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Cass Report

Combined laparoscopic and vaginal cervicovaginal reconstruction using split thickness skin graft in patients with congenital atresia of cervix

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Abstract: Objective: The aim of this study was to introduce a new technique which is combined laparoscopic and vaginal cervicovaginal reconstruction using split thickness skin graft in patients with congenital atresia of cervix and to evaluate the feasibility and the safety of it. Methods: This is a prospective observational study of 10 patients with congenital atresia of cervix who underwent combined laparoscopic and vaginal cervicovaginal reconstruction using split thickness skin graft for cervicovaginal reconstruction from February 2013 to August 2014 in our hospital. All of the surgical procedures were carried out by the same operation team. Patient data were collected including operating time, estimated blood loss, hospital stay post-surgery, complications, total cost, and median vaginal length at 3 month, resumption of menstruation, vaginal stenosis and stricture of the cervix postoperatively. Results: The operative procedure lasted 237±46 (175-380) min. The estimated blood loss was 160±76 (50-300) ml. The hospital stay post-surgery was 12±2 (9-18) days. None of the patients had complications or required a blood transfusion. The mean total cost was $3352±1025. The average vaginal length at 3 month was 8.3±1.1 (8-10) cm. All patients had resumption of menstruation. The patients were followed for a mean of 5±2 (1-10) months. Cervical or vaginal stenosis did not occur in any of the patients. Conclusions: Our experiences of combined laparoscopic and vaginal cervicovaginal reconstruction using split thickness skin graft in10 patients with congenital atresia of cervix were positive, with successful results and without complications, and cervical or vaginal stenosis.

Keywords: Split thickness skin graft, congenital atresia of cervix, laparoscopy

Introduction

Cervical atresia is an extremely rare malformation, always accompanying with agenesis of vagina, and its management is controversial. Hysterectomy eliminates the symptoms caused by hematometra. However, loss of reproductive function is unacceptable. With the rapid development of surgical techniques, conservative management has been gradually applied to avoid excision of the uterus, including the uterovaginal anastomosis [1, 2] and the reconstruction of cervical and vaginal agenesis with some autologous tissues, such as full thickness skin grafts [3], oral and bladder mucosa [4] or heterologous biological graft, such as an acellular porcine small intestinal submucosa (SIS) graft [5].

In this study, we reported our successful experiences of combined laparoscopic and vaginal cervicovaginal reconstruction in 10 patients with congenital atresia of cervix and vaginal dysgenesis by using split thickness skin graft.

Materials and methods

Patients

Between May 2013 and August 2014, a total of 10 patients with congenital cervical atresia and vaginal dysgenesis underwent cervicovaginal reconstruction in the Obstetrics and Gynecology Hospital of Fudan University, Shanghai, China. The diagnosis was based on preoperative symptoms, gynecologic examination, intravenous pyelography (IVP), ultrasonography and magnetic resonance imaging (MRI). The clinical

Table 1. Clinical characteristics of the 10 patients with cervical atresia and vaginal dysgenesis

Patient Previous surgery	Age (years)	Type of cervical malformation	Length of vagina before surgery (cm)	Urogenital anomaly	Upper genital tract malformations	Associated upper genital tract lesions
1	13	Obstruction of the cervical os	0	0	0	pelvic adhesions
2	18	Entire cervical atresia	0	0	0	
3	13	Entire cervical atresia	2	0	saddle-shaped uterus	hematosalpinx
4	13	Obstruction of the cervical os	1	0	0	
5	26	Entire cervical atresia	0	right renal cyst both renal calculi calicectasis;	left unicornuate uterus right rudimentary horn of uterus	right ovarian encapsulated effusion
6	15	Obstruction of the cervical os	0.5	0	unicornuate uterus	pelvic adhesions
7	16	Obstruction of the cervical os	0	right duplication of pelvis	0	right ovarian endometrial cyst
8	18	Obstruction of the cervical os	0	0	0	bilateral ovarian benign cysts
9	14	Obstruction of the cervical os	0	0	0	
10	13	Obstruction of the cervical os	0	0	0	

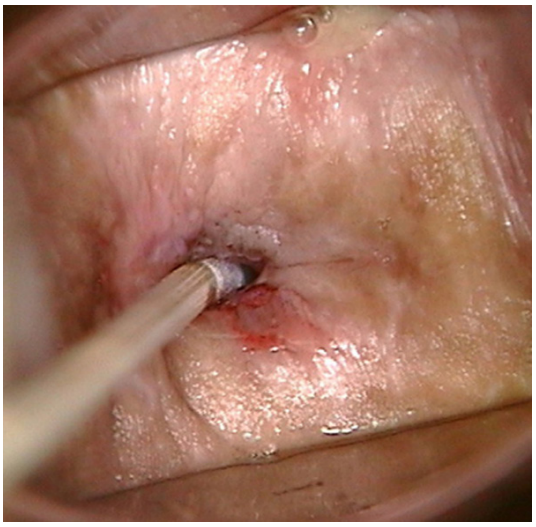

Figure 1. Appearance of the neovagina and cervix under colposcopy at 3 months after surgery. Original magnification ×10.

characteristics of the 10 patients are listed in **Table 1.** The median age of the patients was 16 (range 13-26) years. All patients had a history of cyclic abdominal pain. 2 patients had a previous history of unsuccessful attempt at laparoscopic uterovaginal anastomosis. In one patient, an unsatisfactory neovaginal tunnel was created and anastomosis was failed. The other one had an exploratory laparotomy and the cervix was not detected, so the procedure was failed. The symptoms of both patients caused by hematometra were not relieved postoperatively before referral. Seven patients had complete vaginal aplasia and the other 3 patients had a 0.5-2 cm long vaginal pouch. Preoperative secondary sexual characteristics, levels of sex steroids and gonadotrophin in plasma were unremarkable in all patients, suggesting normal ovarian function. Associated upper genital tract malformations were found in 3 women, including saddle-shaped uterus, left unicornuate uterus, right rudimentary horn of uterus and unicornuate uterus.

Right renal cyst, both renal calculi, calicectasis and right duplication of pelvis were found in 2 patients, respectively. The type of cervical malformation was confirmed during surgery, showing that 3 patient had entire cervical atresia and 7 patients had obstruction of the cervical os.

Time of operation, estimated blood loss, length of stay and follow up, the resumption of menstruation, the neovaginal and new cervical condition were recorded. This study was approved by the Obstetrics and Gynecology Hospital of Fudan University Institutional Review Board and informed consent from the guardians of all the patients was obtained before surgery.

Surgical procedures

The patient was placed in the lithotomy position in the operative theater. A midline incision at the vaginal introitus was made and a 9-cm canal was made between the bladder and the rectum using sharp and blunt dissection along the anatomic vaginal route, with the aid of laparoscopy to ensure correct orientation.

By laparoscopy, the uterine corpus is then grasped and flipped backward, then the level of the lowest pole of the uterine cavity was exposed. The cervix was incised by shape dissection and then the chocolate-like hematocele was extracted from the corpus uteri. After these procedures, a 14×12 cm split thickness skin graft was harvested from the right lateral thigh. 0-Vicryl stitches are used in a continuous fashion to secure the proximal segment of the harvested skin to lower uterine segment by laparoscopy. And then, distal segment was sutured with upper margin of vagina or vulva vaginally.

A T-shaped IUD connected to a 14 Foley catheter was passed into the uterine cavity through the opening from the newly reconstructed cervix and vagina to keep these canals patent, and an acrylic vaginal stent 2.5 cm in diameter and 8.5 cm in length was inserted. The uterus is tilted posteriorly to best visualize the lower uterine segment for cerclage placement. Next, a Mersilene™ tape (Ethicon, Somerville, NJ, USA) suture is placed in a purse-string fashion starting posteriorly. The wound on the right lateral thigh was covered with carbasus full of oculentum aureomycini and bandaged.

The postoperative treatment was the same as our previous report [5]. The Foley catheter was kept for 3 months to prevent cervical stenosis. All patient had regular menstruation during the follow-up period. **Figure 1** shows the condition of the new cervix and the normal healing of the vaginal graft 3 months post-operatively.

Statistical analysis

Descriptive statistics are used. Data are expressed as the mean ± SD and minimum and maximum values.

Table 2. Perioperative data of the patients who underwent combined laparoscopic and vaginal cervicovaginal reconstruction using split thickness skin graft

Parameter	Mean ± SD or n (range or percentage)
Operating time (min)	237±46 (175-380)
Estimated blood loss (ml)	160±76 (50-300)
Hospital stay post-surgery (days)	12±2 (9-18)
Complications (n)	0
Transfusion (n)	0
Conversion to laparotomy	0
Associated procedures for upper genital tract lesions	
salpingostomy	1
ovarian cystectomy	3
adhesiolysis	2
none	4
Total cost ($)	3352±1025
Median vaginal length at 3 month	8.3±1.1 (8-10)
Follow-up (months)	5±2 (1-10)
Resumption of menstruation	10 (100%)
Vaginal stenosis	0
Stricture of the cervix	0

Figure 2. The healing of the split thickness skin graft and the condition of the new cervix 3 months post-operatively.

Results

The procedures were successfully completed.

The perioperative data for the patients are shown in **Table 2**. The operative procedure lasted 237±46 (175-380) min. The estimated blood loss was 160±76 (50-300) ml. The hospital stay post-surgery was 12±2 (9-18) days. None of the patients had complications or required a blood transfusion. The mean total cost was $3352±1025, depending on surgical devices and length of hospital stay. There was no serious infection leading to shedding of the graft and the wound on the right lateral thigh recovered well in any of our patients.

All patients completed their post-operative medical visits. The average vaginal length at 3 month was 8.3±1.1 (8-10) cm. All patients had resumption of menstruation. The patients were followed for a mean of 5±2 (1-10) months. During the follow-up, cervical stenosis did not occur in any of the cases, and haematometra was not found on serial ultrasonography. All patients were told to wear the mould continuously for 3 months. Vaginal stenosis did not occur in any of the patients and the neovagina all had good morphological features. **Figure 2** shows the normal healing of the split thickness skin graft and the condition of the new cervix 3 months post-operatively.

Discussion

In this prospective observational study, we presented our successful experiences of combined laparoscopic and vaginal cervicovaginal reconstruction in ten patients with congenital atresia of the vagina and uterine cervix by using an split thickness skin graft. The results were satisfying compared with previous results. There were no complications, blood transfusion and no cervical or vaginal stenosis.

Our previous study had reported that acellular porcine small intestinal submucosa (SIS) graft was a potential alternative to the management of congenital agenesis and dysgenesis of uterine cervix and vagina [5]. SIS is derived from the submucosal layer of pig small intestine that has been mechanically separated from the adjoining intestinal layers. The SIS is de-cellularized, biocompatible and does not produce an immunologic rejection response. However, the SIS is expensive for the patients in developing countries. Lee et al reported successful treatment by laparoscopically assisted full thickness skin graft for reconstruction in a patient

with congenital agenesis of the vagina and uterine cervix [3]. However, the presence of a scar on thigh remains one of the most inevitable reasons for the decline in the number of patients who undergo the procedure. Perhaps split thickness skin graft is better than full one. Of course, whatever material used to produce a newly constructed reproductive tract, the purpose is to support a lining allowing epithelium to grow.

The procedure and outcome of cervical reconstrunction and vaginoplasty using an split thickness skin graft was rational in this study. The patients were followed for 5±2 (1-10) months, and the morphologic results of the neovagina and new cervix were good. The vaginal length was 8.3±1.1 (8-10) cm, suggesting all the patients had a satisfying vaginal length.

In our study, to keep the newly created cervix patent, a T-shaped IUD connected to a 14-French Foley catheter was inserted into the uterine cavity. And it was taken out 4-6 months later with satisfying results. Menstruation resumed in all the patients, with cervical stenosis not occurring in any of the cases.

Several reports mentioned spontaneous gestation after reconstructive surgery for congenital cervicovaginal atresia [6, 7]. Up to now, no patient had conception in our study, for we have started this procedure for less than 2 years.

Limitations of the study are the small sample size and the lack of a control group, both of which are difficult to include in a study of a very rare condition. In our opinion, congenital atresia of cervix can be safely managed via a combined laparoscopic and vaginal procedure with split thickness skin graft. Fertility after such a procedure should also be evaluated before it is used routinely.

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Disclosure of conflict of interest

None.

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