

**Case Series**

# The Use of the Malecot Catheter and Modified Stent Insertion in Transverse Vaginal Septum

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## Introduction

A transverse vaginal septum is a Mullerian duct anomaly that occurs when there is a congenital failure of the lower vaginal central cells to generate. Severe cyclical abdominal pain can occur shortly after menarche. The retrograde menstrual flow can cause peritoneal inflammation, adhesion, and even infertility. This case series aims to describe the use of a modified corrugated stent and malecot catheter which has shown favourable results in maintaining vaginal patency. The post-operative care is always a challenge. Re-stenosis was extremely common and poorly reported despite the greatest surgical procedures in transverse vaginal septum, especially in high septum or thick septum. The malecot catheter insertion not only serves as a guide for future septum excision, but it can also self-prepare the young child to conduct the dilation with continued counseling while the menses are still present. Despite the usual return of menstruation based on the malecot catheter, the emphasis on regular dilation remains crucial. According to specific institutional experiences in China, the catheter can be implanted for up to three years without showing signs of infection.

## Case report I

An eleven-year-old girl presented to the district hospital with severe cyclical abdominal pain. There was a 24 week abdominal mass. On perineal examination, there was only a dimple where the vaginal opening was expected to be seen.

MRI revealed a transverse vaginal septum at the proximal vagina with atretic distal vagina resulting in hematometra, hematomatroschelos and bilateral hematosalphinx. An emergency laparoscopy, drainage of the hematometra and hematomatroschelos was performed to relieve her pain. Intra operatively, a huge

distended 24 week size uterus and dilated cervix with bilateral hematosalphinx was seen. An incision was made over the fundus of the uterus to insert the suction cannula and the collection was drained. About 700cc of stale blood was evacuated. Post operatively, intramuscular medroxyprogesterone acetate 150 mg was given to suppress her menses while awaiting definitive surgery, planned for a month later.

Despite the medical suppression, the hematometra rapidly reaccumulated. Definitive surgery was done laparoscopically. A suction-irrigation cannula was inserted into the uterine cavity via an incision made at the uterine fundus. The probe was pushed towards the vagina to help localize the margins and plane of the transverse septum, thus helping to avoid bladder and rectum injury. The surgery was performed with a Y incision at the centre of the vaginal septum trans vaginally using the suction-irrigation cannula as a guide. The septum was opened up until the tip of the suction probe was visible. The thickness of the transverse vaginal septum was estimated about 10 mm. The mucosa flaps from the upper part of the vagina were pulled downwards and sutured to underline the vaginal canal with ecosorb 2/0 suture using the Z-plasty method.

An endotracheal tube connector was modified to use only the middle corrugated part (Figure 1) as a stent. The other parts of the connector were cut at both ends and discarded. The modified corrugated drain was covered with interceed (adhesion barrier) prior to its insertion in the vagina. It was secured to the vulva with silk sutures which were removed a month later. Subsequently, she was started on vaginal dilation under supervision. The patient was fearful and experienced vaginal discomfort and pain during dilation, resulting in re-stenosis due to inadequate dilation.

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About 4 months from the first vaginoplasty, she underwent a second laparoscopy assisted vaginoplasty by the same team. We performed the surgery in the same way as the first time but decided to use a long term stent. We placed a malecot catheter whereby the 4 wings mushroom-shaped end was placed at the fundus of uterus by pulling it through vaginal route using a Maryland grasper that was inserted via an incision at the fundus of the uterus; the other end of malecot catheter was excised at the level of the introitus (Figure 1).

At 16 months post surgery, the patient was comfortable with the malecot catheter in situ with return of monthly menses.

### Case report II

An eleven-year-old student presented with intermittent colicky lower abdominal pain for one month. She was treated for a urinary tract infection with antibiotics and analgesia but did not improve. She had a tender 20 week size abdominal mass. Only a vaginal dimple was seen upon examining the perineum. MRI reported as transverse vaginal septum (0.9x1.3x0.2 cm) with hematotrachelos and hematometra.

Laparoscopic drainage of hematometra and vaginal dilation under anaesthesia was performed. Gradual vaginal dilation was done over 5 months. She went through a repeat laparoscopic drainage of haematometra when menstruation failed to be suppressed prior to definitive surgery.

Laparoscopy assisted vaginoplasty was subsequently performed in the same way as case one, however this time we inserted both the modified corrugated stent as well as the malecot catheter as there were concerns that she may not be able to perform post operative vaginal dilation adequately. The stent

was removed 2 weeks after the operation as she was in pain while the malecot catheter was left in situ. She subsequently had normal monthly menses. She started to dilate from about 2 weeks post surgery and the malecot catheter was removed about 7 months after surgery.

### Case report III

A fourteen-year-old girl complained of abdominal discomfort and left sided abdominal mass for one week. A 20 week abdominal mass was noted. A hymenal ring was seen with no obvious bulge beyond hymenal ring. MRI pelvis reported a hematometra and haematocolpos due to transverse vaginal septum which measured 12 mm in thickness.

She underwent a laparoscopic assisted vaginoplasty. The thickness of the transverse vaginal septum was estimated to be 20 mm. Vaginal length was about 5 cm. The surgery was performed in the same way as the previous cases.

### Case report IV & V

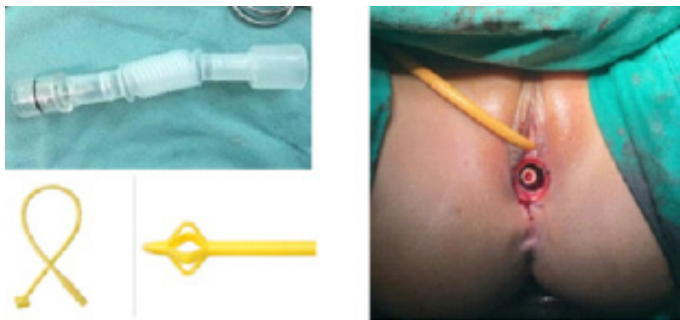
Similarly, a fourteen-year-old student and a ten-year-old student presented with abdominal pain and were diagnosed to have mid transverse vaginal septum. Surgery utilizing both corrugated stent and malecot catheter was performed. Post operatively, prophylactic antibiotic was given to all patients for two weeks (Table 1).

Another case that utilized the modified corrugated stent was excluded as she did not have outflow obstruction as highlighted in above young post menarchal patients. She was diagnosed to have incomplete mid transverse septum during her fertility workup and she achieved spontaneous pregnancy three months after the surgery done same way as described.

**Table 1:** Summary of transverse vaginal septum cases where a modified corrugated stent and malecot catheter was utilized.

No	Patients	Intra-operative Diagnosis	Imaging	Intervention	Outcome
1	11 years old	High Transverse Vaginal Septum -10 mm with Atretic Vaginal	MRI High transverse vaginal septum 2 mm, with atretic vaginal -0.5 cm x 1.3 cm x 4.4 cm with hematotrachelos, hematometra and hematosalpinx	Laparoscopic assisted vaginoplasty Insertion of modified corrugated stent which was removed after 1 month.	Re-stenosis of transverse vaginal septum after 2 months post-operatively with vaginal length of 5 cm
				Second op- Laparoscopic assisted re-cannulation of transverse vaginal septum Insertion of malecot catheter	16 months follow up - return of regular menses
2	11 years old	Vaginal dysgenesis with transverse vaginal septum- 20 mm	MRI transverse vaginal septum (0.9x1.3x0.2 cm) hematotrachelos, hematometra.	Laparoscopic drainage of hematometra and medical suppression of menses to relieve her symptom. Over 5 months, the blind ended vagina was dilated using hegar dilator size 12-13 given adequate Anaesthesia	Prior to her definitive surgery, vaginal length was about 2-3 cm
				Laparoscopic assisted vaginoplasty. Insertion of modified corrugated stent and malecot catheter	Modified corrugated stent was removed 2 weeks post operation. Malecot catheter was removed 7 months later 10 months follow up with regular self vaginal dilation -return of normal menses
3	14 years old	Mid transverse vaginal septum- 20 mm thickness Vaginal length was 5 cm	MRI with intravaginal gel- hematometrocolpos due to lower transverse vaginal septum measuring 1.2 mm thickness. Distance between transverse vaginal septum and introitus is 2.2 cm.	Laparoscopic assisted vaginoplasty Insertion of modified corrugated stent and malecot catheter	8 months follow up - return of normal regular menses Malecot catheter was removed with self vaginal dilation

4	14 years old	Mid Transverse Vaginal Septum	CT scan-distended uterine and cervical canal consistent with imperforate hymen	Examination under anaesthesia; incision at imperforate hymen which drained 30 ml blood and hematocolpos aspiration about 300 ml blood	Re-accumulation of hematometra and hematocolpos 1 month post operation
			Transabdominal ultrasound scan-Hematometra, hematocolpos	Laparoscopic assisted vaginoplasty. Insertion of modified corrugated stent and malecot catheter	Modified corrugated stent was dislodged 2 weeks post operatively. Malecot catheter was planned for removal once patient ready for self vaginal dilation
5	10 years old	Mid transverse vaginal septum- 10 mm thickness Vaginal length was 4 cm	MRI - mid transverse vaginal septum 5 mm thickness located 3.8 cm from the introitus Hematometra and hematocolpos	Laparoscopic assisted vaginoplasty Insertion of modified corrugated stent and malecot catheter	7 months follow up - return of normal regular menses Malecot catheter was planned for removal once patient is ready for self vaginal dilation



**Figure 1:** Image of endotracheal tube connector measuring 4 cm x 15 mm in which only corrugated part was used (upper left); silicon coated latex malecot catheter (lower left); image of the modified corrugated stent and malecot catheter; male kot 4 wings was located in the endometrial cavity and the end of the catheter was incised at the level of introitus (right).

### Discussion

The prevalence of Mullerian Defects is complicated by differences in population, diagnostic technique and an incomplete classification system which is still being revised to enhance effective communication and to improve clinical care (ASRM MAC 2021). Transverse vaginal septum occurs in approximately 1 in 30,000 to 80,000 women [1,2]. The position of the septum is generally described as low, mid, or high, though there is no accepted system for classifying the location and a variety of measurements are used in literature. Williams et al in their case series, classified the septum as low if less than 3 cm, mid position if between 3 and 6 cm, and high if greater than 6 cm from the introitus [3]. Hematometra, hematosalpinx and endometriosis can be present, with the incidence of endometriosis greatest for high septa.

Transverse vaginal septa (<1 cm in thickness) may be treated with a simple end to end anastomosis of the vaginal epithelium or a Z-plasty [1] aiming to cover all the raw surfaces. In our cases, a modified corrugated stent using the endotracheal tube connector (Figure 1) was placed post operatively in the vagina in addition to Z-plasty method to help in promoting epithelization. The concept on its corrugated or rugae like feature can help in preventing any ingrowth of vaginal tissue preventing peri-fibrotic tissue adhesion around the stent that ease the removal of the stent post-operatively. The removal can be easily done in outpatient clinic. It is cost effective and light in weight. In summary, the modified stent was scheduled for removal in 2 to 4 weeks post surgery. Out of the 5 cases, one was dislodged in less than 2 weeks, two patients felt discomfort while they were in sitting position and one patient complained of vaginal pain. Patients did not develop infection with no evidence of fe-

ver or per vaginal foul-smelling discharge. Menstrual flow continued through the lumen of the stent.

In cases of re-stenosis (1/5), high transverse vaginal septum and patient immaturity in handling post-operative vaginal dilation, malecot catheter was inserted. Malecot 4 wing catheter is known to be used as drainage catheter following open renal or bladder surgeries. Malecot wings or mushroom- tip are employed to provide enhanced drainage and promote catheter retention. It provides maximum softness for enhanced patient comfort. In 2 out of 5 cases, the catheter was removed easily in clinic, the patients did not complain of any pain with movement and there was no evidence of infection. In addition, the catheter can serve as a guide for future vaginal dilation when young patient reached was ready. The challenges that were encountered includes fibrotic growth around the catheter after 6 months, where separation was done under general anaesthesia. Initiation of vaginal dilation will need adequate analgesia to reduce the patient's long term psychological impact.

Laparoscopy assisted vaginoplasty is useful for resection of high septa. It facilitates resection of the septum and reduces the surgical related complication. This novel laparoscopic approach to management of high transverse septa was introduced by William et al. 2013 [4]. In our experiences, a thick septa and partial vaginal agenesis can be managed in a similar manner. In our series, intra-operatively, no surgical complications were encountered with operative surgical time ranging between 60 to 90 minutes. The estimated blood loss is about 50 to 100 mls.

If menstruation can be medically suppressed, some surgeons advocate daily dilation of the lower vagina for several months in order to increase vaginal length and to decrease the distance that will require bridging during septum resection which was described as Frank's vagina dilation, 1938. In one of the cases of transverse vaginal septum with atretic vagina, gradual dilation of the vaginal was performed prior to definitive surgery. This was used to force the mucous membrane inward into the introital region and no incision was required. Decades after Frank's first description, several studies reported favourable outcomes using his method [5].

Various methods have been described in few case reports including the use of silicone stent and tracheobronchial stent [6,7]. Vaginal dilation at this young age can be a great challenge to the patient. With the progress of Mullerian anomaly surgery in the last decade, fertility sparing techniques with fewer complications are becoming the target for gynaecologists especially in this reproductive age group. Throughout our year of practice, the impact that gynaecologists experienced every time a

girl presented with re-stenosis was devastating. This was the first case series described based on our own institutional experience in dealing with transverse vaginal septum, including its post-operative care and the detailed procedures performed on our young adolescent girls. The surgical outcomes were encouraging, and all of the girls were pleased with their return of normal life. As indicated by the case series, the surgical approaches used result in the least surgical complications and surgery time as well as minimized girls' psychological impact.

### Conclusion

Primary surgery with minimal manipulation and insertion of modified corrugated drain can help in maintaining the vaginal patency especially in young patients. In cases of re-stenosis, high transverse vaginal septum, and patient immaturity in handling post-operative vaginal dilation, malecot catheter insertion can be one of the additional option.

### Declarations

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**Author contribution statement:** Author 1 is the first author who collected and analyzed the data, applied for ethical approval and wrote the manuscript. Additionally, she was one of the gynaecologist who managed the patients. Author 2 is the principal supervisor who conceived of the notion given. She is also the primary pediatric and adolescent gynaecologist for all patients. She created the idea, edited the manuscript and offered ideas for its improvement. In addition, she authorized the final draft of the manuscript. Author 3 is also the pediatric and adolescent gynaecologist who involved actively in the management of all patients. She proofread the manuscript and offered suggestions for its improvement.

**Conflict of interest:** The authors declare that no conflicts of interest associated with this publication.

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