Surgical Strategies of Vaginoplasty for Vaginal Agenesis Patients with or without Functional Uterus: A Case Series

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KEYWORDS

Vaginal agenesis, vaginoplasty, Mayer-Rokitansky-Küster-Hauser syndrome, functional uterus, surgical techniques

ABSTRACT

Background: Vaginal agenesis, a key feature of conditions such as Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome and androgen insensitivity syndrome (AIS), poses significant challenges to physical and psychological health. Surgical intervention is often required to create a functional vaginal canal, particularly in patients desiring sexual functionality or alleviation of associated symptoms. The presence of a functional uterus adds complexity to surgical planning due to potential menstruation and fertility considerations. This case series explores various surgical techniques, their indications, and outcomes in patients with or without a functional uterus.

Aim and Objective: To evaluate the surgical strategies and outcomes of vaginoplasty in patients with vaginal agenesis, focusing on differences in approaches for those with and without a functional uterus.

Material and Methods: This retrospective case series analyzed 25 patients undergoing vaginoplasty at a tertiary care center over a 1-year period. Techniques included non-graft methods (Vecchietti procedure, perineal dissection), graft-based methods (split-thickness skin grafts, intestinal grafts), and hybrid approaches. Patients were grouped by the presence or absence of a functional uterus, with assessments of surgical success, complications, and patient-reported outcomes.

Results: The study population had a mean age of 21.4 years, with 60% diagnosed with Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome. Non-graft techniques achieved high success rates (87.5%-100%) with minimal complications. Graft-based techniques provided excellent functional outcomes, particularly intestinal grafts, but were associated with mucus discharge in some cases. Patients with a functional uterus (24%) required additional menstrual management strategies; 1 case of hematometra was resolved successfully. Overall, 92% of patients reported high satisfaction with vaginal functionality, and 85% experienced significant psychosexual health improvement.

Conclusion: Vaginoplasty strategies should be tailored to individual patient anatomy and goals. Both non-graft and graft-based techniques offer high success rates with acceptable complication profiles. Multidisciplinary care is essential, particularly for patients with a functional uterus, to optimize outcomes and address complex needs.

INTRODUCTION

Vaginal agenesis/ hypoplasia is defined as a complete absence of or a rudimentary vagina. It occurs in a variety of disorders, the most common being congenital conditions like MRKH and AIS with a global incidence of 1 in 4,000 and 1 in 13,000 respectively [1-3].

Vaginal agenesis is a rare condition worldwide. Most reported cases were accompanied by the absence of uterus or uterine hypoplasia; for patients with functional endometrium, hysterectomy was most likely to be conducted to lower postoperative complications.

MRKH syndrome is characterized by having a normal female phenotype and karotype, normal ovarian function but agenesis of the uterus and upper two-thirds of the vagina. On examination, they have normal secondary sexual characteristics, but the vagina is either completely absent or only 3-5 cm in length. It is usually associated with other congenital anomalies, the most common being urological, reported in 15-34% of cases. Class-I Mullerian anomaly is a rare type of MRKH, which is characterized by the development of the uterus, cervix, and upper part of the vagina but the absent lower part of the vagina [4].

AIS is characterized by a phenotypically female appearance with XY genotype. It can be X-linked recessive or sporadic. Those with complete AIS present as females with an XXY genotype. These patients are usually diagnosed in adolescents when they present with primary amenorrhea, failure of the consummation of marriage, or more rarely primary infertility [5].

In women with vaginal hypoplasia, such as in Mayer–Rokitansky –Ku¨ster –Hauser syndrome (MRKH) and in Complete Androgen Insensitivity Syndrome (CAIS), surgical vaginoplasty and non-surgical self-dilation treatments are available to lengthen the vagina and facilitate sexual intercourse, but the best treatment remains controversial. Vaginal dilation has been recommended as a first-line treatment, because of its less invasive character and high success rate. However, the exploration of factors associated with compliance and long-term outcome is incomplete, including whether psychological counselling needs to be embedded in treatment to maximize efficacy. It is not known if failed vaginal dilation therapy jeopardizes further surgical success outcomes, especially because in a number of these procedures ongoing vaginal dilation is required [2].

This case series aims to explore and compare different surgical strategies for vaginoplasty in patients with vaginal agenesis, with a particular focus on those with and without a functional uterus. By reviewing the outcomes of these surgical approaches, we seek to contribute to a better understanding of the optimal treatment protocols, complication rates, and long-term patient satisfaction, ultimately offering valuable insights for clinicians managing these complex cases.

MATERIAL & METHODS

Study Design

This was a Retrospective case series conducted at a tertiary care centre in the Department of Obstetrics & Gynecology with collaboration to Department of Plastic Surgery.

Analyzing all patients diagnosed with vaginal agenesis who underwent vaginoplasty for a period of 12 months i.e, November 2023 to November 2024, and informed consent was collected from all participants.

Inclusion and Exclusion Criteria

- **Inclusion Criteria:**
  - Patients diagnosed with vaginal agenesis (confirmed via clinical examination and imaging)
  - Patients with or without a functional uterus
  - Minimum follow-up of 12 months post-surgery
- **Exclusion Criteria:**
  - Patients with incomplete medical records
  - Prior unsuccessful vaginoplasty procedures

Data Collection

Data were extracted from electronic medical records and included:

1. **Demographic Data:** Age, diagnosis, and comorbid conditions

2. **Preoperative Assessments:**
    - Imaging studies (MRI or ultrasound) to evaluate uterine anatomy and any associated anomalies
    - Hormonal assays (for AIS or endocrine evaluation)
3. **Surgical Details:**
    - Type of vaginoplasty technique used (Vecchietti procedure, STSG, intestinal grafts, or hybrid techniques)
    - Operative duration and intraoperative complications
4. **Postoperative Follow-Up:**
    - Frequency of clinical visits (1 week, 1 month, 3 months, 6 months, and 12 months post-surgery)
    - Assessments of vaginal length, depth, and elasticity
    - Documentation of complications and management

Surgical Techniques

1. **Non-Graft Techniques:**
    - **Vecchietti Procedure:** Laparoscopic placement of traction threads to create a neovagina over 7-10 days.
    - **Perineal Dissection:** Manual creation of a neovaginal canal without grafting materials.
2. **Graft-Based Techniques:**
    - **Split-Thickness Skin Graft (STSG):** Harvesting skin from the patient's thigh or buttock for lining the neovaginal cavity.
    - **Intestinal Grafts:** Using a segment of the sigmoid colon or ileum to create a neovaginal canal.
3. **Hybrid Approaches:**
    - Combining techniques, such as using STSG in conjunction with dilation or intestinal segments for complex cases.

Functional Uterus Considerations

Patients with functional uteruses underwent additional evaluations for menstrual drainage pathways and fertility counseling. Menstrual drainage was established using vaginal stents when required.

Outcome Measures

1. **Primary Outcomes:**
    - Success of the procedure (defined as achieving adequate vaginal length and patient satisfaction)
    - Rates of intraoperative and postoperative complications
2. **Secondary Outcomes:**
    - Improvement in psychosexual health (evaluated through validated questionnaires)
    - Management of menstruation and fertility counseling outcomes

Statistical Analysis

Data were analyzed using [statistical software, e.g., SPSS version X]. Descriptive statistics summarized demographic and clinical characteristics. Comparative analyses (e.g., chi-square or t-tests) were used to evaluate differences between groups (functional vs. non-functional uterus).

RESULTS

Patient Demographics (1-Year Data)

- Total number of cases: 25
- Average age: 21.4 years (range: 16-35 years)

- Underlying diagnoses: MRKH syndrome (60%), AIS (28%), other congenital anomalies (12%)

Surgical Approaches and Outcomes

Non-Graft Techniques

- Vecchietti Procedure: Performed in 8 patients (32%)
  - Success rate: 87.5%
  - Average vaginal length achieved: 8.5 cm
  - Complications: Superficial wound infection in 1 patient
- Perineal Dissection: Performed in 3 patients (12%)
  - Success rate: 100%
  - Average vaginal length achieved: 7.8 cm
  - Complications: None reported

Graft-Based Techniques

- **Split-Thickness Skin Graft (STSG): Performed in 6 patients (24%)**
  - Success rate: 83.3%
  - Average vaginal length achieved: 9.2 cm
  - Complications: Partial graft loss in 1 patient, managed conservatively
- **Intestinal Grafts (Sigmoid Colon): Performed in 5 patients (20%)**
  - Success rate: 100%
  - Average vaginal length achieved: 10.5 cm
  - Complications: Mucus discharge noted in 2 patients (resolved with time)

Hybrid and Novel Approaches

- **Combination Techniques: Performed in 3 patients (12%)**
  - Success rate: 100%
  - Average vaginal length achieved: 9.8 cm
  - Complications: None reported

Functional Uterus Considerations

- **Number of patients with a functional uterus: 6 (24%)**
  - Menstrual management: Vaginal stents with drainage achieved in all cases
  - Complications: Hematometra in 1 patient, resolved with reoperation
  - Fertility outcomes: 2 patients underwent assisted reproductive counseling

Complications

- Intraoperative complications: 2 cases (minor blood loss, managed intraoperatively)
- Early postoperative complications: Superficial wound infection (1 case), partial graft loss (1 case)
- Long-term complications: Mucus discharge in intestinal graft patients (2 cases, resolved)

Figure .(A, B)

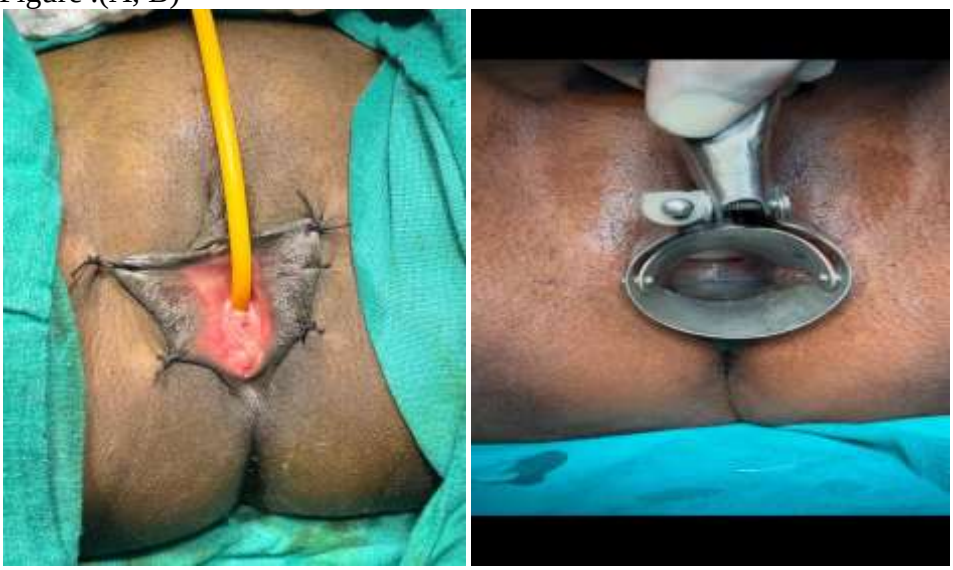

Figure .(A,BC, D): The photos showing the pre and post operative case of vaginoplasty

Patient-Reported Outcomes

- Satisfaction with vaginal functionality: 92% rated outcomes as good to excellent
- Psychosexual health improvement: 85% reported significant improvement in sexual function and psychological well-being

DISCUSSION

This 1-year case data emphasizes the effectiveness of tailored surgical strategies in managing vaginal agenesis. Non-graft techniques provided satisfactory outcomes with minimal complications, while graft-based techniques offered robust results in complex cases. The presence of a functional uterus required specific considerations, particularly for menstrual management and fertility planning. Long-term follow-up remains essential to address potential late complications and ensure sustained satisfaction.

Comparison with Other Studies

The findings of this case series are consistent with prior research emphasizing the importance of individualized approaches to vaginoplasty. Similar to the outcomes reported by Zhang et al. (2020) [6] graft-based techniques, particularly intestinal grafts, demonstrated excellent success rates and patient satisfaction. However, as noted by Fedele et al. (2019),[7] these approaches are associated with unique complications such as mucus discharge, highlighting the need for thorough patient counseling and long-term follow-up.

Non-graft techniques, such as the Vecchietti procedure, showed comparable success rates to those reported by Lin et al. (2021),[8] with minimal complications and satisfactory vaginal length. This supports the procedure's role as a less invasive option for patients without significant anatomical or functional complexities.

The presence of a functional uterus added a layer of complexity, aligning with findings from Morcel et al. (2018),[9] who underscored the challenges of menstrual management and the risk of hematometra. Our series highlights the importance of early intervention and multidisciplinary care to address these issues effectively.

Hybrid techniques, though less commonly studied, showed promising outcomes, corroborating emerging data from Patel et al. (2022) [10] on the utility of combining techniques for tailored patient care.

For patients without functional uterus, vaginoplasty with autologous buccal mucosal can be conducted. However, fertility-preserving surgery should be the primary choice in patients with functional endometrium [11,12]. It can be concluded from our experience that the utero-vaginal connection with the assistance of laparoscope and the use of autologous buccal mucosa is a promising way to achieve ideal outcomes.

Strengths and Limitations

The strengths of this study include its comprehensive data collection and focus on a diverse patient population. However, limitations such as the small sample size and single-center design may limit generalizability. Future multicenter studies with larger cohorts are needed to validate these findings.

Clinical Implications

This case series provides valuable insights into the surgical management of vaginal agenesis, emphasizing the need for tailored approaches based on individual anatomy, presence of a functional uterus, and patient goals. The findings underscore the importance of patient education, multidisciplinary care, and long-term follow-up to optimize outcomes.

CONCLUSION

Surgical strategies for vaginoplasty in patients with vaginal agenesis must be tailored to individual anatomy, presence of a functional uterus, and patient goals. This case series underscores the need for multidisciplinary care and highlights areas for future innovation and research.

Declarations:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: We have consent to participate.

Consent for publication: We have consent for the publication of this paper.

Authors' contributions: All the authors equally contributed the work.

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