

## Which Surgical Technique Should be Preferred to Repair Benign, Primary Vesicovaginal Fistulas?

Abdullah Gedik,<sup>1\*</sup> Hasan Deliktas,<sup>2</sup> Nurettin Celik,<sup>1</sup> Devrim Kayan,<sup>3</sup> Mehmet Kamuran Bircan<sup>3</sup>

**Purpose:** To evaluate and compare the outcomes of benign, primary vesicovaginal fistulas (VVF) treated using the transabdominal transvesical technique and the transvaginal technique without tissue interposition.

**Materials and Methods:** A total of 53 consecutive women with VVF who were treated between September 1999 and October 2014 were evaluated retrospectively. Patients with a malignant etiology and/or prior irradiation were excluded because they required a more complex repair. In the first group, the repair was performed using the transabdominal transvesical technique (n = 28). After one of our fellows had completed his urogynecology training, he began to perform the repairs using the transvaginal technique (n = 25). All included VVF patients were treated without a tissue interposition.

**Results:** Vesicovaginal fistula repair was performed in 53 patients, with a mean age of  $41.4 \pm 15.2$  years. There was no significant difference in terms of the patients' age, fistula size, and the number of deliveries between the groups. All cases failed in terms of conservative management. The size of the fistulas ranged from 15 to 20 mm. The admission time was between 3 days and 21 years, and it was longer in less educated patients. The success rate was 96.4% (27/28) in the transabdominal transvesical group and 100% (25/25) in the transvaginal group ( $P = 1.00$ ). The hospitalization period and complications were significantly reduced in the transvaginal group ( $P = .00$  and  $P = .004$ , respectively). No patients converted from a transvaginal to a transabdominal repair. There was only one recurrence in the transabdominal transvesical group. The patients were followed up for 1 year.

**Conclusion:** Transvaginal repair of benign, primary VVFs is more advantageous than transabdominal transvesical repair. There was a significant decrease in the hospitalization period and complications rates using the transvaginal technique without tissue interposition.

**Keywords:** vesicovaginal fistula; surgery; retrospective studies; treatment outcome; gynecologic surgical procedures; methods.

### INTRODUCTION

Vesicovaginal fistula (VVF) is the most frequent type of acquired fistulas and causes both physical and psychosocial morbidity. In underdeveloped countries, VVFs occur due to obstetric complications when there is limited access to prenatal and obstetric care. In industrialized countries, VVFs usually occur as a complication of gynecological, urological or abdominal pelvic surgeries; other causes include malignant illnesses and radiotherapy of the pelvis.<sup>(1,2)</sup> The overall incidence of VVF because of gynecologic surgery is estimated to be 1 of every 1200 hysterectomies and 1 of every 455 laparoscopic hysterectomies.<sup>(3)</sup> It is estimated that more than 2 million women have untreated obstetric fistulas. There is an incidence of 50000–100000 new cases annually.<sup>(2)</sup>

It is an ancient disease and has been described since

2050 BC as a large vesicovaginal fistula and laceration of the perineum, which is most likely due to birth trauma.<sup>(4)</sup> The first basic principles of VVF repair were described by Hedrick in 1663, and in 1852, Maram Sims carried out the first successful VVF repair.<sup>(2)</sup> However, there are still many controversies in the type of treatment (conservative or surgical), in the optimum time of treatment (early or late), in the type of surgical technique (transvesical, transvaginal, laparoscopic or robotic), in the use of tissue interposition and in the type of urinary diversions used postoperatively (urethral catheter with or without cystostomy).

The approach is dependent on many factors, particularly on the experience of the surgeon. In general, simple fistulas are treated using the vaginal approach, whereas complex fistulas are commonly treated using an abdominal approach.<sup>(5-7)</sup> In the literature, the success rate

<sup>1</sup> Department of Urology, Medical Faculty, Dicle University, Diyarbakir 21000, Turkey.

<sup>2</sup> Department of Urology, Medical Faculty, Mugla Sitki Kocman University, Mugla 48000, Turkey.

<sup>3</sup> Department of Urology, Memorial Hospital, Diyarbakir 21000, Turkey.

\*Correspondence: Department of Urology, Medical Faculty, Dicle University, Diyarbakir 21000, Turkey. Tel: +90 4122488001. Fax: +90 4122488440. E-mail: gedikabd@gmail.com.

Received May 2015 & Accepted November 2015

for simple VVF using the transabdominal technique is 87.5% and is 87.0% using the transvaginal technique.<sup>(8-10)</sup> Compared with the vaginal approach, the transabdominal approach to VVF repair is associated with a longer recovery time and patient hospitalization, greater blood loss, more cosmetic deformity, and in general, greater morbidity.<sup>(11,12)</sup>

In this study, we retrospectively evaluated our treatment modalities in benign, primary vesicovaginal fistulas to assess and compare the outcomes of our treatment modalities and preferences that changed over the years.

## MATERIALS AND METHODS

### *Study Subjects*

This study was approved by the local ethics committee. Patients who underwent surgery for VVFs between September 1999 and October 2014 were evaluated retrospectively. The study included 53 patients with VVF who underwent a transabdominal transvesical repair (n = 28) or a transvaginal repair (n = 25). Only primary benign fistulas were included in this study. Recurrent VVFs and VVFs as a complication of malignant diseases or radiotherapy were excluded. We performed physical and vaginal examinations, and to detect the localization and size of fistula, we performed cystoscopy under local anesthesia in all patients with involuntary urine discharge from the vagina. In six patients, we could not see the fistula using cystoscopy. In these patients, we applied methylene blue via the urethral catheter and localized the fistula by vaginal examination. In all patients, we carried out the repair 12 weeks after the fistula formation. Patients who arrived before 12 weeks were treated conservatively and maintained on a perurethral Foley catheter for 12 weeks. In patients who failed to improve from conservative treatment at the end of 12 weeks, fistula repair was performed.

Until 2008, the repair of 28 patients was carried out using the transabdominal transvesical technique. After 2008, when one of our fellows (AG) completed his urogynecology training, he started to do the repairs by transvaginal technique. After then, in vaginal examination and cystoscopy, ureteral orifices are involved in the fistula and ureteral reimplantation is required, fistula size greater than 20 mm or in recurrent fistula, repair is done by transabdominal transvesical technique. Fistula size smaller than 20 mm and in the uncomplicated fistula, even if the fistula located supratriangular, repair is done by transvaginal technique.

### **Surgical Techniques**

#### *Transabdominal Transvesical Repair*

The patients were operated on in the horizontal supine

position under general anesthesia. Access to the bladder was achieved through an infra-umbilical incision, and the bladder was incised to expose the fistulous orifice. Fistula catheterization was performed in all patients with a 12 French (F) urethral Foley catheter, depending on the fistula size. The fistulous orifice was carefully surrounded with delicate dissection. After adding stay sutures to each side of the fistula, we removed the catheter. First, we closed the anterior vaginal wall with Vicryl 2-0. The bladder wall was closed in two layers: the mucosa and muscle layers were closed with 4-0 and 2-0 Vicryl sutures, respectively. Before closure, a 14F Foley was replaced as the suprapubic catheter, and an 18F Foley was used as a urethral catheter. We inserted a povidone-iodine soaked sponge in the vagina and removed it on the following day. We removed the cystostomy on the third postoperative day and discharged the patient after the drainage stopped from the cystostomy tract and the urine became clear by prescribing antibiotics and anticholinergics, and called the patients back to by the 14th postoperative day to remove the urethral catheter. We stopped the anticholinergics one day prior to the catheter removal.

#### *Transvaginal Repair*

The patient was operated on in the dorsal lithotomy position. First, we inserted a guide wire through the fistula cystoscopically. Fistula catheterization was performed transvaginally in all patients with a 12F Foley catheter over the guide wire, depending on the fistula size. To drain the bladder, a 16F Foley catheter was used. Routinely, we do not use suprapubic catheters. The fistulous orifice was carefully surrounded with delicate dissection. The bladder and perivesical tissue were sutured by 3-0 and 2-0 Vicryl. After the closure of the second layer, the presence of leakage by filling the bladder was evaluated with 300 mL of saline dyed with blue methyl. If the sutures were secure and watertight, then we suture the vaginal layer of the fistula tract with 2-0 Vicryl. We inserted a povidone-iodine soaked sponge to the vagina and removed it on the following day; the patient was discharged after the urine became clear by prescribing antibiotics and anticholinergics. All of the patients were called back on the 10th postoperative day to remove the urethral catheter. We stopped the anticholinergics one day before the catheter removal.

#### *Statistical Analysis*

Statistical analyses were performed using Statistical Package for the Social Science (SPSS Inc, Chicago, Illinois, USA) version 15.0. The differences between the groups for continuous variables were performed using the independent sample *t* test and the categorical data

**Table 1.** Patient and fistula characteristics.

Surgical Methods	Transabdominal- Transvesical (n = 28)	Transvaginal (n = 25)	P Value
Mean age (years), (mean ± SD)	43.4 ± 15	40.3 ± 12	.07
Number of deliveries, (mean ± SD)	4.4 ± 3.1	3.7 ± 4.6	.63
Fistula size (mm), (mean ± SD)	18 ± 11	14 ± 13	.42
Fistula localization, no			
Supratrigonal	26	20	.23
Trigonal/Infra trigonal	2	5	
Etiology, no			.45
Normal delivery	4	2	
Caesarian section	11	14	
Total abdominal hysterectomy	13	9	

were compared using Fisher's exact test and chi-square test. A *P* value of < .05 was considered statistically significant.

## RESULTS

Vesicovaginal fistula repair was performed in 53 patients with a mean age of  $41.4 \pm 15.2$  years. There were no significant differences in terms of patient age, fistula size, and number of deliveries between the groups. All cases failed in terms of conservative management. The success rate was 96.4% (27/28) in the transabdominal transvesical group and 100% (25/25) in the transvaginal group (*P* = 1.00). The hospitalization period and complications were significantly reduced in the transvagi-

nal group (*P* = .00 and *P* = .004, respectively). All of the included patients had a nonirradiated VVF and did not have an underlying malignant disease; further, in all of these patients, the repair was the primary procedure. All repairs were done by the same surgeon (AG) without tissue interposition. The patient and fistula characteristics are shown in **Table 1**. The size of the fistulas ranged from 15 to 20 mm. The application time differed between 3 days and 21 years, and it was longer in undereducated patients. All fistula repairs were carried out after 12 weeks. The repair was performed immediately in patients who arrived later than 12 weeks. No patients converted from a transvaginal to a transabdominal repair. There was only one recurrent fistula in the transab-

**Table 2.** Results and complications.

Variables	Transabdominal-Transvesical (n=28)	Transvaginal (n=25)	P Value
Hospitalization time (day) (mean ± SD)	4.89 ± 2.46	1.12 ± 0.43	.00
Success rate, no. (%)	27 (96.4)	25 (100)	1.00
Follow up time (month)	12	12	
Recurrence, no	1	0	1.00
Complications, no			
Major complications*	0	0	
Minor complications	14	3	
Fever >38°C	3	1	
Hematuria	2	1	
Vaginal bleeding	0	1	
Prolonged drainage (> 24 hours) from the cystostomy tract	4	0	.004
Infection in the cystostomy tract	1	0	
Opening of the incision	2	0	
Infection in incision area	1	0	
Scarring causing cosmetic problems in incision area	1	0	

\*Defined as Clavien Class 2 or greater.

dominal transvesical group.

There were no major complications, as defined by Clavien Class 2 or greater, in either group. There were no bladder, bowel, ureteral or nerve injuries. The minor complications, according to Clavien Class 1, are shown in **Table 2**.

## DISCUSSION

Though Maram Sims carried out the first successful repair of VVF in 1852,<sup>(13)</sup> there are still many controversies about the type of treatment (conservative or surgical), the optimum time of treatment (early or late), the surgical technique (transvesical, transvaginal, laparoscopic or robotic), the use tissue interposition and the type of urinary diversions (urethral catheter with or without cystostomy). In this study, we retrospectively evaluated our treatment modalities in benign, primary vesicovaginal fistulas to assess and compare the outcomes of our treatment modalities and preferences that changed over the years.

There are controversies about the optimum timing of VVF surgery. Early fistula repair is often followed by a relapse because of tissue necrosis. Early surgery is indicated only in intra operatively discovered fistulas. Phsak and colleagues reported that when they repaired fistulae earlier than 6 weeks, they found the repair to be significantly more difficult than necessary.<sup>(3)</sup> Additionally, Altaweel and colleagues<sup>(14)</sup> noted that when they carried out the repair earlier as recommended by Bettez and colleagues,<sup>(15)</sup> their patients had major morbidities.<sup>(14,15)</sup> Phsak and colleagues<sup>(3)</sup> said that a 6-week minimum between surgeries is sufficient to allow the inflammation to lessen and that waiting longer than 6-8 weeks is rarely needed for fistula repairs, regardless of whether it is primary or recurrent. Similar to Hadzi-Djokic and colleagues<sup>(16)</sup> and Altaweel and colleagues,<sup>(14)</sup> we think that the optimum time for surgery is 3 months after the formation of the fistula, i.e., after the healing response is complete.<sup>(14-16)</sup> In cases arriving to the hospital later than 12 weeks, we performed the repair immediately. The approach is dependent on many factors, particularly the surgeon's experience. The most commonly used approaches are vaginal, transvesical, retroperitoneal, transperitoneal, and recently, laparoscopic and robotic approaches.<sup>(16-19)</sup>

The abdominal approach may be used to treat all types of VVF as it is the preferred approach in complex situations when the fistula is large (wider than 4 cm), or when ureteral orifices are involved in the fistula and ureteral reimplantation is required. The biggest drawback of the abdominal approach is that it requires lap-

arotomy and is associated with other morbidities and a longer recovery period.

Between September 1999 and October 2014, 53 patients with VVFs were treated in our clinic. Until 2008, the repair of 28 patients was carried out using the transabdominal transvesical technique. After 2008, when one of our fellows (AG) completed his urogynecology training, he started performing repairs using the transvaginal technique. After observing his technique, we recognized how anuro gynecology fellowship is valuable and effective. The vaginal approach is less aggressive and is well accepted by patients. It involves the tension-free closure of the fistula. The postoperative patient comfort is higher, and the hospital stay is shorter. Additionally, patients are free of abdominal incisional complications. Although the transvesical approach was the most popular approach in the early period of this study, because there is no statistically significant difference in the success rates, we now recommend and prefer the vaginal approach in noncomplicated fistulas. There are no randomized control trials to suggest which approach is superior. Although each approach has its benefits, the decreased length of stay, pain, and morbidity makes the transvaginal approach preferable.<sup>(6)</sup>

In our practice, the transvesical approach is rarely required today and is used only in complex cases with large fistulas and in situations in which an additional surgical procedure, e.g., an ureteroneocystostomy, is required.

Incontinence as a result of VVF is one of the most disturbing conditions present in the female population. The aim of the treatment is to quickly stop the involuntary discharge of urine and to enable complete urinary and genital functions. Surgical success is therefore necessary. Tissue interposition in genitourinary fistula repairs can be accomplished with vascularized flaps, such as the labial fibrofatty tissue (Martius Flap), a pediculated vaginal wall flap, the peritoneum, the omentum, gluteus muscle, rectus abdominus muscle, or gracilis muscle.<sup>(1,20-22)</sup> Nonautologous grafts, namely, small intestinal submucosa and human dura grafts, have also been used to treat benign recurrent VVFs.<sup>(23,24)</sup> It is generally accepted that the first repair has the highest chance of success, and there is little doubt that tissue interposition has allowed for the reconstruction of many complex VVFs. However, interpositional flaps are not without their complications, including hematomas, wound separations, pain and deformities.<sup>(25)</sup> There is no doubt that tissue interposition can be used in complex VVFs. However, in benign VVFs, there is doubt about whether an interpositional flap is truly needed. There-

fore, the risks and benefits of tissue interposition must be considered carefully. We believe that nonirradiated, primary VVFs differ from complex fistulas that typically require tissue interposition, as previously suggested. In fact, our cure rate of VVFs suggests that the risk and time associated with tissue interposition may be avoided in many patients with benign VVFs.

Additionally, there is debate about the use of urinary diversion. Is it necessary to replace a cystostomy with a urethral catheter? It is generally well accepted that replacing a cystostomy with a urethral catheter increases the cure rate. However, cystostomies are not free of complications, and their use is relatively contraindicated in some pathologies such as previous lower abdominal or pelvic surgery and pelvic cancer, with or without a history of irradiation and coagulopathy. Cystostomies also have short-term complications such as damage to the bowel or other surrounding structures, infection, bleeding, blood clots, and catheter migration into the ureteral orifice, which can lead to hydronephrosis and potentially requiring a repeat procedure. Cystostomies also have long-term complications such as urinary infection, stones in the urinary bladder, renal calculi, hematuria and neoplastic changes in the urinary bladder, at the site of the cystostomy or in the suprapubic tract.<sup>(26)</sup> These complications may increase the morbidity and stress of patients and physicians alike. Therefore, the use of cystostomies must be evaluated carefully. As we faced some of these complications, we noticed that the postoperative care of cystostomies is not easy in cases in which we performed the repair transvaginally, and we did not replace the cystostomy. Our results confirm our choice, and in our practice, if the method of repair is transvaginal, we never use a percutaneous cystostomy as a diversion. However, for the transabdominal transvesical technique, we advise and routinely use cystostomies as diversions.

One of the other controversies concerns the removal time of the urinary diversion. The clinically acceptable duration of bladder catheterization in postfistula repair patient is unknown, and a randomized controlled trial to compare shorter and longer durations of the postoperative catheterization period is needed. In our first cases, we kept the catheter in for 21 days. In their retrospective study of 212 transvaginal repairs, Nardos and colleagues removed the urethral catheters at three different time points: in the first group, the catheter was removed on the 10th day; in the second group, the catheter was removed on the 12th day; and in the third group, the catheter was removed on the 14th day. In their study, they suggested that postoperative catheterization for 10

days is sufficient for the management of simple vesicovaginal fistula.<sup>(27,28)</sup> In transvaginal cases, we kept the catheter in for only ten days. Similar to a cystostomy, a urethral catheter has its own disadvantages and should be removed as soon as possible. Altaweel and colleagues<sup>(14)</sup> reported a 95% of success rate in all 26 cases repaired using the suprapubic, transvesical O'Connor technique, and they drained the bladder continuously with only a urethral catheter for 10 days. They noted that the shorter duration of catheterization resulted in similar treatment outcomes and significant reductions in infection and cost.<sup>(14)</sup>

Following the repairs, the contracted bladder reacts to catheters. This reaction increases patient discomfort and involuntary contractions, which develop urinary discharge around the catheter. This complication increases the stress of the patient. To prevent these complications, we prescribed a scheduled dose of anticholinergics to all of our patients. In the postoperative period, however, we advised all patients to rest and asked them to avoid pelvic examination and intercourse for 6 weeks.

## CONCLUSIONS

The transvaginal repair of benign, primary VVFs is more advantageous than transabdominal transvesical repairs. There was a significant decrease in the hospitalization period and cystostomy or incision-related complication rates such as infection in the incision area, scarring causing cosmetic problems, prolonged drainage (> 24 hours) from the cystostomy tract, and an opening of the incision using the transvaginal technique without tissue interposition. We concluded that the best approach is the technique with which the surgeon feels safest and most confident. Surgeons involved in fistula repair should be skilled in both abdominal and vaginal approaches, should have completed urogynecology fellowships, and should have experience in deciding the most appropriate procedure for each individual patient.

## CONFLICT OF INTEREST

None declared.

## REFERENCES

1. Singh O, Gupta SS, Mathur RK. Urogenital fistulas in women: 5-year experience at a single center. *Urol J.* 2010;7:35-9.
2. Milicevic S, Krivokuca V, Ecim-Zlojutro V, Jakovljevic B. Treatment of vesicovaginal fistulas: an experience of 30 cases. *Med Arch.* 2013;67:266-9.
3. Pshak T, Nikolavsky D, Terlecki R, Flynn BJ. Is tissue interposition always necessary

- in transvaginal repair of benign, recurrent vesicovaginal fistulae? *Urology*. 2013;82:707-12.
4. Zambon JP, Batezini NS, Pinto ER, Skaff M, Girotti ME, Almeida FG. Do we need new surgical techniques to repair vesico-vaginal fistulas? *Int Urogynecol J*. 2010;21:337-42.
  5. Woo HH, Rosario DJ, Chapple CR. The treatment of vesicovaginal fistulae. *Eur Urol*. 1996;29:1-9.
  6. Eilber KS, Kavalier E, Rodriguez LV, Rosenblum N, Raz S. Ten-year experience with transvaginal vesicovaginal fistula repair using tissue interposition. *J Urol*. 2003;169:1033-6.
  7. Hadley HR. Vesicovaginal fistula. *Curr Urol Rep*. 2002;3:401-7.
  8. Mondet F, Chartier-Kastler EJ, Conort P, Bitker MO, Chatelain C, Richard F. Anatomic and functional results of transperitoneal-transvesical vesicovaginal fistula repair. *Urology*. 2001;58:882-6.
  9. Raut V, Bhattacharya M. Vesical fistulae--an experience from a developing country. *J Postgrad Med*. 1993;39:20-1.
  10. Sharifi-Aghdas F, Ghaderian N, Payvand A. Free bladder mucosal autograft in the treatment of complicated vesicovaginal fistula. *BJU Int*. 2002;89:54-6.
  11. Angioli R, Penalver M, Muzii L, et al. Guidelines of how to manage vesicovaginal fistula. *Crit Rev Oncol Hematol*. 2003;48:295-304.
  12. Urinary tract fistula. In: Rovner ES, ed. *Campbell-Walsh Urology*. 9th ed. Saunders, Philadelphia, Pa, USA 2007:2323-40.
  13. Riley VJ, Spiurlock J. Vesicovaginal fistula. (online) 2006.
  14. Altaweel WM, Rajih E, Alkhdair W. Interposition flaps in vesicovaginal fistula repairs can optimize cure rate. *Urol Ann*. 2013;5:270-2.
  15. Bettez M, Breault G, Carr L, Tu le M. Early versus delayed repair of vesicouterine fistula. *Can Urol Assoc J*. 2011;5:52-5.
  16. Hadzi-Djokic J, Pejcic TP, Acimovic M. Vesico-vaginal fistula: report of 220 cases. *Int Urol Nephrol*. 2009;41:299-302.
  17. Singh V, Mandhani PA, Mehrotra S, Sinha RJ. Laparoscopic repair of vesicouterine fistula: a brief report with review of literature. *Urol J*. 2011; 8:149-52.
  18. Chibber PJ, Shah HN, Jain P. Laparoscopic O'Conor's repair for vesico-vaginal and vesico-uterine fistulae. *BJU Int*. 2005;96:183-6.
  19. Sundaram BM, Kalidasan G, Hemal AK. Robotic repair of vesicovaginal fistula: case series of five patients. *Urology*. 2006;67:970-3.
  20. Reynolds WS, Gottlieb LJ, Lucioni A, Rapp DE, Song DH, Bales GT. Vesicovaginal fistula repair with rectus abdominus myofascial interposition flap. *Urology*. 2008;71:1119-23.
  21. Ninkovic M, Dabernig W. Flap technology for reconstructions of urogenital organs. *Curr Opin Urol*. 2003;13:483-8.
  22. Yarmohamadi A, Asl Zare M, Ahmadnia H, Mogharabian N. Salvage repair of vesicovaginal fistula. *Urol J*. 2011;8:209-13.
  23. Alagol B, Gozen AS, Kaya E, Inci O. The use of human dura mater as an interposition graft in the treatment of vesicovaginal fistula. *Int Urol Nephrol*. 2004;36:35-40.
  24. Farahat YA, Elbendary MA, Elgamal OM, et al. Application of small intestinal submucosa graft for repair of complicated vesicovaginal fistula: a pilot study. *J Urol*. 2012;188:861-4.
  25. Lee D, Dillon BE, Zimmern PE. Long-term morbidity of Martius labial fat pad graft in vaginal reconstruction surgery. *Urology*. 2013;82:1261-6.
  26. Vaidyanathan S, Soni B, Hughes P, Singh G, Oo T. Preventable long-term complications of suprapubic cystostomy after spinal cord injury: Root cause analysis in a representative case report. *Patient Saf Surg*. 2011;5:27.
  27. Nardos R, Browning A, Member B. Duration of bladder catheterization after surgery for obstetric fistula. *Int J Gynaecol Obstet*. 2008;103:30-2.
  28. Nardos R, Member B, Browning A. Outcome of obstetric fistula repair after 10-day versus 14-day Foley catheterization. *Int J Gynaecol Obstet*. 2012;118:21-3.