Bangladesh J Obstet Gynaecol, 2024; Vol. 39(1): 24-29

Comparative Analysis of Outcome between Laparoscopic versus transabdominal Open Surgical Repair for Vesicovaginal Fistula

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Abstract

Objectives: *Vesicovaginal fistulas (VVF) have detrimental psychosomatic effects on women. Many publications exist on various approaches to VVF repair. Most of the surgeons are trained in open repair of VVF. Laparoscopic VVF repair is gaining popularity. The purpose of this study is to report our experience in the repair of vesicovaginal fistulas (VVF) by open and laparoscopic techniques and compare outcomes.*

Material and methods: *A retrospective study was conducted with the data of the patients who underwent VVF repair from 2017 to 2022. Out of the 60 VVF patients, 27 were managed laparoscopically (group 1) and 33 by open repair (group 2). Data on the etiology, size, number, location, mean operative time, need for blood transfusion, and postoperative complications were analyzed.*

Results: *The mean operative time (hours) in the laparoscopic group (group 1) was (5.01 ± 1.06), and in the open group (group 2), it was (3.09 ± 1.03; p<0.01). The mean hospital stay (days) in group 1 was 6.67 ± 1.14, and in group 2, it was 9.30 ± 2.09 (p<0.001). Two patients needed blood transfusions in group 1 and three patients in group 2 (p<0.015). Postoperative complications were more commonly seen in the open-repair group (p<0.034). Recurrence of fistula was seen in two patients in group 1 and four patients in group 2 (p<0.545) in six-month postoperative follow-up data.*

Conclusion: *Laparoscopic VVF repair is a feasible option for primary as well as recurrent VVF. It is associated with less postoperative morbidity and complications.*

Key words: *Vesicovaginal fistula, Laparoscopic repair, Open repair.*

Introduction:

Genitourinary fistula is defined as an abnormal communication between the genital and urinary tracts resulting in intermittent or continuous leakage of urine through the vagina. It affects physical, mental, social, and sexual lives of these patients. Hysterectomy alone accounts for the majority of bladder (2.9%) and ureteric (1.8%) injuries and subsequent urogenital fistula formation[1]. Complicated labor is a frequent cause of VVF in developing nations with poor obstetrical care. In the developed world, iatrogenic injury to the urinary tract is the most common cause of VVF[2]. Out of all the fistulas, 70% are diagnosed in the post-operative period[3]. There are multiple approaches to managing vesicovaginal fistulas. The choice of operation is predominantly a matter of the surgeon's preference, the location of the fistula, and its complexity. Various options to manage VVF are endourological, open (transabdominal and transvaginal), laparoscopic, or robotic-assisted repair[4, 5]. The minimally invasive

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procedures of laparoscopic and robotic-assisted surgery enable a transabdominal approach with lower morbidity. The main drawback of a minimally invasive approach is that it is associated with a steep learning curve[6]. Fistula recurrence is one of the most frequent side effects after primary treatment. Risk factors for recurrence are multiple fistulas, size and type of the fistula, and obstetrical etiology[7].

In this study, the outcome of primary and recurrent VVF repair was compared between laparoscopic and open modified O'Connor's techniques.

Material and Methods:

Patient selection:

After institutional ethics committee approval, data of the patients who had been operated between 2017 and 2022 were included, and all the data were reviewed retrospectively. VVF, following obstructed labor, difficult instrumental deliveries, and gynecological surgery (for benign causes) like hysterectomy and LSCS, were included in our study. Patients with single fistula, multiple fistulas, and recurrent fistulas were included in this study. Patients with a history of gynecological malignancy or radiation exposure were excluded. Those patients who had ureteric reimplantation surgery along with VVF repair were also excluded from the study. A detailed history and physical examination, including pelvic and per-speculum vaginal examination findings, were noted from the hospital records, telephonic communication with patients, and hospital visit in the follow-up period. All the patients had a urine routine examination and culture, a renal function test, abdominal ultrasonography, CECT KUB, and urography with an extended lateral image (to rule out other urogenital fistulas), and cystourethroscopy and vaginoscopy to assess the number of fistulas, site, size of the fistulas, proximity to ureteric orifices or bladder neck, and mucosa around the fistulous tract. Out of 27 patients in Group 1, 23 had an open abdominal hysterectomy for benign disease, and 4 had caesarean section. In group 2, 24 had a history of hysterectomy, 6 had a history of caesarean section, and 3 had a history of obstructed labor. Preoperative data includes the number of fistulas, the site of the fistula, the previous failed attempt, and the cause of the fistula. Intraoperative data of the duration of surgery, the need to convert open, and any adverse events were collected. Post-operative data included the need for blood transfusion, the number of days of hospital stay, and complications like UTI, wound infection, pain, ambulation, and recurrence of fistula.

Surgical techniques:

Open repair: All the patients were operated under spinal anesthesia and were placed in the low lithotomy position. Cystoscopy was performed, and fistula was identified. A 6 fr ureteric catheter was placed in fistula and a 5 fr ureteric catheter was placed in each ureters for constant identification of ureteral orifices during the procedure. 16 fr foleys catheterization catheterization was done. A vaginal pack was inserted.

The abdomen was opened by a lower abdominal transverse incision. Adhesiolysis was done. The posterior wall of the bladder was freed from attachments. The bladder was opened vertically, and bilateral ureteric orifices were identified. The cystotomy was extended down to the fistula. Clear margins of the bladder and vagina were identified. The anterior vaginal wall was repaired transversely with 2-0 Vicryl interrupted stitches. Omental flap was interposed between the bladder and vagina. The bladder was repaired vertically in two layers in a continuous manner with a 2-0 vicryl suture. An abdominal drain was placed in the pelvis, and the abdomen was closed in layers. Postoperatively, patients were put on analgesics, antibiotics, and anticholinergics.

Laparoscopic repair: All the patients were operated under on general anesthesia. The patient was first placed in the lithotomy position. Cystoscopy was performed, and fistula was identified. A 6 fr ureteric catheter was placed in fistula and a 5 fr ureteric catheter was placed in each ureters for constant identification of ureteral orifices during the procedure. . A 16 Fr Foleys catheter was placed, and both ureteric catheters were secured to it. Vaginal packing was done. Then the patient was placed in supine position with a 15- to 30-degree Trendelenberg tilt.

The initial 10 mm trocar was placed at the infra-umbilical site by the open method. Pneumoperitoneum created. Two working ports, 10 mm at the right iliac fossa and 5 mm at the left iliac fossa, over the spino-umbilical line were placed under vision. Another 5 mm trocar was placed in the lower abdomen if needed. Adhesiolysis was done, and the bladder was filled with about 200 to 250 ml of saline per urethra to see the outline. Near the midline, a limited cystotomy of about 2 cm was performed just above the vaginal vault.

Then the fistula was identified by the different-colored ureteric catheter. The cystotomy was extended up to the fistula. A plane was created between the bladder and vagina. The vaginal opening was repaired with 2-0 vicryl in a single-layer continuous manner, placing the suture line horizontally. Omentum flap were placed between vagina and bladder. Cystotomy was closed with a 2-0 vicryl suture in a single-layer continuous manner in a vertical orientation to get a non-overlapping suture line with respect to the vaginal suture line. Then the bladder was filled with about 150 ml of saline mixed with methylene blue to assess watertight repair. A 20 Fr abdominal drain was kept in the pelvis. 10 mm port site closed with a 2-0 Vicryl suture.

Postoperative instruction for both groups:
IV fluids, IV antibiotics, and painkillers were advised for both groups of patients.

The drain was removed when the output was <50 ml/ 24 hours and there was no suspicion of an intraabdominal leak.

Statistical analysis:
Estimated sample size at 95% confidence level using Z score (N=60). 60 Patients were included in this study and statistical analysis was performed using IBM SPSS version 20. Demographic and non-parametric outcome variables between groups were assessed using chi-square and Fisher's exact tests. ANOVA test were used to compare mean between two groups. Continuous variables were compared by Student's t-test. P <0.05 was considered to be statistically significant.

Results:
There were 27 patients in the laparoscopic group (group 1) and 33 patients in the open group (group 2). Patient clinical characteristics and demographics are summarized in Table I and Table II.

In all the primary cases, surgery was done between 3 to 6 months after gynecological surgery, and in those patients who presented to us with a recurrence of fistula, surgery was done after evaluation and optimization. There were no major intraoperative complications. Intraoperatively, two patients were converted from laparoscopic to open repair due to extensive adhesion and the difficulty of continuing laparoscopic repair. Both patients were included in the open surgical group for analysis.

The mean operative time (hours) in group 1 was 5.01 ± 1.06 and in group 2, was 3.09 ± 1.03, which is statistically significant (p-value<0.001). Postoperatively, 3 patients needed blood transfusions in Group 1 and 3 patients in Group 2 (p-value = 0.534). The mean hospital stay (days) in group 1 was 6.67 ± 1.14, and in group 2, it was 9.30 ± 2.09 (p-value <0.01). In group 2, out of 33 patients, 5 developed a wound infection, 6 had a urinary tract infection, 1 patient developed abdominal distension and 4 patients had urinary retention post foleys catheter removal. Complications were managed conservatively. Similarly, in Group 1, 2 patients developed abdominal distension, 3 patients had UTI and 2 patients suffered from retention of urine post catheter removal during the postoperative period, which was managed conservatively. Data of the follow-up period (6 months post-discharge) were collected, and we found that, in group 1, recurrence of fistula was seen in 2 patients. In the open repair group, 4 patients had a recurrence of fistula (p-value 0.545). Out of 2 patients in Group 1, 1 had a previous failed attempt of fistula repair and another was complication of abdominal hysterectomy surgery. In group 2, one patient had obstructed labor, one patient had a previous failed attempt of fistula repair, and 2 patients had abdominal hysterectomy surgery. The results are summarized in Table III.

Table-I
Demographics and clinical characteristics of patients with VVF

Parameters	Group 1	Group 2	P value
Mean age(years)	40.74+5.90	44.36+6.82	0.098
Parity			
Primi-para	5(18%)	7(21%)	>0.05
Multi-para	22(82%)	26(79%)	>0.05
No. of fistula			
Single	25(92%)	27(81%)	>0.05
Multiple	2(8%)	6(19%)	>0.05
Cause of fistula			
Hysterectomy	23(85%)	24(72%)	>0.05
Post caesarean	4(15%)	6(18%)	>0.05
Obstructed labor	Nil	3(10%)	-

Table-II

Characteristics of vesicovaginal fistula

Parameters	Groups 1	Groups 2	P value
Mean size of fistula(cm)	1.61+0.42	1.65+0.46	0.707
Type of fistula			
Primary	22(81%)	26(78%)	>0.05
Recurrent	5(19%)	7(22%)	>0.05
Type of previous repair in recurrent fistula			
Abdominal repair	4	5	>0.05
Vaginal route	1	3	>0.05

Table-III

Intraoperative and postoperative data

Parameters	Group 1	Group 2	P value
Operative time (hours)	(5.01±1.06)	(3.09±1.03)	<0.01
Hospital stay (days)	(6.67±1.14)	(9.30±2.09)	<0.01
Complications			
Urinary tract infection	3	6	0.034
Wound infection	0	5	
Abdominal distention	2	1	
Urinary retention post PUC removal	2	4	
Need for blood transfusion	3	3	0.534
Recurrence of fistula	2	4	0.545

Discussion:

VVF is a rare surgical complication that is extremely stressful for both patients and surgeons. VVF necessitates treatment with a high likelihood of success; this is what patients and colleagues expect[8,9].

The most important principle in VVF repair is to provide a watertight, tension-free closure, and the surgical route should be the one that provides the best possible chance of closure[10].

While managing these patients, the most commonly asked questions are:

i) Optimal timing for repair? ii) Surgical mode and approach?

The ideal timing for surgical intervention for VVF repair is open to discussion. In our institute, primary VVF was repaired after 3–6 months of gynecological surgery. It is believed that some small fistulas may close spontaneously with foleys catheterization. Delaying surgery will also allow local inflammatory responses to settle. Angioli et al also suggested that waiting 2–4 months has better outcomes[11].

There is still no “best” approach for the repair of VVF. Many factors, like the location of the fistula, size, number of fistulas, nearness to ureteric orifice, and distance from the bladder neck, help to determine the optimal approach. Apart from that, surgeon preferences and expertise available in hospitals are also deciding factors for surgical approach. In our institute, all the repairs were performed through the abdominal route. Our success rate was 93% in group 1 and 88% in group 2. R Warner et al did a comparative study of vaginal and open abdominal repair of vesicovaginal fistulas (VVF), and they found the success rate of abdominal open repair of VVF was 86% in 32 patients[12]. A Bouattour et al did a retrospective study of 14 patients with VVF who underwent transperitoneal laparoscopic fistula repair between 2016 and 2020, and their success rate was 85 %[13].

At present, there is no randomized prospective trial that evaluates the superiority of one approach over another. Previously, a retrospective comparative study was done between laparoscopic and open repair of VVF by Ghosh et al[14]. They included 13 patients in each arm and discovered that the laparoscopic group had lower mean blood loss and hospital stay. Although the sample size was small in this study, it does show that laparoscopic VVF repair has better outcomes.

Tiong HY et al and Wong C et al also showed that laparoscopic repair had faster recovery, less blood loss, which requires blood transfusion, and shorter hospital stay[15, 16]. These findings are also corroborated in our study. The overall success rate of laparoscopic VVF repair ranges from 86–100% in studies[17, 18].

No case series exclusively addresses laparoscopic repair of recurrent VVF. Much of the data is case reports. Miklos et al published the first report of laparoscopic repair of recurrent VVF in a patient with failed Latzko partial colpocleisis fistula repair following a hysterectomy. The bladder and vagina were sutured separately, and an omental patch was anchored in between[19].

In this study, we have included primary and recurrent fistulas in both groups. The outcomes of recurrent fistula repair by open and laparoscopic repair are comparable. For recurrent fistulas, the same route has also been recommended by Gupta et al[20].

Conclusion:

Though laparoscopic repair of VVF is technically challenging, it is a feasible and safe procedure with a high success rate and low morbidity. It is an excellent alternative to traditional open repair. For recurrent VVF repair, the best surgical approach is yet to be defined. Few cases of recurrent VVF were included in both groups, and our study showed that the laparoscopic approach is also suitable for recurrent fistulas with similar outcomes. The total recurrence rate did not differ significantly between various procedures. The limitation of this study is that it is a retrospective study. The surgeries were performed by separate surgeons. Further randomized and prospective studies are needed to standardise outcomes.

Acknowledgement:

I would like to acknowledge that no financial grant was needed for this study. Data of the patient were collected from hospital records; that's why no funding was required.

Contribution of authors

Dr Soumya Mondal: conception and design of the study; revising the manuscript critically for important intellectual content.

Dr Praveen Kumar Soni: acquisition of data, analysis and interpretation, drafting manuscript

Dr Dilip Kumar Pal: revising the manuscript critically for important intellectual content; approval of the manuscript to be published.

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