



## Short communication

## Novel technique of neovagina creation with uterine serosa in the treatment of vaginal agenesis associated with mullerian agenesis



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## ABSTRACT

**Objective:** Our aim was to create a neovagina with the least surgical morbidity and the best functional outcome.

**Materials and methods:** We hereby describe a new technique (Lee's neovaginoplasty) using a combined laparoscopic and vaginal approach in the creation of a neovagina using the uterine serosa layer from the rudimentary uterus and the peritoneum as a graft to line the vagina. This procedure was performed in three patients who were followed-up for a duration of 4 months to 2 years. Vaginal dilation was maintained with a vaginal mold daily for 3 months and three to four times a week thereafter.

**Results:** Adequate vaginal length of 6–7 cm and width of 2.5 cm was achieved postoperatively. There were no surgical complications and postoperative recovery was fast. Vaginal examination 1 month later showed healthy vaginal tissue with no necrosis or infection. Long-term follow-up did not show any shortening or stenosis of the vagina. Patients were able to have satisfactory sexual intercourse with no pain.

**Conclusion:** The laparoscopic–vaginal approach of using a uterine serosa and peritoneal graft for creation of a neovagina is a simple and effective approach with minimal surgical morbidity that can create a passageway for satisfactory intercourse.

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## Introduction

Mullerian agenesis, or Mayer-Rokitansky-Kuster-Hauser syndrome, has an incidence of 1 in every 4000–10,000 females.<sup>1</sup> It results from embryologic failure of development of the mullerian duct, which leads to agenesis or hypoplasia of the uterus and vagina. Patients normally present with primary amenorrhea but have normal secondary sexual characteristics and are genetically female. They have an absent or short blind-ending vagina. Most affected individuals have small, rudimentary uterine bulbs without functional endometrium. The ovaries are normal in

structure and function because they have a different embryologic source. There is an association with other congenital anomalies; 30% have renal anomalies and 12% have skeletal (mainly vertebral anomalies).<sup>1</sup>

Treatment aims to create a neovagina that can provide a passageway for satisfactory intercourse with the least morbidity. Options include nonsurgical and surgical methods. The nonsurgical Frank and Ingram methods of progressive self-vaginal dilation with hand-held dilators or dilators mounted on a bicycle seat stool<sup>2,3</sup> carries the least morbidity but requires a prolonged period of treatment<sup>4</sup> and may cause discomfort. Surgical options for the creation of a neovagina include split-thickness skin graft (McIndoe procedure),<sup>5,6</sup> or full-thickness skin graft,<sup>7</sup> sigmoid vaginoplasty,<sup>8–10</sup> peritoneal graft (Davydov procedure),<sup>11,12</sup> Vecchiotti procedure<sup>13,14</sup> (which uses an external traction device placed on the abdomen to exert continuous pressure on the vaginal dimple via a 2-cm olive bead), and amnion grafts.<sup>15,16</sup> However, there is still no clear consensus on the best method.

Conflicts of interest: All authors declare that they have no conflicts of interest.

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Our aim was the creation of a neovagina with minimal surgical morbidity with characteristics that can facilitate satisfactory intercourse with natural lubrication and good sensitivity. The use of laparoscopy decreases morbidity because laparoscopic surgery has smaller wounds, less pain, and faster recovery. Minimally invasive surgery has been the trend in gynecologic surgery with an increasing spectrum of applications.<sup>17–19</sup>

In this paper, we describe a novel procedure in three patients with vaginal agenesis secondary to müllerian agenesis, whereby a combined laparoscopic and vaginal approach was used to create a neovagina with the uterine serosa layer from the rudimentary uterine horns.

### Case report

Three patients with vaginal agenesis underwent surgery at ages 19 years, 20 years, and 21 years. They first presented with primary amenorrhea at the age of 14–15 years. Development of secondary sexual characteristics, height, weight, and external genitalia were normal. On examination, the hymen was present but the vagina was absent or only a small dimple was present. Pelvic ultrasound showed normal ovaries and absent uterus and vagina. However magnetic resonance imaging of the pelvis revealed small unilateral or bilateral rudimentary uterine bulbs. Karyotype studies showed normal female chromosomes 46XX. Hormonal function – follicle stimulating hormone, luteinizing hormone, estradiol, prolactin, and testosterone were all in the normal range. The female chromosomes and normal testosterone levels exclude androgen insensitivity syndrome. Intravenous pyelogram was performed because there is a high incidence of associated renal abnormalities. The kidneys and ureters were normal in all three patients. One patient had a bladder diverticulum. A chest radiograph showed scoliosis in one of the patients. None of the three patients had any cyclical pelvic pain or hematometra on ultrasound excluding the possibility of functional endometrium in the rudimentary uterine bulbs. These three patients sought help because they wanted to be sexually active. They underwent a combined laparoscopic vagina surgery with uterine serosa and peritoneum as a graft for the neovagina.

The patients were placed in the lithotomy position and were catheterized. We performed laparoscopy with the closed entry technique. A Veress needle was inserted at the umbilicus because none of the patients had a previous midline laparotomy. High intra-abdominal pressures of 20–25 mm Hg were used during insufflation to minimize the risk of vascular and bowel injury during first trochar entry.<sup>20</sup> The 5-mm primary trochar was inserted through the umbilicus and three accessory ports were inserted under laparoscopic guidance. The intra-abdominal pressure was then lowered to 15 mm Hg during surgery. Intraoperative findings showed bilateral rudimentary uterine bulbs (Fig. 1) in two patients; the third patient had a left uterine bulb and an absent right uterine bulb. In all three patients, both ovaries were normal and the vagina was absent. The rudimentary uterine bulbs were first separated from the ovaries by coagulating and cutting the ovarian ligament.



Fig. 1. Bilateral rudimentary uterine bulbs.

The anterior and posterior leaves of the broad ligament were opened from lateral to medial until the uterine arteries were reached. The ureters were traced and identified on both sides and the peritoneal incision was made above the ureters. The attached peritoneum from the anterior and posterior leaves of the broad ligament and the vesical fold peritoneum were harvested as part of the graft. The uterine arteries were preserved.

We then proceeded vaginally and a knife was used to make a vertical incision on the hymenal tissue. This space between the urethra and the rectum was developed with the closing and opening action of an artery clamp. A finger was inserted in the space created and blunt finger dissection was used to open up the space. To ensure that the dissection was in the right direction and space, another finger was placed in the rectum simultaneously during dissection of the neovagina space to ensure there was no rectal perforation. The bladder was catheterized with an indwelling catheter to minimize inadvertent cystostomy. The entire process of the creation of the neovagina space was done under laparoscopic guidance to ensure correct axis of the neovagina.

The vaginal space was then opened up with two metal retractors placed anteriorly and posteriorly. A plastic probe was then inserted into the vagina space created. The vagina vault was pushed up with the plastic probe and an incision was made with monopolar scissors on the vaginal vault laparoscopically, creating an opening between the abdominal cavity and the vagina. The two rudimentary uterine bulbs were then brought down into the vagina with the use of a ring forceps. The excess myometrium layer was trimmed away with a scissors vaginally, leaving a uterine serosa layer of about 3 mm in thickness. The peritoneal surface of the uterine serosa forms the vaginal wall surface. The two pieces of uterine serosa were then fixed at the introitus anteriorly and posteriorly with four interrupted sutures. A cylindrical silicone vaginal mold was then inserted into the vagina and stitched to the perineum to prevent vaginal adhesions. This was later removed on the 3<sup>rd</sup> postoperative day.

The vaginal vault was then closed laparoscopically, taking care to avoid occlusion of the blood supply from the uterine arteries. The completed surgery is shown laparoscopically and vaginally in Fig. 2 and Fig. 3, respectively.

Postoperatively, patients were covered with intravenous cefazolin and gentamicin for 1 day followed by 1 week of oral cefadroxil. They were started on graduated feedings to a soft diet on the 1<sup>st</sup> day and encouraged to ambulate. The cylindrical vaginal stent and bladder catheter were kept *in situ* and removed on the 3<sup>rd</sup> postoperative day. The patients were then monitored for 1–2 more days to assess wound healing and any complications after vaginal mold removal. They were discharged on the 4<sup>th</sup> or 5<sup>th</sup> postoperative day. Prior to discharge they were taught how to use a vaginal dilator and were given bacitracin ointment and premarin cream twice a day for vaginal application for 2 weeks. The vaginal mold is used



Fig. 2. Laparoscopic view after vault closure.

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