The mean duration of surgery was  $190 \pm 14.1$  minutes in the first group and  $32 \pm 6.4$  minutes in the second group. At 14 years of follow-up, both patients who underwent McIndoe vaginoplasty had a mean  $\pm$  SD length and width of  $8.2 \pm 0.4$  cm and 5 cm and negative Schiller's test 24 months postoperatively. At 4 years of follow-up, eight out of the nine patients who underwent the Vecchietti procedure (89%) had a mean  $\pm$  SD length and width of the neovagina of  $7.4 \pm 0.6$  cm and  $4.2 \pm 0.5$  cm and iodine-positive vaginal-type epithelium coating 100% of the neovagina 24 months postoperatively.

**Conclusion(s):** While appearing to be safe, effective, and with optimal functional results, the modified Vecchietti approach also seems to yield good anatomical and aesthetic results along with shorter surgical and hospitalization times. (Fertil Steril® 2010;93:1280–5. ©2010 by American Society for Reproductive Medicine.)

**Key Words:** Rokitansky syndrome, pelvic kidney, neovagina, McIndoe, Vecchietti

Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome is the second most frequent cause of primary amenorrhea, occurring in 1:4000 to 1:5000 female births (1). Uterovaginal agenesis can be associated in 30%–40% of cases with congenital anomalies of the upper urinary tract, of which the most common are monolateral renal agenesis and the pelvic kidney (2, 3). A pelvic kidney is found opposite the sacrum and distal to the bifurcation of the aorta. The variation in its anatomy is associated with anomalous vascular patterns and altered spatial relations with the adjacent pelvic organs (4). Additionally, owing to the failed ascent, the pelvic kidney remains unrotated and often maintains its fetal vascular supply from the distal aorta or the iliac vessels (5).

Patients with MRKH syndrome and a pelvic kidney, which is almost always associated with a contralateral agenesis,

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therefore constitute an important surgical challenge as the pelvic anatomy is altered and this renders impractical most of the currently used procedures for creation of a neovagina, that is, intestinal transposition (6–8) and the Davydov technique (9, 10). In 1999, we reported the feasibility of the laparoscopic creation of a neovagina in patients with MRKH syndrome and a pelvic kidney (11). However, despite the prevalence of 11.3%–17% of pelvic kidneys in patients with MRKH syndrome (12, 13), there are still only episodic reports in the scientific literature of these patients undergoing creation of a neovagina.

The objective of this report is to evaluate the perioperative data and the long-term anatomical and functional results of consecutive patients with MRKH syndrome and a pelvic kidney who underwent the modified Vecchietti and the McIndoe procedures.

## MATERIALS AND METHODS

In this retrospective descriptive study, we assessed data from 11 patients with MRKH syndrome with a pelvic kidney, of which the first two underwent McIndoe's surgical procedure

between 1988 and 1993 and the latter nine underwent Vecchietti's modified technique between 1993 and 2003 at our tertiary referral center for the study and treatment of MRKH syndrome. Since 1993, our institute has exclusively adopted the laparoscopic approach for the creation of a neovagina with Vecchietti's and Davydov's modified techniques. The medical records of all patients with MRKH syndrome and a pelvic kidney operated with the McIndoe and modified Vecchietti techniques from 1988 to 1993 were examined, and data were assessed regarding surgery duration and perioperative complications. Data were also analyzed regarding postoperative anatomical and functional results during follow-up examinations at 1, 3, 6, and 12 months postoperatively and twice yearly thereafter. At each follow-up visit, all patients had undergone a gynecologic examination and vaginotomy with Schiller's test and evaluation of sexual function and satisfaction. All patients were requested to define the degree of satisfaction at sexual intercourse as one of the following: unsatisfactory, moderately unsatisfactory, moderately satisfactory, or satisfactory. The study did not require formal approval from the Institutional Review Board because of the observational nature of the study.

All patients had been diagnosed with MRKH syndrome before surgery. All had a normal female karyotype, amenorrhea, and normal secondary sexual characteristics with the absence of functioning median uterine structures. Of the first two patients who had undergone McIndoe's procedure, one patient had no vaginal fovea, while the other had a 1-cm vaginal dimple. Of the nine patients who underwent the Vecchietti procedure, six had no vaginal fovea and the other three had a 1-cm vaginal dimple. The mean age of the patients was 21.8 years. Ten of the 11 patients had a solitary pelvic kidney, nine of which were on the right; only one patient had a normal contralateral left kidney.

All patients had undergone an abdominal and pelvic ultrasound scan, a pelvic magnetic resonance imaging scan, and a urinary tract sonogram or urography for evaluation of the uterine rudiments, adnexae, and urinary tract.

The first two patients had undergone the McIndoe vaginoplasty (14), while the latter nine had undergone creation of a neovagina according to the modified laparoscopic Vecchietti procedure (15).

### The McIndoe Technique

A Foley catheter was inserted into the bladder after the patient was placed in the lithotomy position. A horseshoe-shaped midline incision at the vaginal fovea was made, and a cavity was obtained by blunt digital and scissor dissection in the vesicorectal space that admits two fingers and was about 13 cm in depth (Fig. 1A). A 13 cm × 5 cm split-thickness skin graft from the thigh or gluteal area was harvested. An acrylic mould with multiple openings (i.e., to allow serous and bloody discharge) was wrapped with the skin graft (Fig. 1B and 1C) with its raw surface facing outward and inserted into the neovagina (Fig. 1D). The mould was retained in this position for

an average of 14 days, during which the neovagina was irrigated daily with sterile saline solution. After 14 days, the mould was removed and the graft was inspected. Postoperatively, the patients were instructed on the use of vaginal dummies of 11.5 cm × 3 cm in size to be used daily as well as on douching daily with sterile saline solution.

### Modified Vecchietti Laparoscopic Technique

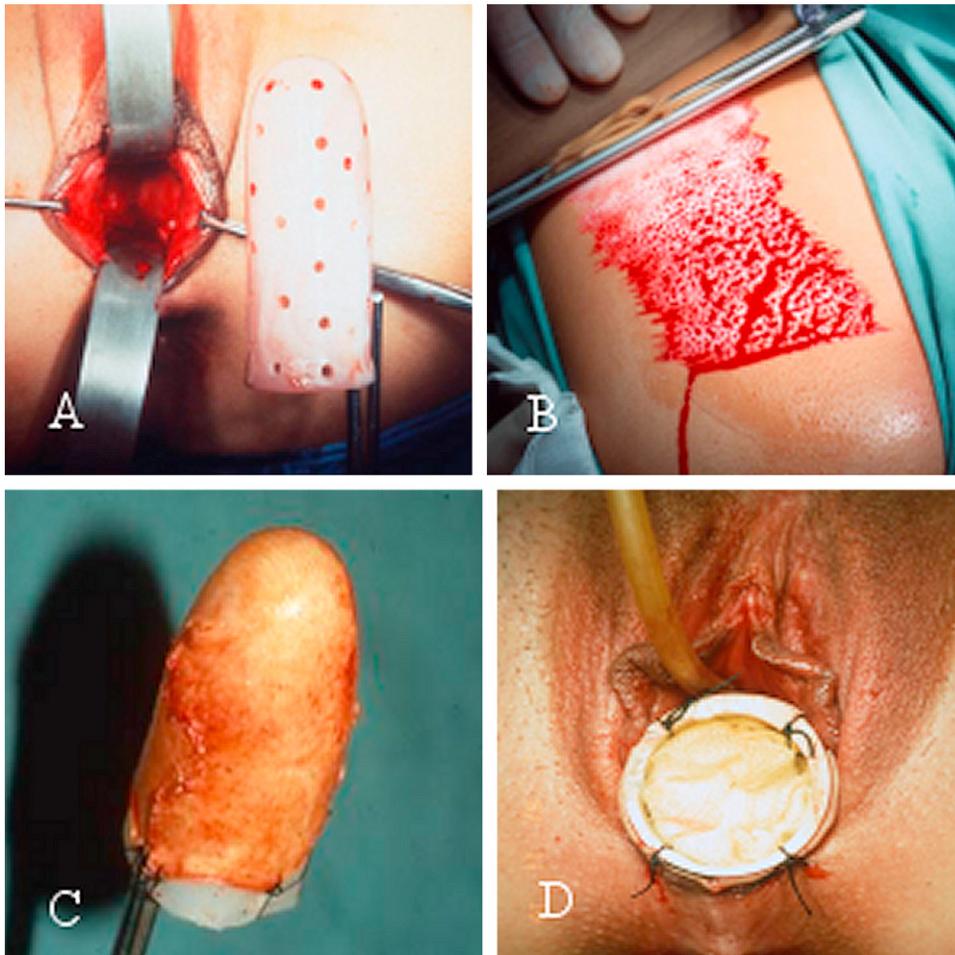
The instrumentation required to perform this operation includes the thread-bearing needle, the traction device, and its mobile dummy. The traction device and the acrylic olive originally developed by Vecchietti (G. Cremascoli, Milan, Italy) were used in this group.

After the bladder was emptied by catheterization, adequate pneumoperitoneum was obtained, and a laparoscope was introduced by the transumbilical route. The traction device along with the threads was temporarily placed on the suprapubic region, and the points at which the threads pass were marked on the skin. Adjacent to the markings, two ancillary trocars were introduced to allow accurate exploration of the abdominal and pelvic organs. The peritoneum corresponding to the vesicouterine fold was incised for about 5 mm (Fig. 2A) and lifted from the subperitoneal tissue on both margins (Fig. 2B) to facilitate the lateromedial passage of Vecchietti's thread-bearing needle. The trocars were then removed, and one was replaced by Vecchietti's straight thread-bearing cutting needle, which was passed through the loose subperitoneal connective tissue downward and medially until it reached the fold between the bladder and uterine rudiment (Fig. 3A). Since it is difficult to separate the peritoneum from the rudiment, the thread-bearing needle is brought out of the peritoneal cavity and reinserted in the subperitoneum immediately below the uterine rudiment. At this point, the direction was changed from lateromedial to craniocaudal (Fig. 3B) so that the cutting needle crosses the space between the bladder and rectum and reaches the pseudohymen. Before perforating the pseudohymen, the laparoscopist should guide the tip of the instrument aided by the middle finger inserted in the rectum. Bladder and rectal integrity are immediately checked with a cystoscopic and rectoscopic control. The pseudohymen was perforated centrally, and the threads attached to the mobile dummy were hooked. As the needle was withdrawn, the threads were brought back into the peritoneal cavity (Fig. 4A) and then both brought outward and passed subperitoneally through the abdominal wall (Fig. 4B). Finally, the threads were attached to the traction device and their tension was graduated.

The traction device and mobile dummy were removed after the neovagina had reached at least 7–8 cm in depth, which may be obtained between the sixth and ninth day after surgery. Patients can be discharged from the hospital 48–72 hours after surgery and subsequently seen every 48 hours so as to adjust the thread tension. An adequate oral analgesic therapy is usually necessary before traction regulation. The patient was discharged at removal of the traction device and was instructed to the use of soft and blunt vaginal dilators of 11.5 cm × 3 cm in size.

## FIGURE 1

(A) A cavity is obtained by blunt digital and scissor dissection in the vesicorectal space that admits two fingers and is about 13 cm in depth. On the right, the acrylic mould with multiple openings on which the skin graft will be wrapped. (B) Thigh area from which the skin graft is obtained. (C) The acrylic mould wrapped with the skin graft with its raw surface facing outward. (D) The prepared mould is inserted into the neovagina.



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## RESULTS

The surgical procedure was successful in all 11 patients, and no perioperative complications occurred. Anatomic success was defined as a neovagina  $\geq 6$  cm long, allowing easy introduction of two fingers, within 6 months after surgery. Functional success was considered achieved when the patient reported satisfactory sexual intercourse starting from 6 months after surgery.

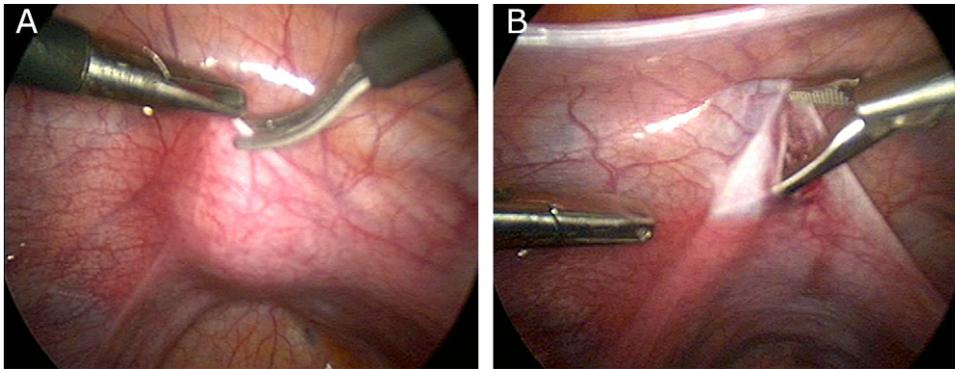
In the patients who underwent the McIndoe vaginoplasty, the mean duration of surgery was  $190 \pm 14.1$  minutes. The mean hospital stay in these patients was 14 days. The mean  $\pm$  SD length and width at removal of the mould was of  $12.5 \pm 0.7$  cm and  $4.5 \pm 0.7$  cm. After about 3 weeks, the patients were allowed to have sexual intercourse, and in these patients the use of dilators was also concomitantly reduced.

The mean duration of the surgical procedure was  $32 \pm 6.4$  minutes in the group of patients who underwent the modified Vecchietti creation of a neovagina. The traction device was maintained for a mean time of 7 days, after which it was removed. The mean  $\pm$  SD length and width of the neovagina at removal of the traction device and dummy was  $6.9 \pm 0.4$  cm and  $3.0 \pm 0.6$  cm. Sexual activity was allowed 20 days after surgery, after which the use of dilators was diminished in relation to the frequency of intercourse as well as the width, length, and epithelialization of the neovagina.

At a long-term follow-up of 14 years, both patients who underwent McIndoe vaginoplasty have shown a mean  $\pm$  SD length and width of  $8.2 \pm 0.4$  cm and 5 cm. Both report a normal satisfactory sexual life and no dyspareunia or urologic long-term complications. Schiller's test performed

## FIGURE 2

(A, B) The peritoneum corresponding to the vesicouterine fold is incised for about 5 mm and is lifted from the subperitoneal tissue on both margins to facilitate the lateromedial passage of Vecchietti's thread-bearing needle.



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during vaginoscopy showed a completely iodine-negative neovagina at 6 and 24 months after surgery.

At a long-term follow-up of 4 years, eight (89%) out of the nine patients who underwent the modified Vecchietti technique have shown anatomical and functional success. The mean  $\pm$  SD length and width of the neovagina at 4 years in these patients is  $7.4 \pm 0.6$  cm and  $4.2 \pm 0.5$  cm, respectively. The only patient who did not have optimal results had refused to use the vaginal dummies postoperatively due to her fear of pressing on the pelvic kidney. The other eight patients reported a normal satisfactory sexual life and no dyspareunia or urologic long-term complications. Schiller's test performed during vaginoscopy in these patients showed an iodine-positive vaginal-type epithelium coating, respectively, 90% and 100% of the neovagina at 6 and 24 months after surgery.

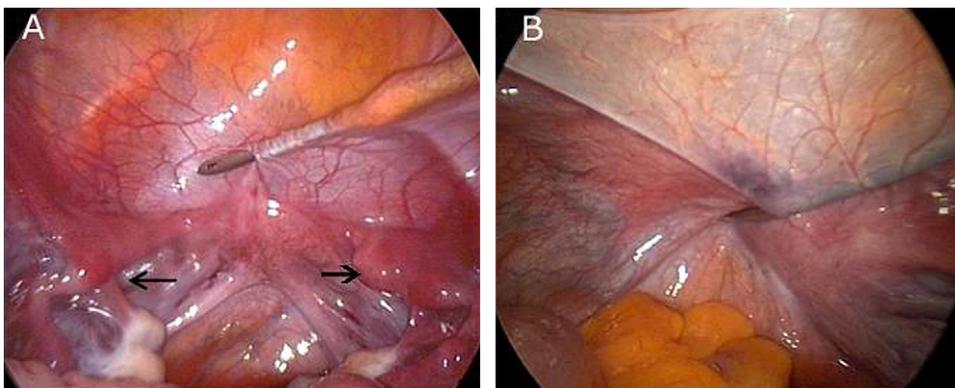
## DISCUSSION

Our present data show that both the McIndoe and the modified Vecchietti techniques appear to be safe and effective with equally optimal functional results in this particular subset of MRKH patients with a pelvic kidney. A more specific analysis of this present data, however, yields differences in terms of invasiveness, anatomical and aesthetic results, and surgical and hospitalization costs.

With respect to the McIndoe technique, the anatomical and functional results are known to be good, especially in terms of width of the neovagina. However, the aesthetic results should also be considered since a visible dyschromia can always be noted at the introital margin of the neovagina and because the graft donor site often shows a broad and visible scar in these young patients. The neovaginal tissue normally requires

## FIGURE 3

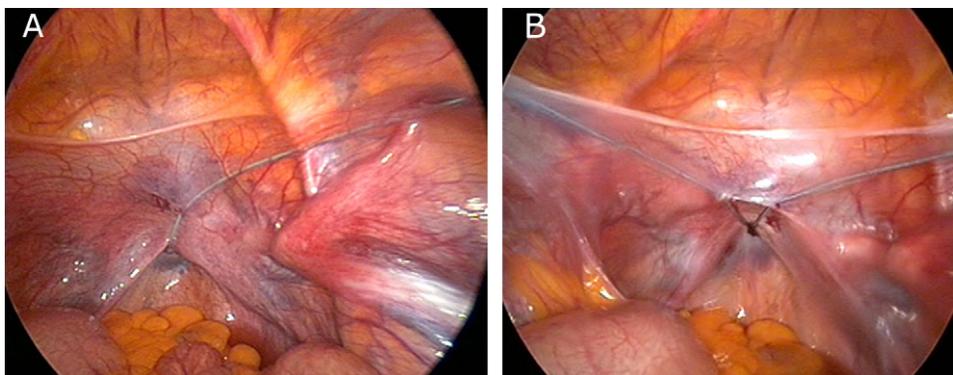
(A) Vecchietti's straight cutting needle, which is run through the loose subperitoneal connective tissue downward and medially until it has reached the fold between the bladder and uterine remnants (arrows). (B) The direction of the needle is changed from lateromedial to craniocaudal so that it crosses the space between the bladder and rectum and reaches the pseudohymen.



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**FIGURE 4**

(A, B) While the needle is withdrawn from the abdomen, the threads are brought into the peritoneal cavity and are then both guided outward by passing subperitoneally through the abdominal wall.



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a long period of time before acquiring an adequate resilience, when the epidermal squamous layer possibly diminishes its regenerative keratinizing process. While the Vecchietti procedure only requires the placement of the traction device with a subperitoneal approach, in the McIndoe technique, the graft preparation is followed by dissection of a rectovesical space, for which an accurate hemostasis is required but with a minimal use of the electrocautery to avoid tissue necrosis. Although we have not experienced failure of skin graft take, there are indeed such reports in the literature (16–18). The McIndoe vaginoplasty certainly entails higher costs as it requires the presence of a team of plastic surgeons for the preparation of the skin graft as well as long surgical and hospitalization times that also imply maintaining a bladder Foley catheter and daily dressings of the graft.

In this study, the evaluation of the patients who underwent the modified Vecchietti procedure has confirmed the brief duration of this technique regardless of this particular setting and has also shown optimal short- and long-term results both from an anatomical-functional point of view as well as relative to the safety of the technique. Contrary to the McIndoe technique, in patients who have undergone the Vecchietti procedure, only a meticulous gynecologic inspection can uncover the differences between this neovagina and a normal vagina. Another advantage of the modified Vecchietti approach is the possibility of making a precise study of the pelvic anatomy (i.e., site of the pelvic kidney, size of the uterine rudiments) before the surgical procedure. In addition, in cases of failure of the first-line surgical procedure, the Vecchietti technique can be safely adopted as an alternative option.

In Rokitansky patients with a pelvic kidney, which can be often associated with contralateral agenesis, the creation of a sigmoid neovagina implies the possibility of major intraoperative risks also due to the complexity of this intraperitoneal procedure. On the contrary, amid the possible treatment choices, the nonsurgical Frank method can be indicated. De-

spite the fact that it represents one of the most used first-line methods for patients with vaginal agenesis due to the absence of surgical and anesthetic risks, such an approach requires daily use of vaginal dilations for a long period of time, while these young patients often cannot maintain the necessary perseverance or may refuse to continue the dilations. Urinary tract infections should also be considered as a risk in these patients, especially initially when the urethral meatus can be strained together with the vaginal fovea below. In our case series of 11 patients with MRKH syndrome with a pelvic kidney, none agreed to attempt the nonsurgical method.

The extraperitoneal approach implied in the Williams techniques certainly minimizes the risks associated with the presence of a pelvic kidney. This vaginoplasty technique also has the advantage of having an extraperitoneal approach and being a relatively simple procedure. However, the presence of perineal hair and the nonphysiologic external angle of the neovagina that results from this technique does not allow optimal anatomical results.

The number of patients considered in this study is admittedly low owing to the rarity of the MRKH syndrome when associated with a pelvic kidney. However, the presence of a tertiary care center for MRKH syndrome in our hospital has allowed for the assessment of this relatively high number of cases. This present study also shows the results obtained in a homogeneous series of patients, that is, with comparable lengths of the vaginal fovea present before the surgery. Admittedly, there is a predictable bias due to the different attitudes of each patient as well as differences in their compliance with the use of dilators and in their sexual activity.

The presence of a pelvic kidney, which is most commonly a solitary one, in a patient requiring vaginoplasty should allow for the choice of a minimally invasive procedure with minor involvement of the adjacent pelvic organs during the operation. When confronted with the choice of which of

the possible surgical procedures to use to create a neovagina in patients with a pelvic kidney, Vecchietti's laparoscopic technique seems to have the important advantages of being brief, safe, effective, and yielding optimal anatomic-functional results in this critical subset of MRKH patients with a known higher perioperative risk factor.

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