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CLINICAL ARTICLE

The laparoscopic Vecchietti technique for vaginal agenesis

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Abstract

Objective: To evaluate surgical, long-term anatomic and functional results of the laparoscopic Vecchietti procedure to treat women with vaginal agenesis. *Methods:* Retrospective analysis of 86 women treated at the Department of Gynecology and Obstetrics at the University of Verona, Italy. Data were analyzed based on surgical results and postoperative sexual satisfaction. Depth and diameter of the neo-vagina was determined. The characteristics of the neo-vaginal mucosa were investigated by vaginoscopy. Patients reported frequency, satisfaction, and any difficulties found at intercourse. *Results:* Functional success was obtained in 98.1% and anatomic success in 100%. In all patients, at 1 year, the mucosa was pink, trophic, and moist. Two fingers were introduced easily into the neo-vagina in all cases. All patients, which decided to have sexual intercourse, defined these as satisfying within 6 months. *Conclusions:* Laparoscopic procedure used in this study is simple, safe, and effective. Anatomical and functional results obtained suggest this laparoscopic procedure as the treatment of choice for this syndrome.
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1. Introduction

Vaginal agenesis is a rare congenital anomaly of the female genital tract with a prevalence of 1 in 5000 female newborns and is the result of an alteration occurring during the embryonic development of the female internal genitalia [1-13].

A standardized treatment does not yet exist, but numerous techniques to create a neo-vagina have been proposed in the past. Most methods for the treatment of aplasia or atresia of the vagina can be considered non-surgical, such as progressive dilatation [14], or surgical, such as skin transplants [15], intestinal transplants [16], or

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epithelialization from the outer skin layer (the Vecchietti method) [17].

In Europe during the last 30 years, the most commonly used method for the creation of a neo-vagina has been that proposed by Vecchietti [1] in 1965, which combines surgical and functional connotations. This procedure can be considered as a surgical version of Frank's method [14]. Instead of applying pressure from below, constant traction is exerted from above to an acrylic olive, which is pulled upward, causing a deep invagination in the vesicorectal space, usually in 7–8 days. The constructed neo-vagina must be maintained by daily application of artificial dilators.

In 1994 a laparoscopic version of the Vecchietti method that has proved safe and effective was described [18]. Other investigators have proposed various laparoscopic modifications of the Vecchietti operation, but with small series. The aim of our investigation was to assess clinical and surgical results as well as anatomical and functional outcomes after a laparoscopic Vecchietti procedure with a follow-up of 2–10 years.

2. Materials and methods

Between 1993 and 2004, 86 patients aged between 16 and 34 with vaginal agenesis were observed at the Verona University Hospital for diagnosis and treatment with the laparoscopic Vecchietti technique.

All patients were post-pubertal with primary amenorrhea. They had a diagnosis of vaginal agenesis made by physical examination. Criteria for the diagnosis of this syndrome were normal external genitalia, pubic and axillary hair, absence of vagina, the presence of ovaries, tubes and rudimentary horns of uterus documented by pelvic ultrasound in genotypic females.

Each patient underwent pelvic ultrasound, karyotyping, and ultrasonographic examination of the urinary system.

2.1. Technique: the laparoscopic Vecchietti procedure [18]

The principle of this technique is to create a neo-vagina by gradual stretching of the patient's own vaginal skin placing 2 threads that course subperitoneally, cross the vesicorectal space, and connect a traction device placed suprapubically. This involves placing an olive-like bead onto vaginal dimple, which is pulled up gradually by threads that run through the olive from the peritoneum into the pelvis and out through the abdomen, where they are attached to the traction device. The bladder has to be catheterized, and a pneumoperitoneum achieved via transumbilical approach; then a 10-mm laparoscope and two 5-mm trocars are laterally inserted. A probe is inserted into the rectum to outline it. The vesicorectal space is then dissected and the bladder reflected anteriorly. Under direct vision, the Vecchietti straight thread-bearing cutting needle is introduced and passed subperitoneally until reaching the presumed vesicorectal space, which is noted by the probe into the rectum and the tube into the bladder. The olive bead is threaded on the perineal side to sit on the vaginal dimple externally, while the other ends of the thread are inserted again into the Vecchietti straight needle and slowly brought back through the abdominal wall. Once in position the threads are pulled gently before attaching them to the traction device that sits on the abdomen. The peritoneum is then closed with absorbable suture and a cystoscopy performed to ensure that the bladder has not been perforated (Fig. 1).

Patients were discharged from the hospital 48–72 h postoperatively, and progressive traction was done at the outpatient department every 48 h to adjust the tension of the traction sutures. The dilating olive and the Vecchietti traction device were removed after the neo-vagina had progressed to at least 7–8 cm in depth.

After this initial phase, all women were instructed to use a dilator and to keep it inserted in the neo-vagina for approximately 8–10 h per day during the first month. The decision to progress to a larger dilator was made by the physician at the follow-up examination so as to obtain homogeneous use of the different sizes by all patients. If patients experienced discomfort related to size progression, they were advised to alternate two consecutive sizes for a few days. After the first month and the start of sexual activity, the use of dilators was recommended for shorter periods of time, taking into consideration the frequency of intercourse.

The dilators were made of soft latex, measured 10 cm long, and came in three sizes of 1.5, 2, and 2.5 cm in diameter. Intercourse was generally allowed 20 days after removal of the acrylic olive. Follow-up consisted in a postoperative examination at 1, 3, 6 months, 1 year, and then once every year and in a detailed sexual history. At each follow-up visit the physician assessed symptoms, evaluated the patient's quality of sexual life and carried out vaginal and rectal examinations, vaginoscopy with Schiller test and vagnal cytology with microbiologic testing. All patients were requested to define the degree of sexual satisfaction by choosing one of the following: unsatisfactory intercourse, less satisfactory intercourse, moderately satisfactory intercourse, or satisfactory intercourse.

Anatomic success was defined as a neo-vagina $\geq$6 cm long allowing easy introduction of two fingers within 6 months after corrective surgery. Functional success was defined if the patient reported satisfactory sexual intercourse, with low use of lubricating gel and achieved orgasm.

In the post-operative period, the period of time was evaluated during which discomfort or pain required the use of analgesic drugs (< or more than 10 days), as well as whether neo-vaginal depth, degree of lubrication/use of lubricant gel and regular sexual intercourse were good predictors of sexual satisfaction.

The Schiller test was performed in all patients using a colposcope to evaluate the epithelialization of the neo-vagina; acetic acid 3% solution was used for about one minute to cleanse the mucosa and to give the epithelium a bright pink color. A small swab drenched in an iodo–iodine solution was then passed on the vaginal mucosa, with the vaginal epithelium gaining a yellow-brown color.

Mean follow-up time for patients was 42 months (range, 34–64 months). Continuous data were analyzed using Student's *t*-test, and category data were analyzed using Fisher's exact test, with a significant *p* value less than 0.01.

3. Results

The procedure was completed successfully in all patients. There were no complications with the laparoscopic technique.

The operating time for surgical procedure was 18–30 min (mean time = 22 min). The neo-vaginal depth in all patients ranged from 60 to 90 mm, with a mean (SD) of 74.9 ± 7.9 mm. An adequate length of the neo-vagina was achieved in all patients except for 2 within 8 days after surgery ($p<0.01$).

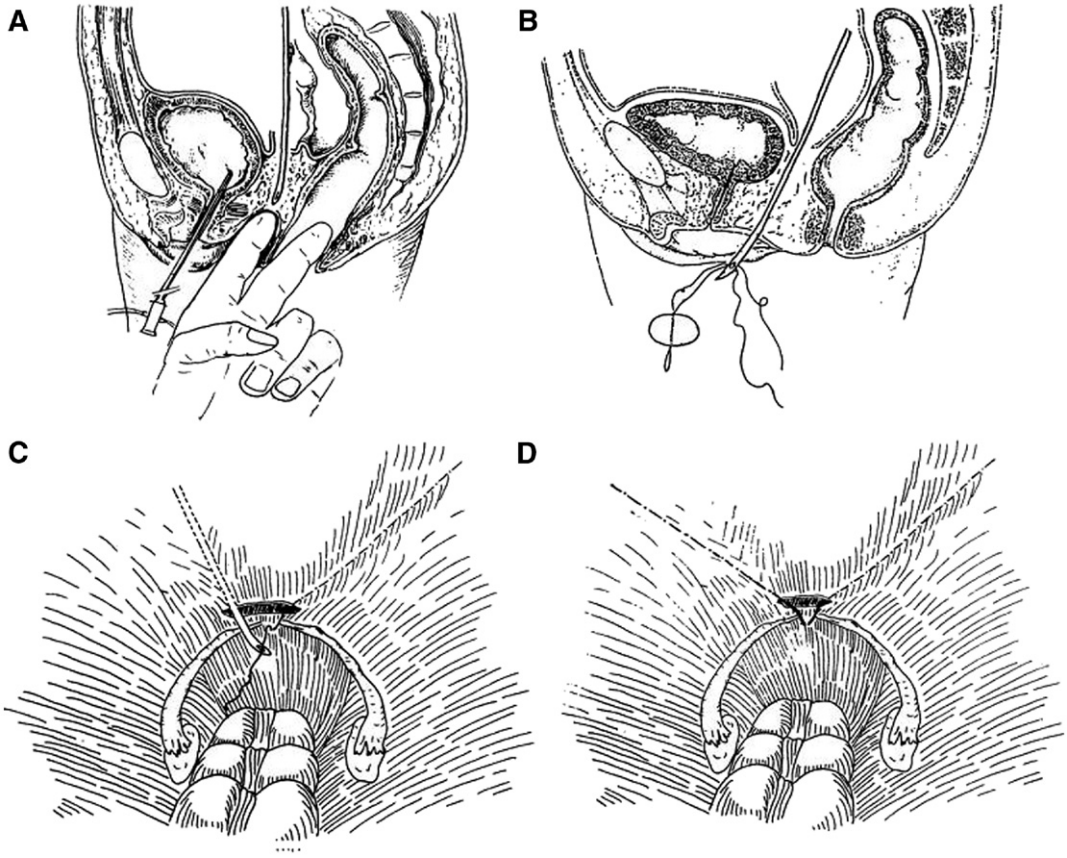

Figure 1 Laparoscopic Vecchietti's procedure: (A) under direct vision, the Vecchietti's straight thread-bearing cutting needle is introduced and passed subperitoneally till reaching the presumed vesicorectal space, which is noted by the probe or finger into the rectum and by the index finger to guide the needle between both fingers down through the non-existent vescicorectal space; (B) the non-absorbable thread, attached to the olive, is hooked on the needle; (C) one of the ancillary trocars is removed to introduce a hook-shaped instrument to put the thread in the hook and than extracted via the ipsilateral trocar hole. The same procedure is repeated on the other side; (D) intra-operative view: the threads are tied to the traction device and the strength of tension graduated.

The 2 patients who did not have an adequate vaginal length within 8 days after surgery achieved it after 1 month.

The first dilator used after removal of the device and olive had a diameter of 1.5 cm, but within 3 months all patients were able to use a dilator of 3 cm in diameter. After 6 months, the length of the neo-vagina was 6.5 cm in 4 patients and >7 cm in all remaining patients ($p<0.01$), so that two fingers could be easily introduced into the neo-vagina in all cases (Table 1).

All patients complained of perineal discomfort or pain requiring administration of analgesic drugs during the initial postoperative period (2–5 days), when the Vecchietti traction device was still in use, especially while adjusting the tension of the traction sutures. None of the patients suffered mictation difficulties caused by the presence of the olive bead.

The mean time during which pain required analgesic drugs was 4 days. All patients stopped drugs within 10 days ($p<0.01$).

Vaginoscopy showed a vaginal-type epithelium, with positive reaction to the Schiller test, coating 80% of the newly formed vagina after 3 months ($p<0.01$). Such epithelial growth could be seen on >90% of the surface 6 months after surgery and was complete, with only a few iodo-negative zones, after 1 year.

Patients who experienced an early sexual intercourse (45 patients) started within 30 days after removal of the olive. All of them initially needed a lubricating gel and felt discomfort of varying degrees.

At an average of 3 months after surgery, sexual intercourse was reported as no longer painful or associated with discomfort. After 6 months of regular sexual activity, patients no longer needed lubricating gel.

Table 1 Anatomical result

Anatomical results	Complications	Device duration	Vagina length (>6 cm)	Analgesic use
<8 days	None	86 patients*	84 patients*	84 patients*
>8 days	None	None	2 patients	2 patients (10 days)
<6 months	None	-	86 patients	-
>6 months	None	-	None	-

*Statistical difference: $p<0.01$.

Table 2 Functional results

Functional outcomes	Vaginoscopy (vaginal-type epithelium)	Sexual activity	Use of lubricant	Satisfactory intercourse	Achieve orgasm
<1 month	2	45	All 45	10	1
<3 months	70*	50	40	27	15
<6 months	82	71*	12*	49	40
<1 year	86	80	-	68*	68*
>1 years	-	86	-	73	-
End of study (2006)	-	86	-	81	70

*Statistical difference: $p<0.01$.

There was a significant difference between the number of patients who used lubricating gel during the first 6 months and the number of patients who required lubricant gel for more than 1 year ($p<0.01$), but this is not related to sexual satisfaction.

Overall, 71 patients (82.6%) started sexual intercourse within 4 months. All these patients succeeded in having a stable sexual relationship (i.e. husband, fiancé) after the operation. The remaining 15 patients (aged between 16 and 20 years) resorted to dilators for the period of time while they did not have any stable sexual partner.

After 1 year 53 patients (74.6%) described their sexual life as satisfactory, 14 (19.7%) as moderately satisfactory, 4 (5.7%) as less satisfactory and 63 (88%) reported having orgasm. Patients who did not take up early sexual activity asserted that they were scared of feeling pain or of lacerating the neo-vagina.

There was a statistically significant difference between the number of patients who reported sexual satisfaction within the first year and the number of those who reported sexual satisfaction at later stages ($p<0.01$).

At the end of the study, 81 patients (94.4%) described their sexual life as satisfactory and 70 (81.3%) of these patients reported having orgasm (Table 2).

There was not a statistically significant correlation between neo-vaginal depth and sexual satisfaction: that is between those patients who reported sexual satisfaction and those who reported moderately or less satisfying sex (73.6 ± 7.2 mm vs. 74.7 ± 8.2 mm, $p=0.62$).

Neo-vaginal depth and the use of lubricating gel over an extended period of time (>6 months or >1 year) were not good predictors of sexual satisfaction ($p>0.01$).

4. Discussion

Vaginal agenesis occurs in approximately 1:5000–7000 female births and recently many authors suggest the role of genetic defect in familial aggregates, suggesting an autosomal dominant trait with an incomplete degree of penetrance and variable expressivity [19].

This could explain the involvement of their mutations in a major developmental gene or a limited chromosomal deletion. HOX genes have been shown to play key roles in body patterning and organogenesis, and in particular during genital tract development. Expression or function defects of one or several HOX genes may account for this syndrome [19,20].

Differential diagnosis of vaginal agenesis includes congenital absence of the uterus and vagina, androgen insensitivity, a low lying transverse vaginal septum and imperforate hymen. The external genitalia are essentially normal with a small pouch that is a 1–4 cm depth vagina.

The timing of the surgery depends on the patient and the type of procedure planned. Surgeries are often performed in late adolescence or adulthood (18–30 years) when the patient is socially and sexually mature and better able to comply with postoperative dilatation or instruction.

After the diagnosis the adolescent must be offered psychological support and counseling should explain that a normal sex life will be possible after that a neo-vagina has been created.

Since 1994, the authors have progressively modified the technique into a much simpler and safer one. Specifically, the original Vecchietti suture carrier passes through the vesico-urethro-rectal space only once, and the traction sutures rest for a very short tract intraperitoneally, following a sub-peritoneal course all the way up to the abdominal wall.

The Vecchietti traction device may also be less likely to cause discomfort, as it does not compress a healing laparotomy incision. This could allow increased traction and a quicker formation of the neo-vagina. These latest changes have shortened the operative time to approximately 20 min including the cystoscopic control. However, many other factors also are relevant for the success of the operation. In particular, the patient must be motivated and understand the technique and the need for a postoperative phase.

In order to minimize the risk of complications, several steps can be taken. The authors recommend preservation of the pseudo-hymenal membrane and a completely sub-peritoneal internal passage of the traction with a gradual and steady pulling in order to avoid tearing the vault. The insertion of a rectal probe during the intervention reduces the risk of perforation.

In the medical literature, sexual activity after gynecologic or pelvic surgery is poorly documented [21–23].

Despite the difficulties encountered to achieve lubrication, satisfactory sexual intercourse, clitoral and vaginal-orgasm, low pain and discomfort, patients were significantly satisfied after surgery. The degree of satisfaction with their overall sexual life and with their sexual relationships was related with their self-esteem and capacity for social relations. To this purpose, the recommendation is for patients to initiate sexual activity early in the postoperative period and an adequate number of experiences of sexual intercourse per week (3 or more).

The growing number of patients in this series and the extended follow-up allow the conclusion that the laparoscopic approach for creating a neo-vagina with the Vecchietti method is simple, safe, and effective and encouraging results

about sexual functioning. Further clinical evaluation is needed to confirm the benefits of the laparoscopic approach.

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