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Outcome of laparoscopic repair of vesicovaginal fistula in comparison with open transabdominal transvesical technique

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Abstract

Vesicovaginal fistula (VVF) is a distressing condition requiring surgical repair. This quasi-experimental study compared outcomes of open transabdominal transvesical (Group A) versus laparoscopic (Group B) VVF repair performed in the Urology Department, Dhaka Medical College Hospital, from March 2022 to August 2023. Thirty-seven patients meeting the inclusion criteria (supratrigonal VVF, fistula size <3 cm) were enrolled through purposive sampling and non-randomly assigned to two groups. Patients with complex, malignant, or recurrent fistulas or significant comorbidities were excluded. Baseline characteristics, surgical outcomes (operative time, blood loss, drain tube duration, hospital stay), and postoperative complications were assessed. Data were analyzed using SPSS version 26.0 with statistical significance set at $p < 0.05$.

Group A (n=20) underwent open transabdominal transvesical repair, and Group B (n=17) underwent laparoscopic repair. Both groups were comparable in age, BMI, fistula size, and baseline characteristics. Operative time was 125.05 ± 15.60 minutes in Group A and 131.88 ± 13.96 minutes in Group B ($p=0.1726$). Blood loss was 123.88 ml in Group A versus 70.23 ml in Group B ($p = 0.8657$). Drain tube duration (5.50 ± 1.40 vs. 2.12 ± 1.45 days) and hospital stay (7.90 ± 1.37 vs. 4.00 ± 1.37 days) were significantly shorter in Group B ($p < 0.0001$). Postoperative urinary leakage was 10% in Group A and 5.89% in Group B ($p = 0.44$). Laparoscopic VVF repair demonstrates advantages over the open approach in terms of reduced drain tube duration and hospital stay, with comparable safety and efficacy. Further studies are recommended to validate these findings.

Keywords: Vesicovaginal Fistula, Post-operative VVF, Obstetric VVF, Cystoscopy, Laparoscopic repair of VVF, Open Transabdominal Transvesical Repair of VVF, Complex Fistula, Multiple Fistula

Introduction

Vesicovaginal fistula is an abnormal communicating tract between the urinary bladder and vagina that results in continuous leakage of urine through the vagina [1]. It is a devastating, depressing, and debilitating condition. Due to the continuous leakage of urine and uriferous smell, the patient become socially outcasts [2]. VVF commonly results from prolonged, obstructed labor in underdeveloped and developing countries. On the other hand, abdominal hysterectomy is the most common cause of VVF in developed countries [3]. The most common site of VVF is the vaginal cuff, typically in the supratrigonal posterior wall of the bladder. During gynaecological surgery this is the usual site of bladder injury and occurs mainly when the procedure is technically difficult [4].

Treatment options include surgery from either vaginal or abdominal approach, which depends on fistula location, size, complexity, and aetiology as well as previous operative repair attempts. Transvaginal vesicovaginal repair is likely the most minimally invasive approach since the vagina in its native state serves as a natural orifice [5]. But this approach is not indicated for supratrigonal VVF owing to the associated poor visual exposure and limited opening space [4].

Open transabdominal repair is indicated and suggested in supratrigonal fistula, large fistulas, complex fistulas, multiple fistulas, and failed vaginal repair. This approach provides optimal access to the urinary bladder, excellent mobilization of different layers, identification of ureters and ability to position an interposition graft as omentum or peritoneum [6].

The main disadvantage of the abdominal approach includes the necessity of laparotomy, splitting the urinary bladder, and its associated morbidity with longer recovery [7].

Laparoscopy in urology has become tremendously popular in recent years. It is increasingly performed in many institutions worldwide. Laparoscopy as a minimally invasive intervention can be a suitable alternative for those patients who have been selected for abdominal surgery to manage VVF [8]. Laparoscopic repair of VVF after gynecological surgery was first reported by Nezhat *et al.* in 1994 [9]. It is now one of the modalities in the management of VVF, with a number of studies demonstrating its safety, feasibility, and efficacy with a good success rate and less morbidity compared with those open surgery [10]. But it requires a highly skilled surgeon, steeper learning curve which is main drawback and lastly, intracorporeal suturing remains a challenge.

The objective of my study is to evaluate the outcome of patients undergoing open trans-abdominal transvaginal VVF repair and laparoscopic VVF repair at our institution and to standardize a better treatment option for VVF. Surgical repair is the mainstay of treatment for vesicovaginal fistula. Different approaches have their own indication. Per-vaginal and transabdominal approaches are used by most of the surgeons. Open transabdominal approach has some disadvantages like bivalving the urinary bladder, greater morbidity of the patient, longer recovery time, longer hospital stay. This can be overcome by the use of modern technology that is laparoscopic VVF repair to combat those disadvantages of open transabdominal approach. But the efficacy regarding postoperative leakage still remained undefined in laparoscopic approach. There is no established proclaimed superiority of laparoscopic repair over open VVF repair as no high level of evidence exists. So, the role of laparoscopic VVF repair still remains unspecified. There are only two retrospective comparative studies published worldwide. In Dhaka Medical College Hospital, we have started laparoscopic VVF repair, we want to see the outcome of this approach whether it is better than open transabdominal transvesical. So that we can offer the VVF patients the better option as we know first time is best time in reconstructive surgery. So far, my knowledge no such study has yet been done in this institute. Keeping this view in mind the present study is designed to compare effectiveness and outcome of laparoscopic VVF repair in comparison with open transabdominal approach. If this study shows encouraging result, this will open up a new avenue for the management of VVF effectively and will be the basis of further research.

Materials and Methods

This quasi-experimental study was conducted at the Department of Urology, Dhaka Medical College Hospital from March 2022 to August 2023 to compare the outcomes of open transperitoneal transvesical repair (Group A) and laparoscopic vesicovaginal fistula (VVF) repair (Group B) for supratrigonal VVF less than 3 cm in size. Thirty-seven (37) patients were purposively selected and divided randomly between the two groups, with allocation determined alternately following an initial lottery. Patients underwent thorough preoperative evaluations, including clinical history, physical examination, and investigations such as urine culture, coagulation profile, renal function tests, and imaging studies. Surgeries were performed under

general anesthesia, with Group A undergoing an open surgical approach via a midline infraumbilical incision and Group B receiving laparoscopic repair using minimally invasive techniques with pneumoperitoneum and layered closure. Standardized postoperative care included catheter management, antibiotics, and regular follow-ups at 3 weeks, 6 weeks, and 3 months to monitor outcomes and complications. The primary outcomes compared included urinary leakage, duration of drain tube placement, and length of hospital stay. Data were analyzed using SPSS v26, with statistical significance set at $p < 0.05$, employing unpaired *t*-tests for quantitative variables and chi-square tests for qualitative data. The study was ethically approved, and informed consent was obtained to ensure confidentiality and patient autonomy. Findings were systematically presented in tables and graphs, highlighting the comparative effectiveness and safety of both surgical techniques.

Results

Table 1: Comparison of age and BMI of the participants (N=37)

Variables	Group A (n=20)	Group B (n=17)	p-value
Age (years)	32.95(±5.57)	35.35(±7.11)	0.256
BMI (kg/m ²)	21.50(±3.44)	22.29(±3.06)	0.466

Results were expressed in mean±SD

Values in the parentheses denote the corresponding standard deviation

Group A= open transabdominal transvesical approach

Group B= Laparoscopic approach

n = Number of the study population in groups

Unpaired *t*-test was done to measure the level of significance

p-value <0.05 is considered significant

Table 2: Comparison of size of fistula and etiology of fistula (N=37)

Variables	Group A (n=20)	Group B (n=17)	p-value
Size of the fistula (cm)	1.795	1.567	0.113 ^a
Etiology of the fistula Iatrogenic			
TAH	11(55%)	7(41.18%)	
C/S	4(20%)	5(29.41%)	0.683 ^b
Obstructed labour	5(25%)	5(29.41%)	

Values in the parentheses denote the corresponding percentage.

Results were expressed in mean±SD

Group A= open transabdominal transvesical approach

Group B= Laparoscopic approach

n = Number of the study population in groups

a-Unpaired *t*-test was done to measure the level of significance

b-Chi square test was done to measure the level of significance

p-value <0.05 is considered significant

Table 3: Comparison of drain tube duration and hospital stay in both groups (N=37)

Variable	Group A (n=20)	Group B (n=17)	p-value
Duration of drain tube (days)	5.50(±1.40)	2.12(±1.45)	<0.0001
Duration of hospital stay (days)	7.90(±1.37)	4.00(±1.37)	<0.0001

Values in the parentheses denote the corresponding standard deviation

Result was expressed in mean \pm SD

Group A= open transabdominal transvesical approach

Group B= Laparoscopic approach

n = Number of the study population in groups

unpaired t-test was done to measure the level of significance

p-value <0.05 is considered significant

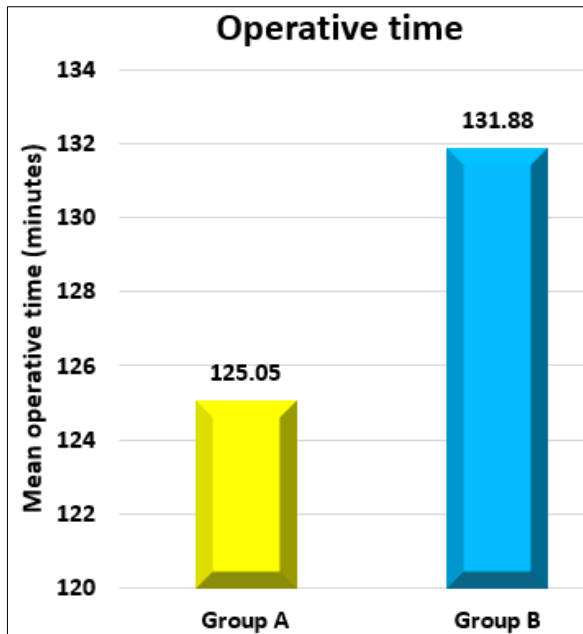


Fig 1: Comparison of operative time of open transabdominal transvesical approach and laparoscopic approach (N=37)

Results were expressed in mean \pm SD

Group A= open transabdominal transvesical approach

Group B= Laparoscopic approach

n = Number of the study population in groups

Unpaired t-test was done to measure the level of significance

p-value <0.05 is considered significant

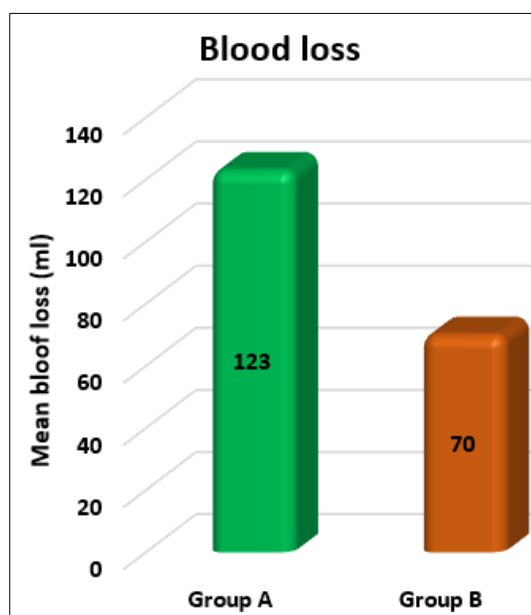


Fig 2: Comparison of blood loss of open transabdominal transvesical approach and laparoscopic approach (N=37)

Results were expressed in mean \pm SD

Group A= open transabdominal transvesical approach

Group B= Laparoscopic approach

n = Number of the study population in groups

Unpaired t-test was done to measure the level of significance

p-value <0.05 is considered significant

This prospective study compared outcomes between the open transabdominal transvesical approach (Group A) and laparoscopic repair (Group B) for vesicovaginal fistula (VVF) repair in 37 patients. Baseline characteristics, including age, BMI, fistula size, and etiology, were comparable between groups ($p > 0.05$). The mean operative time was 125.05 ± 15.60 minutes in Group A and 131.88 ± 13.96 minutes in Group B ($p = 0.1726$). Mean blood loss was 123.88 ml in Group A and 70.23 ml in Group B ($p = 0.8657$). The duration of drain tube placement (5.50 ± 1.40 days vs. 2.12 ± 1.45 days, $p < 0.0001$) and hospital stay (7.90 ± 1.37 days vs. 4.00 ± 1.37 days, $p < 0.0001$) were significantly shorter in Group B. Postoperative urinary leakage rates were 10% in Group A and 5.89% in Group B ($p = 0.44$). These findings suggest that while both approaches have comparable efficacy, laparoscopic repair offers advantages in terms of reduced drain tube duration and hospital stay.

Discussion

Surgical repair is the definitive treatment for vesicovaginal fistula (VVF), with reported success rates ranging between 85% and 95% for the first surgical intervention, emphasizing the importance of a precise and effective approach. The key principles of VVF repair include adequate mobilization of tissues, excision of the fistula tract, watertight closure of the bladder, and interposition of a well-vascularized flap to separate the bladder and vagina [1]. While the open transabdominal transvesical approach has been widely accepted as effective, it is associated with higher morbidity, increased blood loss, longer hospital stays, and extended recovery periods [2]. The emergence of minimally invasive laparoscopic techniques offers an alternative with comparable success rates but reduced morbidity and improved outcomes in carefully selected cases [3].

In our study, the mean age of patients in both groups was consistent with previous research by Xiong *et al.* (2016) and Ghosh *et al.* (2016), demonstrating that VVF commonly affects women in their reproductive years (4, 5). The etiology of VVF predominantly involved iatrogenic causes such as abdominal hysterectomy and cesarean section in both groups, aligning with findings by Sheikh *et al.* (2011) and Javed *et al.* (2015), who reported similar distributions of causative factors [6, 7].

Blood loss was lower in the laparoscopic group, with a mean of 70.88 ± 8.52 mL compared to 123.75 ± 12.23 mL in the open approach. These results corroborate findings by Ghosh *et al.* (2016) and Xiong *et al.* (2016), who also observed reduced intraoperative blood loss in laparoscopic repairs [4, 5]. Although the laparoscopic approach required slightly more operative time (131.88 minutes vs. 125.05 minutes in the open approach), the difference was not statistically significant ($p = 0.1726$). This observation is consistent with the findings of Gozen *et al.* (2009), suggesting that surgical experience and patient characteristics can influence operative time [8].

Postoperative outcomes were favorable for the laparoscopic group, with significantly shorter drain tube duration (2.12 days vs. 5.50 days in the open group; $p < 0.0001$) and hospital stay (4 days vs. 7.90 days; $p < 0.0001$). These findings align with Miklos *et al.* (2015) and Xiong *et al.* (2016), who reported similar advantages in terms of reduced postoperative recovery times^[9, 4]. The preference of patients to remain hospitalized until tube and suture removal, despite being fit for discharge, reflects socio-cultural factors unique to the healthcare system in Bangladesh.

Success rates for both techniques were comparable, with 90% in the open group and 94.11% in the laparoscopic group. The slightly higher success rate in the laparoscopic group may be attributed to enhanced visualization and precision afforded by laparoscopy, especially in the confined pelvic space. These results are consistent with studies by Xiong *et al.* (2016) and Sotelo *et al.* (2005), who reported similar success rates between the two approaches^[4, 10]. However, the difference in success rates was not statistically significant ($p=0.44$), indicating that both approaches are effective when performed by skilled surgeons.

The findings suggest that laparoscopic VVF repair offers distinct advantages, including reduced blood loss, shorter hospital stays, and faster recovery, while maintaining comparable success rates to the open transabdominal approach. However, the steep learning curve and requirement for advanced laparoscopic skills remain significant challenges, as highlighted by Gozen *et al.* (2009) and Wong *et al.* (2006)^[8, 11]. This study underscores the potential of laparoscopic VVF repair as a viable and possibly superior alternative to open surgery in appropriate cases, warranting further research and skill development in this technique.

Conclusion

The laparoscopic repair of vesicovaginal fistula is advantageous. It provides wide exposure of the fistula site and better dissection of tissues and the omental interposition flap can be given by this procedure. It significantly reduces drain tube duration and hospital stay. The postoperative leakage is also lower in this approach.

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