Custom fabricated acrylic vaginal stent as an adjunct to surgical creation of neovagina for a young female with isolated vaginal agenesis

ABSTRACT
Vaginal agenesis is one of the major congenital anomalies of the female genital tract. It may present either as an isolated developmental defect or within a complex of more extensive anomalies. Most commonly it is associated with Mayer–Rokitansky–Küster–Hauser (MRKH) syndrome. The correction of vaginal agenesis requires the creation of a neovaginal cavity that is dissected between the bladder and the rectum. After reconstruction of space for vagina surgically, a long-term vaginal stent use is required to maintain vaginal width and depth and to prevent contraction. In this article is presented a case of nonsyndromic agenesis of vagina in a 14-year-old girl and its surgical management using custom fabricated acrylic vaginal stent.

KEY WORDS: Mayer–Rokitansky–Küster–Hauser syndrome, vaginal agenesis, vaginal stent, vaginoplasty

INTRODUCTION
Vaginal agenesis is a congenital anomaly of the female genital tract and may occur as isolated developmental defect or as part of a complex of anomalies. It is estimated to occur in 1 in 4,000–5,000 live female births. Majority of these patients form part of Mayer–Rokitansky–Küster–Hauser (MRKH) syndrome, with either absence or presence of only remnants of the uterus. Ultrasound examination discloses the presence of a small uterus and perhaps ovaries. If the uterus is normally developed and menstruation occurs, hematometra and hematosalpinx results. Endometriosis is quite a common finding in these patients. There is association of renal or skeletal anomalies, but ovarian functions are normal. Absence of the vagina poses many marital, reproductive, and social problems to an individual and is a cause of great concern for the parents.

These patients have been managed surgically by McIndoe’s vaginoplasty using split thickness skin graft obtained from thigh or buttocks. Autologous graft like buccal mucosa has also been used with success. Allograft like amnion has been used to line the neovagina, which can reduce the morbidity of the graft donor site. Correct postoperative use of stent is recommended to avoid shrinkage and stricture of neovagina to maintain vaginal width and depth.

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CASE REPORT
A 14-year-old young female patient was referred for preparation of a vaginal stent. The girl was unmarried, accompanied by her parents, and reported with a chief complaint of pain in lower abdomen since 1 week. There was history of primary amenorrhea. The accompanying parents were in great stress. However, they were willing for surgical treatment at the earliest.
On examination, patient had normal appearance and normally developing secondary sexual characters. Gynecological examination showed the presence of vaginal agenesis. Ultrasound was advised and ultrasonography (USG) abdomen revealed hypoechogetic multiple foci. The patient was diagnosed to have hematocolpos, hematometra with hematosalpinx. Ovaries were of normal dimensions.

The patient and her parents were counseled about the surgical therapy regarding the detailed procedure, its purpose, possible outcome, and the benefits of use of stent postoperatively. The patient was referred from the gynecology department for the fabrication of vaginal stent of the size determined by clinical and radiographic examination.

**Stent fabrication**
A hollow acrylic vaginal stent was planned with the suggested dimensions of \(9 \times 2 \times 2.5\) cm. The size of the mold was determined on the basis of the thickness of the intervening tissue between the perineum and pelvic peritoneum which was determined by magnetic resonance imaging (MRI) done by the concerned gynecologist. An internal scaffolding of modeling wax was made with dimensions 2–3 mm short of final size of the stent in all aspects [Figure 1]. The shape was conical as the diameter at one end was more than that on the other end. The wax surface was smoothened. Then 2–3 mm thick layer of chemically cured acrylic resin was adapted in the dough stage all over the wax scaffolding except at the small central areas at both ends [Figures 2 and 3]. The holes at the ends permitted escape for the tissue fluid and the secretions. After the acrylic resin was set, the assembly was placed in boiling water for dewaxing of internal scaffolding to permit hollowing [Figure 4]. Then finishing and polishing of the stent was done to provide a smooth surface. The acrylic was used as a mold material because of its simplicity, low cost, adequate strength and wear resistance, easy maintenance, and preparation.

**Clinical procedure**
Patient was offered treatment in the form of creating a neovagina. She was taken up for the Abbe McIndoe procedure. Patient was operated under general anesthesia. The dissection was done and neovagina was created. Drainage of hematometra and hematocolpos was done. Hemostasis was achieved. The acrylic stent was inserted in the newly created vaginal cavity to check the stent compliance with neovagina. Amnion was prepared by washing with saline, mixed with antibiotics, and then secured around the chemically sterilized stent. The amnion covered stent was placed in the neovagina. The labia minora were sutured with two transverse vulval sutures to keep the stent in position and retained in neovagina.

Postoperatively, patient was kept on intravenous and oral fluids, antibiotics, and a low residue diet for a period of 72 h. Perineal area was regularly checked for any bleeding, discharge, position of mold, and any cutting through of the vulval sutures. After 1 week, labial sutures were removed and the vaginal mold was removed gently. Follow-up was done every fortnight for 6 months. The patient was trained to use the acrylic stent and further recovery was uneventful. Post-insertion instructions regarding use of vaginal stent, maintenance, and daily cleaning were given. She was advised to use acrylic mold continuously for 3 months and then during night time for the next 3 months. During
Follow-up at 3 months, no complication was seen except a minimal granulation tissue formation which was managed by electrocautery and another new stent was fabricated for the patient. Compliance for the use of mold was satisfactory. No complication was observed and the patient and her parents were satisfied with the treatment outcome.

DISCUSSION

Developmental absence of vagina is a major congenital anomaly of female genital tract that occur as isolated developmental defect or as a part of a complex anomaly.[11] Absence of vagina is a cause of concern for the patient and for the parents as it is associated with mental, reproductive, and social problems. Taking advantage of surgery for treatment of abnormalities of genital area is considered prohibited in the community. Vaginal agenesis commonly form part of MRKH syndrome, first described by Hause and Scheiner in 1961.[13] It is often associated with anomalies of the renal and skeleton system and with normal female genotype, phenotype, and normal endocrine status.[14]

No consensus has been reached regarding ideal method for creating functional vagina for patients with congenitally absent or rudimentary vaginal growth. Treatment for vaginal agenesis includes vaginal replacement with mucus membrane lined preexisting canal.[15] Surgical intervention to create neovagina that has a satisfactory appearance and function is an alternate surgical therapy at an appropriate age when patient is mature enough to wear the vaginal stent for at least 6 months. Autologous graft from buccal mucosa or allograft like amnion has been used to line the surgically created cavity. Abbe McIndoe procedure, first described in 1888, is still the most effective and preferred method. Surgical vaginal stents have been described for postoperative maintenance after McIndoe vaginoplasty.[7‑12] Laparoscopic Vecchietti procedure creates neovagina by using acrylic mold attached to retraction device.

Corrective postoperative use of stent is recommended to avoid shrinkage and stricture of neovagina. In order to prevent a possible contraction of reconstructed vagina, a long-term vaginal stent use is required to maintain vaginal width and depth. It also serves the hemostatic purpose. Soft mold has been used. However, it is recommended that the soft stent is to be replaced by hard stent. Failure to wear a stent, even if it is inconvenient, is the major cause of failure.

In the present case, use of hard mold had proper snug fitting in the vagina, which kept the graft in close contact with the raw surface of the dissected space. The vacuum-assisted closuresystem has been reported to exclude the need for vaginal stent and improve the take of graft in vaginal reconstruction.[16] Nonsurgical creation of vagina using prefabricated vaginal dilators has met with limited success as it causes the patient discomfort and depends on patient motivation.[17]

CONCLUSION

Creating a neovagina using amnion as a graft for vaginoplasty is a safe, simple, and beneficial procedure to treat the patients of vaginal agenesis. However, good compliance regarding persistent use of stent in the postoperative period is essential for attaining functional neovagina. Acrylic molds are very cost-effective. This mold can be easily procured by any clinician from a prosthodontist prior to surgery. Hence, a simple, quick, and cost-effective technique to fabricate vaginal stent to prevent contracture is suggested.

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