Creation of a neovagina in patients with Rokitansky syndrome using peritoneum from the pouch of Douglas: an analysis of 48 cases

Herbert de Sousa Marques, M.D., Francisca Lopes dos Santos, M.D., Pedro Vitor Lopes-Costa, M.D., Alesse Ribeiro dos Santos, M.D., and Benedito Borges da Silva, M.D., Ph.D.

Department of Gynecology, Federal University of Piauí, Teresina, Piauí, Brazil

Objective: To evaluate the surgical feasibility and the long-term anatomical and functional results of the technique of vaginal reconstruction using peritoneum from the pouch of Douglas in patients with uterovaginal agenesis, known as Rokitansky's syndrome.
Design: Retrospective single-institution case series.
Setting: A tertiary referral center for the treatment of female genital malformations.
Patient(s): Forty-eight patients with vaginal agenesis.
Intervention(s): Laparotomy and use of pelvic peritoneum to form a neovagina.
Main Outcome Measure(s): Anatomical success was defined as a neovagina ≥ 8 cm in length that easily permitted the insertion of two fingers 6 months after corrective surgery. Functional success was considered to have been achieved when the patient reported satisfactory sexual intercourse beginning 6 months after surgery.
Result(s): The surgical procedure was carried out uneventfully, and anatomical success was achieved in 100% of cases. Functional success was also achieved in the entire population studied.
Conclusion(s): The construction of a neovagina using pelvic peritoneum is simple, safe, and effective in patients with Rokitansky syndrome. (Fertil Steril® 2008;90:827–32. ©2008 by American Society for Reproductive Medicine.)

Key Words: Neovagina, Rokitansky syndrome, genital malformations, uterovaginal agenesis, pelvic peritoneum, construction

Complete vaginal agenesis is a rare congenital condition (1) that occurs in approximately 1 in 4,000–10,000 female births (2). Congenital vaginal agenesis is frequently associated with Mayer-Rokitansky-Kuster-Hauser syndrome, which is characterized by primary amenorrhea, normal female genotype and phenotype, normal ovarian function and endocrine status, and normal secondary sexual characteristics. The uterus may be completely absent or may be represented by two rudimentary horns (1–3). Some patients also have other associated malformations, such as renal (40%), skeletal (10%–12%), and auditory abnormalities (4.5%) (3).

In the past, the construction of a vagina in patients with vaginal agenesis associated with Rokitansky syndrome was not recommended until the patient was contemplating marriage (4). However, today there is a tendency to treat patients when they reach 14–16 years of age (5, 6). Although many techniques have been proposed for the construction of a neovagina, no consensus has yet been established with respect to treatment (5–8). Indeed, the number and variety of these methods reflect the fact that this remains a challenging problem and that the optimal treatment approach has yet to be established (6).

The most common nonsurgical technique for the construction of a neovagina is the Frank technique, which has the disadvantage of requiring long-term use of vaginal dilators (9). In addition, different surgical approaches have been proposed for vaginoplasty in patients with vaginal agenesis, including methods that involve pedicled segments of the intestine, bowel grafts, skin grafts, pedicled skin flaps, and peritoneum from the pouch of Douglas (6, 10). In particular, vaginoplasty using peritoneum from the pouch of Douglas was reintroduced in 1974 by Davydov and Zhvitiashvili (11) and ever since Davydov's name has been linked to this procedure. These investigators reported completely satisfactory results with this technique. Here we report our experience with 48 cases of vaginal construction using peritoneum from the pouch of Douglas.

MATERIALS AND METHODS

Between March 1976 and December 2006, 48 patients aged 16–30 years (mean 18 years) with Rokitansky syndrome underwent construction of a neovagina by means of a technique

Received April 4, 2007; revised July 6, 2007; accepted July 12, 2007.
Reprint requests: Benedito Borges da Silva, M.D., Ph.D., Avenida Elias João Tajra 1260, Apt. 600, Bairro Jockey Club, CEP 64059-300 Teresina, Piauí, Brazil (FAX: 55-86-3215-0470; E-mail: beneditoborges@globo.com).

involving the pelvic peritoneum. All patients had primary amenorrhea. Diagnostic criteria for Rokitansky syndrome were normal external genitalia, normal secondary sexual characteristics, vaginal agenesis, finding of a fibrous remnant in the place of a uterus at rectal examination, and no cystic swelling due to retained menstrual blood. All patients were submitted to pelvic ultrasonography, karyotyping, and ultrasonography of the urinary tract. The clinical and anatomical characteristics of the patients are shown in Table 1. All patients were informed with respect to the technique to be used in the formation of the neovagina using pelvic peritoneum. Publication of this article was approved by the institutional review board of the Research Ethical Committee of the Federal University of Piauí with no restrictions because the procedure has been carried out in this hospital for more than 30 years and is considered a routine surgical procedure for the treatment of vaginal agenesia in this institution.

Presurgical preparation consisted of a thorough program of bowel cleansing based on a low-fiber diet and a colonic enema on the day preceding surgery. Antibacterial chemoprophylaxis was given at the beginning of surgery in almost all cases. The surgical procedure was performed with the patient under general anesthesia in the modified dorsal lithotomy position.

After a Pfannenstiel laparotomy, an acrylic mold 2.5 cm in diameter and 14 cm in length was placed against the hymenal fossa or vaginal stump protruding from the urogenital sinus and was pushed in a cephalad movement by the assistant surgeon by placing pressure at the vault of the vaginal stump. A transversal incision was made with the scalpel through the pelvic cavity at the location of the protrusion made by the mold between the bladder and the rectum, corresponding to the vault of the vaginal stump of the urogenital sinus, until the mold was reached, thus creating an opening of the vaginal stump vault, and consequently the vesicorectal space through which the mold would pass. The borders of the vault of the vaginal stump were stitched with catgut 00 to serve as a guide for posterior suturing of the pelvic peritoneum. Next, the mold was pushed through the opening at the vault of the vaginal stump until it completely penetrated the pelvis. Next, the peritoneum from the Douglas pouch was marked with methylene blue in the form of butterfly wings, in an area of sufficient size to easily cover the mold. After the peritoneum had been marked, it was sectioned at that point, mobilized, and the proximal borders were sutured with catgut 00 onto the mold using noncontinuous sutures. The borders of the vault of the vaginal stump, initially open, were then sutured with catgut 00 to the borders of the peritoneal tube formed over the mold, thereby completing the neovagina. The edges of the distal peritoneum were stitched across the median line, eliminating the exposed areas and strengthening the neovagina (Figs. 1 and 2).

Immediately after surgery the acrylic mold was lubricated with an ointment containing neomycin and replaced in the neovagina. Forty-eight hours after surgery the mold was removed, and secretions were cleaned from the cavity of the neovagina. Next, another 10-cm-long mold lubricated with cream containing estriol was inserted to accelerate re-epithelization of the peritoneal tube by the squamous epithelium from the vaginal stump of the urogenital sinus and/or by metaplasia. At the time of hospital discharge, 72 hours after surgery, the patients were taught how to clean the genital area and how to correctly manipulate the vaginal mold. Patients were also recommended to use the mold in the neovagina for a period of 9 months, or for 6 months in the case of those patients who had regular, frequent intercourse. This smaller mold allowed the patients freedom of movement and permitted them to carry out their regular activities without any major discomfort. The mold remained inserted in the neovagina throughout the day and was only removed for genital hygiene and sexual activities. Intercourse was generally permitted after adequate neovaginal re-epithelization, which usually occurred approximately 90 days after surgery (Fig. 3).

Clinical follow-up was scheduled for 1, 3, 6, and 12 months after surgery and every 6 months thereafter. At each follow-up visit the following procedures were carried out: evaluation of symptoms and of the quality of the patient's sexual life, vaginal and rectal examinations, vaginoscopy and vaginal cytology for hormone evaluation, and microbiological tests. Schiller's test was carried out in all patients to evaluate re-epithelization of the neovagina (Fig. 3). All patients were requested to define their degree of sexual satisfaction by selecting one of the following: unsatisfactory intercourse, less than satisfactory intercourse, moderately satisfactory intercourse, or satisfactory intercourse.

The criteria defining anatomical success was a neovagina $\geq$8 cm long that easily permitted insertion of two fingers within 6 months after corrective surgery (Fig. 3). Functional success was considered achieved when the patients reported satisfactory sexual intercourse beginning 6 months after surgery. The mean follow-up of patients was 35 months (range 12–58 months).

TABLE 1

Characteristics of the 48 patients with Rokitansky syndrome submitted to construction of a neovagina using peritoneum from the pouch of Douglas.

Age (y), mean (range)	18.0 (16–30)
No. of patients	48
with vaginal uterine agenesis	
Urinary tract abnormalities	
Unilateral pelvic kidney	6
Unilateral renal agenesis	2
Hydronephrosis	4
Skeletal abnormalities	
Spina bifida	1
Webbed neck	1
Absence of fourth finger	1

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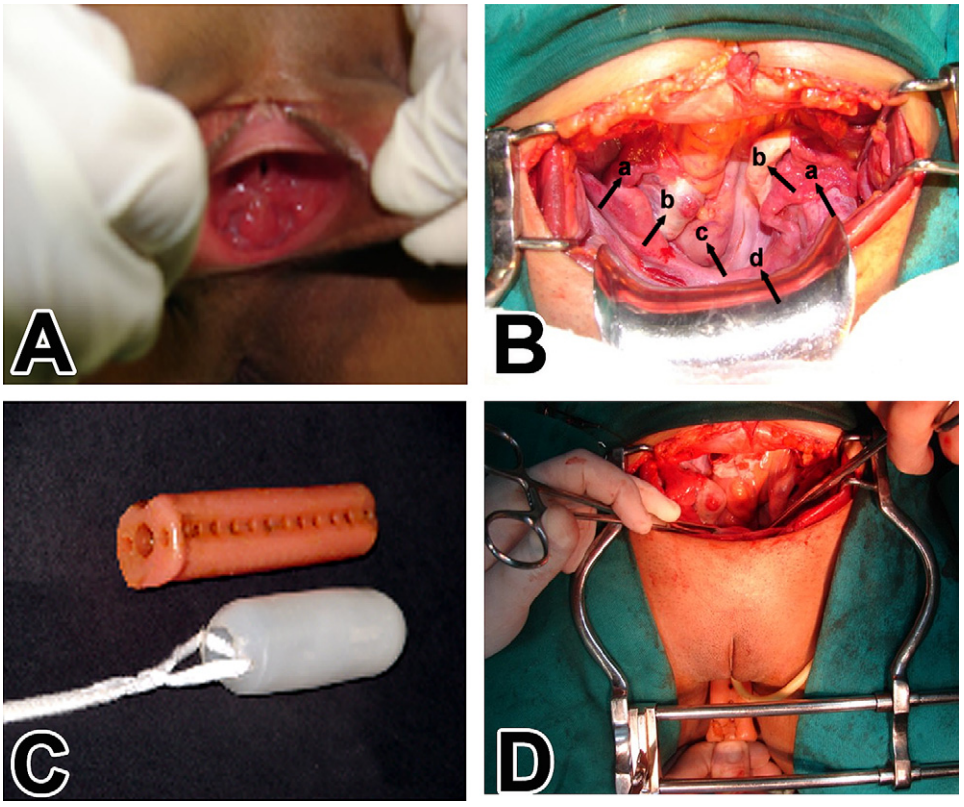
FIGURE 1

Beginning of surgery. **(A)** Partially open vulva showing hymenal fossa. **(B)** Intrapelvic structures: tubes, ovaries, rectum, and fibrous cord in the place of a uterus (*arrows* a, b, c, and d, respectively). **(C)** Models of molds used. Note the openings in the center and the sides to permit the drainage of secretions. **(D)** Mold pressing against the vault of the vaginal stump of the urogenital sinus.



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RESULTS

The procedure proved a complete success in all cases. Mean duration of surgery was 120 minutes (range 100–140 minutes). No accidental rectal or bladder perforations occurred during vesicorectal space opening, and there were no other complications during surgery. No blood transfusions were necessary. All the patients reported some degree of perineal discomfort, albeit of no major concern. A slight blood-stained vaginal discharge was observed in the majority of patients. Mean duration of follow-up was 35 months.

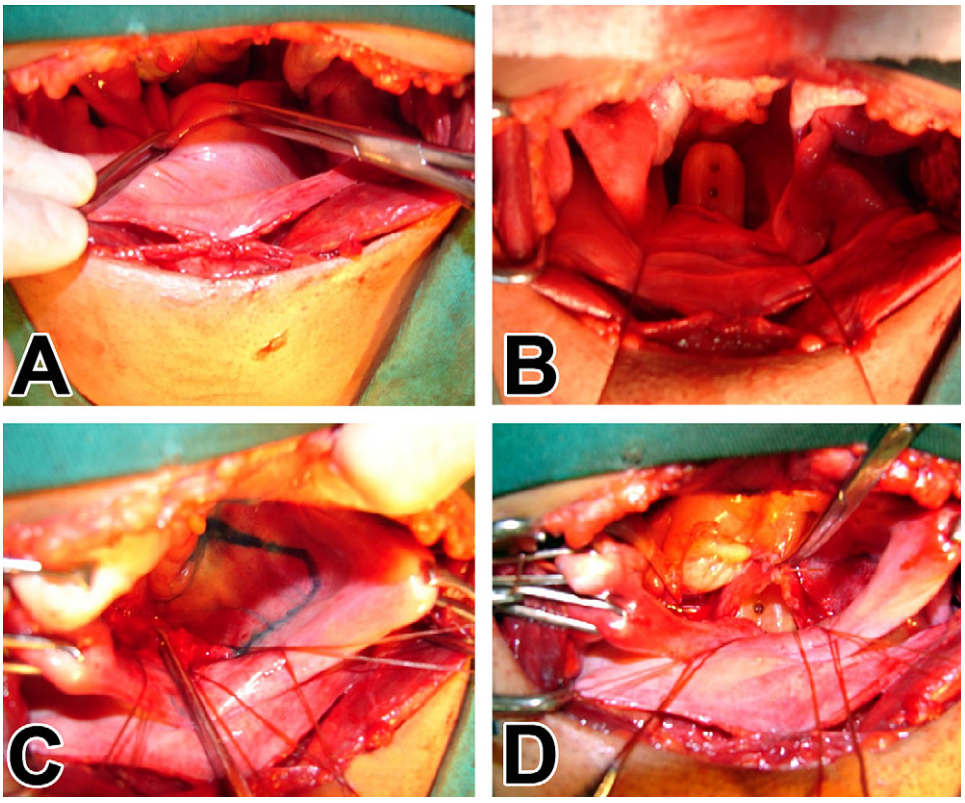
Anatomical and functional results were successful. The mean length of the neovagina, as evaluated at the first post-surgical follow-up visit, was 9 cm (range 8–10 cm) (Fig. 3). No reduction was observed in this length at the 6-month visit. From vaginoscopy and the Schiller's test performed at the 30-day follow-up visit, it was already possible to observe initial re-epithelization of the walls of the vaginal canal formed from the pelvic peritoneum by the squamous epithelium. Ninety days after surgery, the entire neovagina formed from the pelvic peritoneum was covered by squamous epithelium, and Schiller's iodine test was positive (Fig. 3). From that time onward, patients began to have sexual intercourse. Initially they used lubricating gel; however, as soon as they began to maintain regular sexual activity, they no longer required it. All patients described their sexual life as satisfactory and reported having achieved orgasm.

DISCUSSION

In view of the considerable number of patients in our series, the prolonged duration of follow-up, and the satisfactory anatomical and functional results achieved with the neovagina constructed from pelvic peritoneum in patients with Rokitansky syndrome, we may conclude that this method is effective as well as simple and safe. The procedure was carried out in 48 patients with no major complications, and anatomical and functional success was achieved in 100% of cases. The most important steps in the management of vaginal agenesis are making a correct diagnosis with respect to conditions that may hamper the operation, such as malformations of the urinary tract, and the patient's desire to undergo corrective surgery (10).

FIGURE 2

During surgery. **(A)** Protrusion made by the mold between the bladder and the rectum, seen through the pelvic cavity. **(B)** Mold inserted into the vesicorectal space and pelvic cavity. **(C)** Methylene blue staining showing the region of the pelvic peritoneum to be cut and mobilized. **(D)** Suturing of the pelvic peritoneum onto the mold.



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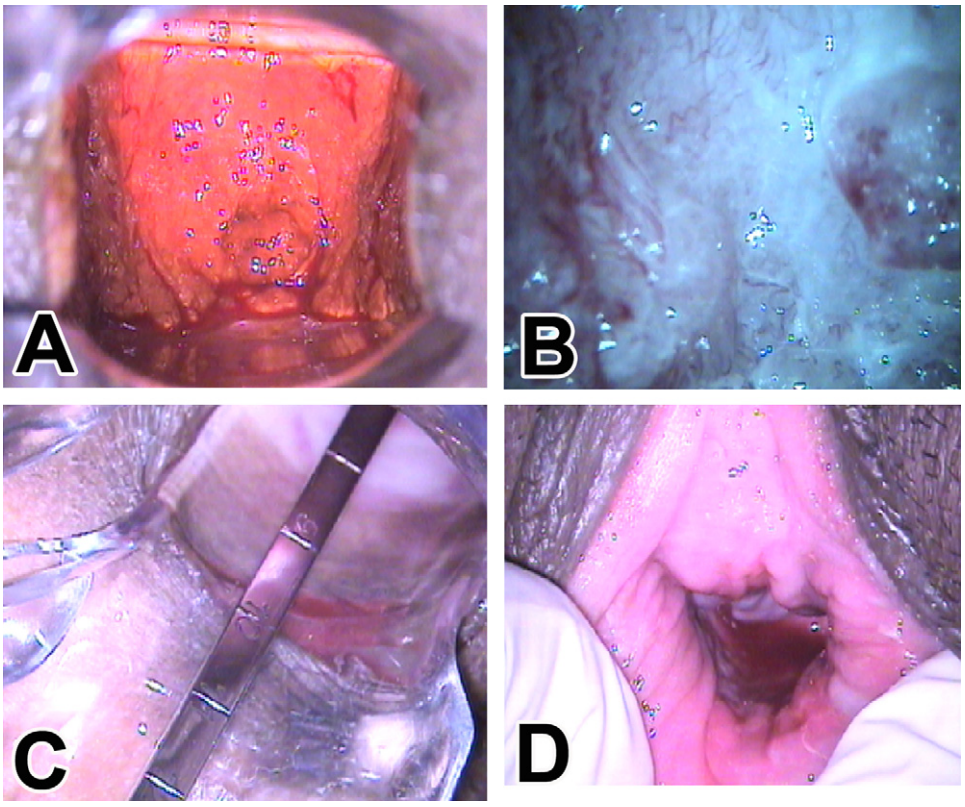
In the past, the construction of a neovagina in patients with vaginal agenesis was not recommended until the patient was contemplating marriage (4). More recently, some investigators have reported a tendency to treat patients between 14 and 16 years of age (5, 6). However, others believe that after genital malformation has been diagnosed, usually in adolescence, it is of utmost importance to wait until the woman is ready to engage in sexual activity (8). On the other hand, an excessively long waiting period may have a negative effect on the young woman's personality, influencing the functional success of the operation (8). The various surgical techniques available for the construction of a neovagina reflect the fact that no consensus has yet been reached with respect to the best option for surgical correction of vaginal agenesis associated with Rokitansky's syndrome (10, 12).

A nonsurgical method of vaginal construction, the Frank technique of progressive vaginal dilatation, may be used for patients who have a 2 to 3-cm hymenal fossa (8). The Frank method has the advantage of avoiding surgery; however, it requires long-term use of dilators, which may not be acceptable to some younger patients (10). Moreover, the depth of the vagina is limited, and the anatomical and functional success rates of the Frank method range from 43% to 100% (13–15). Vecchietti (13) developed an alternative to the Frank method that consists of implantation of a device to increase the depth of the vaginal vault. Just as in laparoscopy, this alternative technique does not require vesicorectal dissection, and anatomic and functional success rates are 100% and 98.1%, respectively (16). The most widely used surgical skin graft method is the McIndoe method, consisting of a split-thickness skin graft inserted into a space created between the bladder and the rectum and maintained in position by a stent. Anatomical and functional success rates range from 57% to 91% and from 81% to 100%, respectively, with this method (3, 15). However, disadvantages of this technique include a high rate of graft shrinkage, dyspareunia, and stenosis (17, 18). On the other hand, sigmoid grafting is a method of vaginal construction that offers adequate length, natural lubrication, low risk of stenosis at the perineal introitus, and early coitus. Moreover, shrinkage in length and width is minimal (10, 19, 20). Nevertheless, this method is carried out by laparotomy, which is a major surgical procedure and is associated with the usual risks involved in bowel surgery, including rectal or colonic perforation in 1%–3% of cases (21).

Therefore, the anatomical and functional results found with the surgical technique used by our group for the

FIGURE 3

Ninety days after surgery. **(A)** The lateral walls of the vagina after Schiller's test. **(B)** Vaginoscopy with a green filter shows vessels of the epidermization of the neovagina. **(C)** Measurement of the depth of the neovagina using a hysterometer (10 cm). **(D)** Vulvar introitus after removal of the vaginal mold.



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construction of a neovagina in patients with Rokitansky syndrome were superior to those reported in the literature for Frank's nonsurgical method. Moreover, this technique eliminates concern over patient compliance with the long-term use of vaginal dilators. Compared with other techniques for the surgical construction of a vagina such as, for example, McIndoe's technique, this method of using peritoneum from the pouch of Douglas has been shown to be easy, safe, and effective and does not require plastic surgery. Care in dissecting the vesicorectal space, together with the experience of the surgeon, minimizes the possibility of lesions to these organs (bladder and rectum). One interesting finding, detected 90 days after surgery, was the presence of squamous epithelium, similar to that found in the vaginal introitus, covering the entire internal surface of the peritoneum forming the neovagina. This finding was confirmed by the Schiller test, which showed positive iodine staining on all the walls of the neovagina. After surgery these patients used a vaginal cream containing estriol to lubricate the mold, and this may have accelerated re-epithelization of the neovagina. At the 6-month follow-up visit, satisfactory anatomical and functional results had been achieved in all the patients in this series, confirming the use of peritoneum from the pouch of Douglas as the method of choice at our institute for the construction of a neovagina in patients with vaginal agenesis associated with Rokitansky's syndrome.

Acknowledgments: The authors thank Professor Paulo Barros *in memoriam*. Professor Barros was Head of the Department of Gynecology at the Hospital dos Servidores, Rio de Janeiro, Brazil. He introduced this surgical technique to the institution and trained the authors to perform it, thereby making this study possible.

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