

Research Article**Recto-Neovaginal Fistula Following Vaginoplasty for Vaginal Agenesis: Our Experience and Management Guidelines****Randhir Singh Rao¹, Jagdeep Singh Rao², Harsh Deora³, Rahul Gupta^{4*}**¹Junior Specialist Surgery, Department of General Surgery, SMS Medical College, Jaipur, Rajasthan-302004, India²Assistant Professor, Department of Plastic Surgery, SMS Medical College, Jaipur, Rajasthan-302004, India³Resident, Department of General Surgery, SMS Medical College, Jaipur, Rajasthan-302004, India⁴Senior Resident, Department of Paediatric Surgery, SMS Medical College, Jaipur, Rajasthan-302004, India***Corresponding author**

Dr. Rahul Gupta

Email: meetsurgeon007@yahoo.co.in

Abstract: Recto-neovaginal fistula is an abnormal communication formed between the rectum and newly formed vagina, following vaginoplasty for vaginal agenesis. It results in soiling of neovagina by fecal matter and inflicts great deal of physical, social and psychological handicap on the sufferer and is one of the most dehumanizing conditions that affect women. The aim of this study was to review our experience in the management of this rare but debilitating condition with emphasis on treatment of fistula, maintaining the neovagina and to present guidelines for the management of this rare and devastating complication. This prospective study was undertaken from June 2007 to September 2011 at the Department of General Surgery, Obstetrics and Gynaecology. Six patients of recto-neovaginal fistula were included, which resulted as a consequence of operative trauma to the rectum during vaginoplasty for vaginal agenesis. Diverting colostomy was made in all cases. After 8-12 weeks definitive repair was done using Gracilis muscle transposition technique. All 6 cases reported complete healing of the fistula as evidenced by absence of fecal matter leakage and preservation of adequate vaginal length. No case had neovaginal stenosis or contracture. After colostomy closure at 4 weeks no patient had neovaginal graft loss or dimensional compromise. The anal sphincter was preserved in all patients. Our study is the largest series of recto-neovaginal fistula repair after Abbe-McIndoe vaginoplasty and has tried to reach a general guideline for their management without neovaginal compromise by providing vascularized gracilis muscle between the rectum and neovagina, expediting the healing of the fistula, and providing a mould to prevent its obliteration while maintaining bulk of the neovagina.**Keywords:** Recto-neovaginal fistula, Vaginoplasty, Vaginal agenesis, Gracilis muscle, Transposition technique, Vaginal mould.**INTRODUCTION**

Recto-neovaginal fistula is an abnormal communication formed between the rectum and newly formed vagina, following vaginoplasty for vaginal agenesis. It results in uncontrollable soiling of neovagina by fecal matter [1]. Recto-neovaginal fistula inflicts great deal of physical, social, and psychological handicap on the sufferer and is regarded as one of the most dehumanizing conditions that affect women. The patient suffers significantly because of the congenital absence of the vagina. When a ray of hope is seen in the form of a vaginoplasty, a recto-neovaginal fistula causing fecal leakage from the vagina forms and all hope seems lost.

Recto-neovaginal fistula causes multi-dimensional morbidity. Local infection of the newly created vagina may cause graft infection and loss. Recurrent urinary tract infection may also result. Finally

obliteration of the vaginal tract can occur with the fistulous opening and gynaestraxia making sexual activity impossible. This defies the very purpose for which the vaginoplasty procedure was carried out initially. This condition typically affects the young unmarried and newly married women who are their peak of self esteem & such a condition of continuous uncontrollable leakage of fecal matter and soiling of clothes renders the patient socially an outcast [1]. What compounds the problem is that no perfect guidelines are available to treat the misery of these unfortunate patients. The aim of this study is to review our experience in the management of recto-neovaginal fistula with emphasis on treatment of fistula and maintaining the neovagina by preventing its obliteration.

MATERIALS AND METHODS

The study was undertaken from June 2007 to September 2011 at the Department of General Surgery/Obstetrics and Gynaecology, Sawai Man Singh (SMS) Medical College Jaipur, Rajasthan, India. Data was prospectively collected. 6 patients of Recto-neovaginal fistula were included in study in which Recto-neovaginal fistula formed as a result of operative trauma to the rectum during vaginoplasty. Patients in whom rectal injury identified at primary surgery & repaired at same time were not included. A detailed record of the patient's age, nature of injury, time interval of appearance of fistula was made. Examination under anesthesia (EUA) and dye test was done to evaluate the size, site, and number of fistulas (Fig.1).

All 6 patients had Abbe-McIndoe vaginoplasty performed for vaginal agenesis by the Department of Plastic & Reconstructive Surgery. Recto-neovaginal fistula was identified in all 6 patients at the time of the 1st post-operative dressing change (i.e on 7th post-operative day). The initial dressing is always done under the supervision of the plastic surgeon. The patients were diagnosed with fistula by the passage of feculent discharge and flatus through the neo-vagina after removal of the mould.

Patients were kept nil per orum, thorough toileting of the vaginal cavity was done, and use of the vaginal mould was discontinued. Diverting colostomy was created on the same day. Subsequently, daily toileting of the neovagina was done with soap, water, and antiseptic solution. After 3 days when the colostomy started functioning and the neovagina becomes dry, the patient resumed using the vaginal mould. A small size mould prevents the obliteration of the neovagina without putting undue pressure on the injured rectum. Once the neovagina completely heals (i.e after 10-12 weeks), a dye test was done to evaluate the site, size, and number of fistulas.

After 10-12 weeks duration of fecal diversion and neovaginal healing, patients were taken for definitive surgical repair of the fistulas. Patients were placed in the lithotomy position after urinary catheterization. A trans-neovaginal approach to fistula repair was used in all patients (Fig. 2). A curvilinear incision along the anterior anal sphincter border was created. The neovaginal graft was first dissected from the anterior rectal wall in the midline. Then bilateral flaps of the neovaginal graft were raised with underlying fascial tissue on both sides. This dissection continued cephalad to the level of the fistula. In all cases the neovaginal graft was adhered to the mucosal folds of the rectum. Utmost care was taken while raising the flaps to prevent injury to the rectum as the intervening tissue was very thin. Once the neovaginal walls were mobilized from underlying rectum, the entire fistulous tract along with the adherent rectal mucosa was excised, converting the fistula to a fresh

injury. With the surgeon's non-dominant index finger lifting and supporting the anterior rectal wall, the initial sutures are placed extramucosally, including a portion of the muscularis and submucosa with 3-0 absorbable sutures. The initial suture line extends about 5-8mm above and below the site of fistulous tract to assure complete closure. A second layer of suture begins 5mm above and below the previously closed suture line, imbricating the initial suture line into the rectum.

The gracilis muscle is identified unilaterally and the muscle is transected near its insertion site and muscle flap raised based on the superior neurovascular pedicle (ascending branch of medial circumflex femoral artery and vein). The flap is then tunneled under the intact perianal skin and interpositioned between the neovagina and the anterior rectal wall covering the repair site (Fig. 3). The muscle is spread on all sides into the plane of recto-neovaginal dissection secured using 3-0 absorbable sutures. The graft skin and fascia flap are reapproximated over the underlying muscle. A conformer is not needed and the donor site is closed in a linear fashion (Fig. 4).

Post-operatively, patients were given antibiotic coverage and the urinary catheter kept in situ for 7 days. Patients were kept on bed rest for 7 days. Patients were discharged on the 10th post-operative day. The diverting colostomy closed after 4 weeks. Follow up was between 4-6 months. Patients started using a conformer after colostomy closure.

RESULTS

A total of 6 rectoneovaginal fistulas were treated during this study. The age of the patients ranged from 11 to 20 years (Table 1). Of our patients, 5 (83.3%) were unmarried adolescent females with history of primary amenorrhea. Four patients (66.67%) belonged to an upper socio-economic class.

Position of the fistula was upper vagina (66.67%) in most cases (Table 2). Size of the fistula was less than 1cm in 50% of the cases (Table 3). Most of the cases (83.3%) were diagnosed at the time of first dressing (7th post-operative day) change (Table 4).

Of our patients, 5 had an absent uterus and vaginal agenesis and 1 patient had rudimentary uterus & cervix with vaginal agenesis. All the patients underwent Abbe-McIndoe vaginoplasty in the Department of Plastic and Reconstructive Surgery from September 2008 to June 2011. Successful repair was defined as the absence of leakage of fecal matter per neovagina and preservation of adequate vaginal length. The fistula healed in all cases and patient started using conformer at 4 weeks post-operatively (Table 5).

No patient had neovaginal stenosis or vaginal contracture. After colostomy closure at 4 weeks no

patient had neovaginal graft loss. Anal sphincter function was preserved in all cases.

Table 1: Age distribution of patients

Age	11-16 years	16-20 years
Number	4 (66.67%)	2 (33.3%)

Table 2: Distribution of cases according to position of fistula

Position of fistula	Upper vagina	Middle vagina	Lower vagina
Number	4 (66.67%)	2 (33.3%)	NIL

Table 3: Distribution of cases according to size of fistula

Size of fistula	<1cm	1-2cm	>2cm
Number	3 (50%)	2 (33.33%)	1 (16.67%)

Table 4: Distribution of cases according to time of fistula diagnosis

Time of fistula diagnosis	7 th Post-operative day	10 th Post-operative day
Number	5 (83.3%)	1 (16.67%)

Table 5: Final vaginal dimension after conformer use

Vaginal length after 6 months of conformer use	5-6 cm	6-7.5cm	7.5-9cm
Number	2	3	1

Table 6: Peri-operative complication rates in various series of vaginoplasty

Name	Number of Patients	Primary graft failure	Hematoma formation	Rectal perforation	Fistula formation
Alessandrescu <i>et al.</i> [28]	201	1.4%	NIL	0.5%	0.5%
Wiser & Bakes [29]	92	1.0%	NIL	1.0%	1.0%
Rock <i>et al.</i> [30]	79	2.5%	2.5%	NIL	NIL
Buss & Lee [31]	50	2.0%	6.0%	NIL	NIL



Fig.1: Rectoneovaginal fistula demonstrated using methylene blue dye test and by passing an artery forceps through the fistula



Fig. 3: Gracilis muscle tunneled between the neovagina and anterior rectal wall



Fig. 2: Trans-neovaginal approach used in the operative management



Fig. 4: Neo-vagina after transposition of gracilis and closure

DISCUSSION

Counsellor reported that congenital absence of the vagina occurs in approximately 1 in every 4000 births and these abnormalities usually co-exist with uterine and urinary tract abnormalities [2, 3]. The ovaries are usually not affected, however, and the secondary sexual characteristics develop normally [4]. Because the cervix and vagina initially form a solid embryological unit, the reason for vaginal agenesis is the lack of cavitation and cell death needed to form the vagina [5].

There are various methods for surgically constructing neovagina. The difference among the various surgical approaches lies in the tissues used to line the neovagina. The various techniques described are Abbe–McIndoe vaginoplasty, McIndoe and Bannister procedure [6,7], constructing neovagina from bowel segments [8-10], pudendal-thigh flaps [11], fasciocutaneous flaps [12], gracilis myocutaneous flaps [13], labia minora flaps [14], flaps raised following tissue expansion of the labial pocket [15], peritoneum and bladder mucosa [16, 17], amniotic membranes [18], the Gynecare Interceed absorbable adhesion barrier (Ethicon US, LLC) [19], and autologous buccal mucosa graft [20, 21].

In general, the results of vaginal reconstruction are satisfactory. However, potential problems can include inadequate general wound coverage due to foreshortened graft or flap harvest, fecal contamination if preoperative bowel preparation has not been adequate, adjacent urethral injuries during dissection of the new vaginal pocket, difficult immobilization of patient in the post-operative period, and injury to rectum [3].

Skin grafting to construct the vagina was first reported by Abbe in 1898. In 1938, McIndoe reported the method using a split-thickness skin graft inverted over a stent. The McIndoe technique was widely used thereafter, generally with favorable results [7]. Recto-neovaginal fistula occurring during Abbe-McIndoe vaginoplasty is generally a high type of fistula [22]. During dissection of the apex of the vaginal pocket, vision and tactile feedback of tissue becomes difficult. An overenthusiastic effort to reach the rudimentary or underdeveloped cervix leads to injury to the rectum. If this injury is identified at the time of surgery, it can be repaired primarily and the rest of procedure continued in the usual manner. However, problems arise when rectal injuries go unnoticed during initial dissection and the vaginoplasty is completed as usual. At the time of the first dressing change on the 7th post-operative day the injury may be discovered. A fistula may be identified by feculent smell from the neovaginal fluid and presence of fecal soiling in neovagina. At this time, the fistula is already established.

Different methods are available to treat recto-neovaginal fistula according to anatomical location. These are dissection and anatomical repair in layers. Interposition grafts may be used between repaired

layers to support the repair and provide an additional layer of tissue. Various methods are

- Martius flap- Labia fat and bulbocavernosus muscle passed subcutaneously to cover the repair [21].
- Graclis muscle interposition or rectus muscle interposition [13].
- Omental pedicle graft- Omentum is harvested on right gastroepiploic artery and is useful in any transperitoneal procedures [23].
- Rectus abdominis flap graft- Rectus abdominis flap is harvested in transperitoneal approach [24].

The vagina forms in the third month of embryonic life. While the uterovaginal canal is forming, the endodermal tissue of the sinus tubercle begins to proliferate forming sinovaginal bulbs, which form the inferior 20% of the vagina. The tissue elongates over the subsequent 2 months and canalizes by a process of central desquamation. The fibromuscular wall of the vagina originates from mesoderm of the uterovaginal canal [25].

Vaginal agenesis is an uncommon condition that may result from a spectrum of underlying causes. Vaginal agenesis occurs as a result of variable Mullerian duct development and is possibly associated with renal, skeletal, and auditory anomalies. It is thought that Mayer-Rokitansky-Küster-Hauser syndrome (MRKH), agenesis or underdevelopment of the uterus and vagina, affects 1 in 5000 live born females. Vaginal agenesis is a rare entity occurring in 1 in 4000 live born females. Affected females suffer a great psychological and social trauma from knowing that they lack a functional vagina [26].

The primary goal of a neovaginoplasty is to create a vagina adequate for sexual interactions, adequate egress of menses if the uterus is present, normal amount of secretion and lubrication, absence of malodour, and minimal maintenance care. Unfortunately no single method achieves all of these goals [5].

In our patients, the method used was Abbe-McIndoe vaginoplasty using split thickness skin grafts harvested from the buttocks, applied over a conformer and lining a neovaginal canal which was dissected in the potential space between urethra and the rectum. The initial injury to the rectum may occur unrecognized at the time of initial surgical dissection. Alternatively, fistulas may develop because pressure placed on the rectal wall by the conformer.

Once the recto-neovaginal fistula is diagnosed, patients must undergo a diverting colostomy to prevent continuous soiling of the neovagina causing infection, graft loss, and formation of infected raw area at the neovaginal canal which is very difficult to heal.

Secondly, patient cannot afford the obliteration of the neovaginal canal as, regardless of the method of neocorporopoesis performed. It is important that the corrective operation be performed at a correct point in time. If the vagina becomes constricted because of infection and granulation tissue formation, then subsequent attempt to create a satisfactory vagina will be very difficult. The first operation has the best chance of success, so the aim is to preserve as much skin graft as possible.

All six patients started using vaginal mould after 4 weeks once the neovagina becomes dry. Definitive surgery was undertaken after 8-12 weeks of fecal diversion and neovaginal healing, once the skin graft matures. During definitive corrective surgery, the posterior neovaginal wall near the fistula is very thin, due to the absence of normal vaginal mucosa and submucosal connective tissue. Skin graft contracture adds to the technical difficulty of repair and to the surgeon's misery. Graft flaps once raised require adequate vascular bed to resettle. Gracilis muscle interposition provides sufficient bulk and vascular bed for the graft of posterior neovaginal wall. It brings its own blood supply lending new softness and pliability to the fibrosed area which is not achieved by any other technique [27].

Lastly, the immediate use of a conformer or mould is not possible immediately after corrective surgery. Gracilis muscle prevents the contracture of neovaginal canal during this initial period. So, this technique helps, not only to cure the fistula, but also to preserve the neovaginal canal length. A comparison (Table 6) of peri-operative complication of McIndoe Vaginoplasty in various series shows the rarity of this disease [28-31].

CONCLUSION

To conclude, once recto-neovaginal fistula is diagnosed, patients must undergo a diverting colostomy. Corrective operation must be performed at a correct point in time, approximately after 8-12 weeks of fecal diversion and neovaginal healing, once the skin graft matures. Gracilis muscle interposition provides sufficient bulk and vascular bed for the graft of posterior neovaginal wall, not achieved by any other technique. It not only helps to cure the fistula, but also to preserve the neovaginal canal length. Finally, our study is the largest series of recto-neovaginal fistula repair after Abbe-McIndoe vaginoplasty and has tried to reach a general guideline for the management of recto-neovaginal fistula without obliteration of the neovaginal canal.

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