

# Vesicovaginal fistula repair experiences in a single center high volume of 33 years and necessity of cystostomy

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## ABSTRACT

**Objective:** The aim of this study was to retrospectively examine the patients who underwent surgical treatment for vesicovaginal fistula (VVF) repair in our clinic, to evaluate our surgical preferences, success, and treatment results, to compare these with the literature, and firstly to reveal the necessity of cystostomy and its effect on treatment success.

**Material and methods:** Between 1985 and 2018, a retrospective evaluation was performed on the records of 102 patients who underwent surgical treatment for VVF repair. All cases underwent a detailed physical examination and had their routine laboratory tests and imaging methods. In obese patients, a Foley catheter was moved into the bladder through the fistula tract, then inflated in order to push the vagina and bladder wall upwards. A transurethral catheter was used in all cases, and cystostomy was used in 58 (56.9%).

**Results:** The most common cause was prior hysterectomy for benign diseases in 35 (34.31%) cases. Among a total of 102 cases with for VVF, 95 (93.1%) were primary, 5 (4.9%) secondary, and 2 (1.9%) tertiary. The transvesical and O'Connor approaches (transabdominal) were performed in 61 (59.8%) and 41 (40.2%) cases, respectively. Transvaginal approach was not used in any of the cases. Cystostomy was applied in 58 (56.9%) of cases and not applied in 44 (43.1%).

**Conclusion:** Complete excision of the fistula tract and sealing of the layers separately using the water-tight technique are extremely crucial factors to increase the success rate of VVF repair. In cases where good transurethral drainage is ensured, cystostomy is unnecessary and may increase the risk of infection.

**Keywords:** Cystostomy, fistula, repair, transvesical repair, vesicovaginal

## Introduction

Vesicovaginal fistula (VVF) is the most commonly observed type of urogenital fistula. It often occurs because of obstetric reasons, gynecological surgery, or pelvic radiotherapy. Although difficult and prolonged deliveries were once the most common cause of VVF, easier access to healthcare services and the technological advances of our day have made total abdominal hysterectomy surgeries the most common cause of VVF today.<sup>[1,2]</sup> The rate of occurrence of VVF after hysterectomy varies between 1/87 and 1/3800.<sup>[3]</sup> Another cause of VVF is infiltration by malignancies originating from neighboring organs, such as the vagina, bladder, and rectum. The increasing use of radiotherapy in the treatment

of pelvic tumors has an impact on the rising occurrence of VVF.<sup>[4]</sup> The incidence of VVF owing to organ injury during pelvic organ surgery is 0.5%–2%.<sup>[5]</sup>

The typical symptom of VVF is the continuous leakage of urine from the vagina. That may start approximately after a week after the operation or immediately after the removal of the transurethral catheter, just as it may occur weeks later. Detailed physical examination and patient history are very important for suspected cases. Before planning surgery for VVF repair, radiological and cystoscopic imaging should be performed in order to determine the location of the fistula and its proximity to the ureter orifices and to exclude additional pathologies.

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In surgical treatment, the main principle is to excise the fistula and separate the vagina from the bladder to enable closing the gap without tension and leakage. Meanwhile, the use of tissue flaps in suitable cases tends to increase the success rates. Possible surgical approaches are transvaginal, transvesical, transperitoneal, endoscopic, laparoscopic, and, in present-day conditions, robotic.<sup>[6]</sup> When choosing a surgical approach, the location and size of the fistula as well as the experience and preference of the surgeon should be considered.<sup>[7]</sup> The 8–12-week period after fistula formation is the most suitable time for surgical treatment.

This study aims to retrospectively examine the patients who underwent surgical treatment for VVF in our clinic, to evaluate our surgical preferences (surgical techniques), success, treatment results, and complications, to compare these with the literature, and firstly to reveal the necessity of cystostomy and its effect on treatment success.

## Material and methods

A retrospective evaluation was performed on the records of 102 patients who underwent surgical treatment in the Urology Department of Atatürk University Medical Faculty Research Hospital for the diagnoses of primary or recurrent VVF between 1985 and 2018. The patients were evaluated with respect to their demographic data, causes of VVF, type of surgery performed, history of previous VVF repair, diameter and location of fistula, time between VVF and surgery, findings during operation, use of cystostomy, recurrence rate, and complications. Perioperative and postoperative data include primary outcomes. Patients with VVF who did not accept the treatment, who had urinary incontinence for other reasons, and who had rectovesical fistula were not included in the study.

All patients underwent a detailed physical examination and had their routine laboratory tests done. For preoperative imaging, intravenous urography (IVU) and cystography were used, along with urethrocystoscopy that was performed for all cases to evaluate the relationship between trigone and ureter orifices by seeing the localization of the fistula (Figure 1). During vaginal examination, an attempt was made to visualize the fistula by administering methylene blue from the transurethral catheter. Local genital infections were all fully treated before sur-

gery. Because of the high risk of contamination, urine cultures were obtained by transurethral catheterization in all patients with VVF. Routine urine cultures of all patients were evaluated preoperatively. The operations were performed while urine was sterile. Just before the operation, 1 g of cefazolin was given intravenously. Until the transurethral catheter was removed in the postoperative period, the patients were given oral quinolone group antibiotics in the previous years, and the third-generation cephalosporin group antibiotic treatment was given in the last 10 years. In addition, antimuscarinic treatments were given to patients who developed urges to prevent catheter-related bladder contractions. Treatments were repeated in case of contamination. In case of infection, sterile urine culture was obtained after appropriate antibiotic treatment, and the procedure was performed.

## Surgical technique

The purpose of all surgical techniques used for VVF repair is to remove the scar tissue and fistula tract between the vagina and bladder; separate the bladder from the vagina with a healthy tissue cavity and close both organs to prevent further leakage. In the transvesical approach, the extraperitoneal area was entered by suprapubic incision, and the bladder walls were opened through the bladder without opening the abdomen; the bladder wall was mobilized by separating from the vagina, and all fibrotic tissues were removed. The layers of the bladder and the vagina were closed to prevent further leakage of water by healthy tissue cavity formation. The suture materials used during surgery and their locations of use are shown in Table 1. The transperitoneal O'Connor approach, on the contrary, involves a midline incision along the posterior bladder wall to the fistula opening (Figure 2). After excision of the fistula tract, repair was performed using the same suture materials and in the same way as with the transvesical approach. The tissue flap was then brought between the bladder and vagina and fixed to the bladder wall. The omentum was used as the first choice for the flap, but owing to its insufficient length, the peritoneal flap was used instead. In patients who were obese, a Foley catheter was moved into the bladder through the fistula tract, then inflated in order to push the vagina and bladder wall upward, which made it easier to excise the fistula and prepare the tissues (Figure 3). Transurethral catheter was used in all cases. Cystostomy was used in 58 (56.9%) of the cases, whereas cystostomy was not used in 44 (43.1%).

### Main Points:

- The location, size, and time of VVF repair are crucial parameters in the timing and technical selection.
- There is no significant difference between transvesical and O'Connor techniques in terms of success rates.
- Cystostomy is unnecessary in cases where good transurethral drainage is ensured and may increase the risk of infection.

**Table 1. Used suture materials**

Anatomy structure	Suture material
Bladder mucosa	3/0–4/0 Vicryl (polyglactin)
Bladder muscle and serosa	2/0 Vicryl (polyglactin)
Vaginal mucosa	3/0 Polyglytone monofilament
Vaginal fascia	2/0 Polydioxanone monofilament

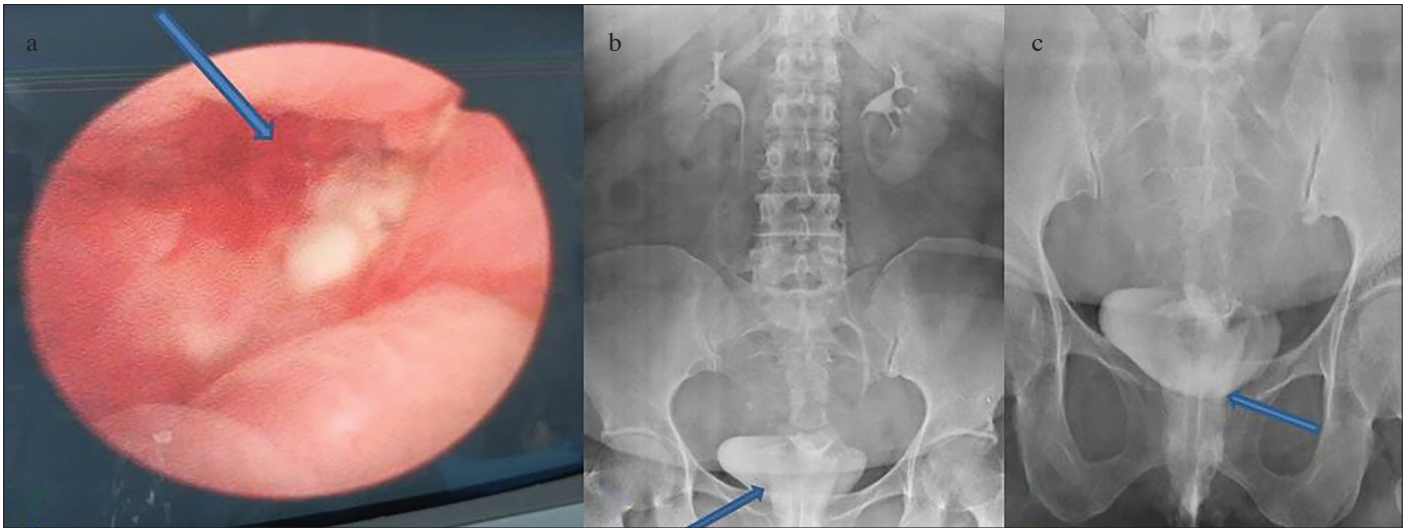


Figure 1. a-c. Vesicovaginal fistula in cystoscopy (a) and the appearance of the fistula and vagina on intravenous urography (b, c)

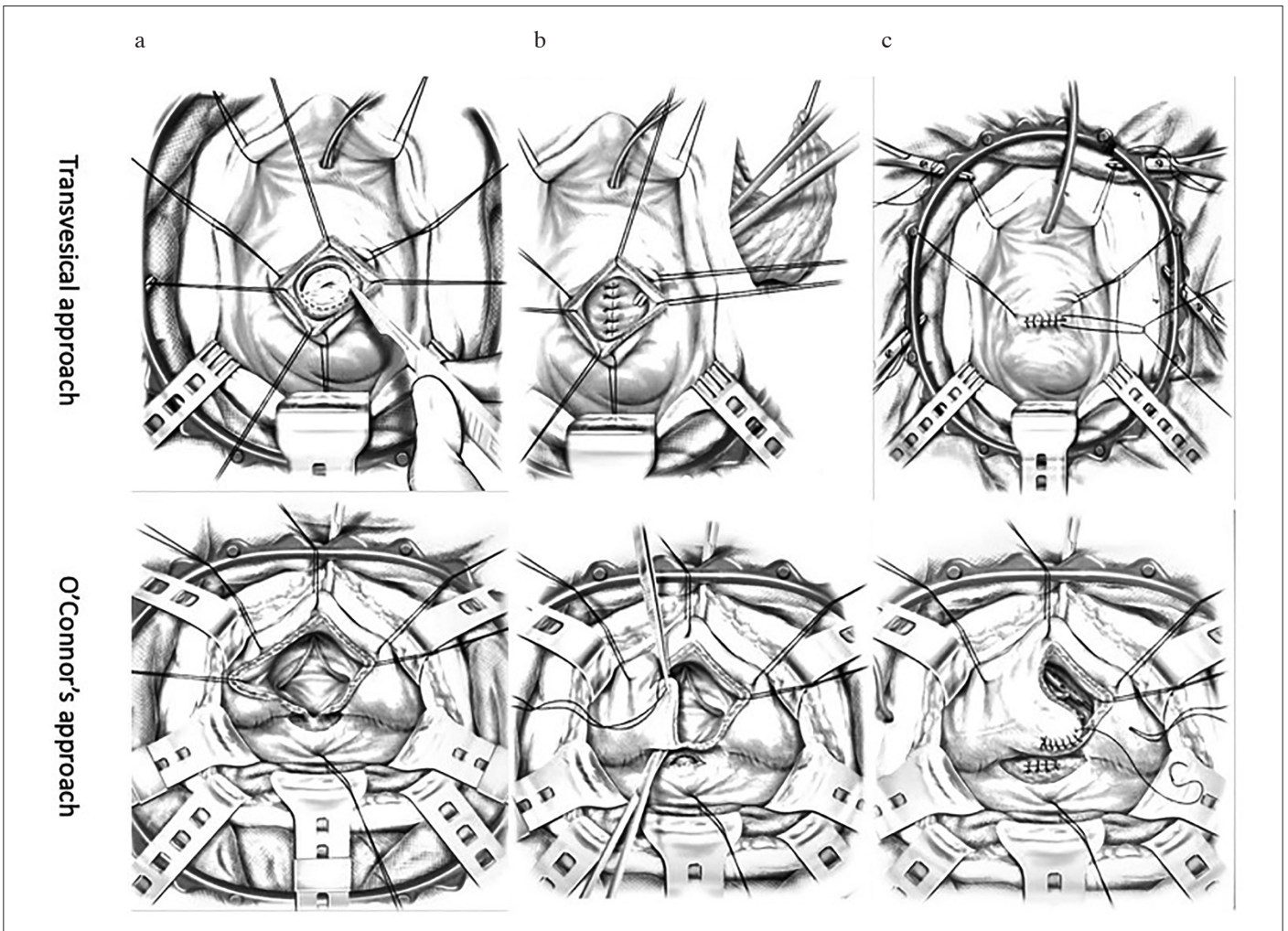


Figure 2. a-c. Drawing for transvesical and O'Connor's approaches. (a) Incision and dissection plans. (b, c) Tension free closure of the layers



Suprapubic catheters and transurethral catheters were removed 10 and 10–14 days later, respectively. Suprapubic and transurethral catheter sizes were 10 Fr and 18–20 Fr, respectively. To ensure good urine drainage, 18–20 Fr transurethral Foley catheters were preferred in all cases according to the diameter of the urethra. Additionally, all patients were persistently warned that the catheter was very important for surgical success and should not be folded. Wound infection in the suprapubic catheter area was evaluated as a complication of this catheter. Laparotomy infection and/or urinary infection was considered as a measure of suprapubic catheter complication. Urinary and laparotomy tract infections were diagnosed by cultures. Patients were followed-up in the postoperative third month.

All patients were evaluated with an examination of medical history, physical examination, complete urinalysis, urine culture, and IVU. The absence of urine leakage was considered as success of the procedure. Patient records have been recorded in our archive in a standard way for many years.

#### Statistical analysis

The data were evaluated with the IBM Statistical Packag for the Social Sciences (IBM SPSS Corp.; Armonk, NY, USA) SPSS 25.0 package program; descriptive statistics were given with numbers and percentage distributions and means and standard deviations. Statistical analyses were evaluated with the chi-square test, and  $p < 0.05$  was considered as significant. There was no need for the approval of the ethics committee because of the retrospective nature of the study and the use of 33-year data.

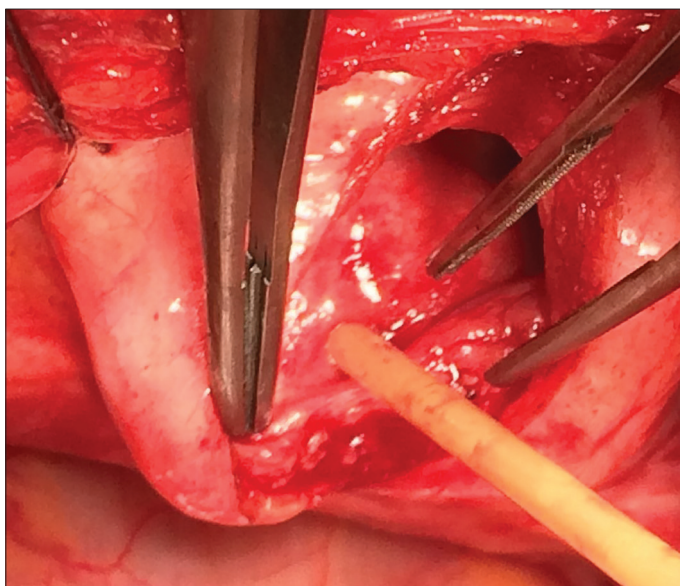


Figure 3. Traction of the fistula tract using a Foley catheter

## Results

The patient's mean age was 42.7 (27–54) years. Causes of VVF included prior hysterectomy for benign diseases in 35 (34.31%) of cases, 33 (32.35%) prior total abdominal hysterectomy + bilateral salpingo-oophorectomy, 29 (28.4%) cesarean section (CS), 3 (2.94%) myomectomy, 1 (0.98%) inguinal herniotomy, and 1 (0.98%) urinary tuberculosis (Table 2). The mean time between fistula etiology and diagnosis was 5.1 months.

Among a total of 102 cases with VVF, 95 (93.1%) were primary, 5 (4.9%) secondary, and 2 (1.9%) tertiary. The mean fistula diameter was 2.04 cm (0.5–4.4). Fistula localization was trigonal in 21 (20.5%) of the patients and supratrigonal in 81 (79.4%) of the patients.

Repair was performed using the transvesical technique in 61 (59.8%) cases and transperitoneal O'Connor technique in 41 (40.2%) cases. Although it was preferred for difficult cases, there was no difference between the O'Connor technique and transvesical technique in terms of success rates (Table 2) ( $p = 0.993$ ). Thus, patients with fistula diameters of  $> 2.5$  cm were treated using the O'Connor technique, whereas cases with fistula diameters of  $< 2.5$  cm were treated using the transvesical approach. The O'Connor technique was applied to seven cases with secondary and tertiary VVF. The patients with late diagnosis (waiting  $> 3$  months) had their repairs performed immediately, whereas in other cases, repairs were performed at least 8–12 weeks after the diagnosis of VVF. In all cases, transurethral catheter was used for urine drainage from the bladder. Cystostomy was applied in 58 (56.9%) of cases and not applied in 44 (43.1%). Applying cystostomy was not observed to have any positive effect on success ( $p = 0.284$ ). However, 17.2% (10/58) of the cystostomy patients and 4.5% (2/44) of the patients who did not undergo cystostomy had infection and/or urinary infection at the postoperative laparotomy site, and this difference was significant ( $p = 0.049$ ).

No perioperative or postoperative mortality was observed in any patient. Hemorrhagic bleeding was not life-threatening in 4 (3.9%) of the patients, and postoperative laparotomy infection and/or urinary infection were observed in 11 (10.8%) of patients (Table 3). These infected wounds were treated through antibi-

Table 2. Success and infection rates of both surgical techniques

	Transvesical	O'Connor	p
Success rate	58/61 (95.1%)	39/41 (95.1%)	0.993*
Infection rate	9/61 (14.8%)	3/41 (7.3%)	0.253**

\* $p = 0.993$ , statistically insignificant. \*\* $p = 0.253$ , statistically insignificant.

**Table 3. VVF etiology and effect of cystostomy on infection**

<b>Etiology of VVF</b>		
<b>Cause of VVF</b>	<b>n</b>	<b>%</b>
Hysterectomy	35	34.31
TAH+BSO	33	32.35
C/S	29	28.4
Primary	3	2.94
Recurrent	26	25.5
Myomectomy	3	2.94
Herniotomy	1	0.98
Urinary tuberculosis	1	0.98
<b>Factors affected by cystostomy</b>		
	<b>Cystostomy (+) (n, %)</b>	<b>Cystostomy (–) (n, %)</b>
Infection (+)	10 (17.2)	2 (4.5)*
Infection (–)	48 (82.8)	44 (95.5)*
Mean transurethral catheter time (day)	12.6 (9–14)	13.1 (10–15)**
Success rate	54/58 (93.1)	43/44 (97.7)***
VVF: vesicovaginal fistula; TAH+BSO: total abdominal hysterectomy+bilateral salpingo-oophorectomy; C/S: cesarean/section. *p=0.049, statistically significant. **p=0.685, statistically insignificant. ***p=0.284, statistically insignificant.		

otic treatment and left to secondary healing. None of the patients developed postoperative intestinal obstruction. One patient underwent tertiary repair and developed dyspareunia, which was believed to be associated with the fact that she was operated three times for the same reason. VVF recurrence was observed in four of the primary cases and one secondary case. Recurrence cases were successfully treated using the O'Connor technique and flap procedures. Success and recurrence rates in cases receiving primary repair were 95.79% (91/95) and 4.21% (4/95), respectively, whereas success and recurrence rates in secondary cases were 80% (4/5) and 20% (1/5), respectively. Total success rate was 95.1% (97/102), and total recurrence rate was 5/102 (4.9%).

## Discussion

Vesicovaginal fistula is a complication that may develop after obstetric and gynecological interventions. It is known that women sometimes live with VVF for months or even years and delay their application to the clinic because of fear of surgery or for social and economic reasons.<sup>[8]</sup> For the patients we treated in our clinic, the mean time between VVF formation and admission to our clinic was 5.1 months. Studies in the literature revealed that this period is approximately 30–36 months in un-

derdeveloped countries.<sup>[9,10]</sup> We believe that early intervention in the case made by their application at an early stage has increased the success of treatment. In the literature, it is stated in the study by Waaldijk that the success of treatment in the 3-month period after the development of VVF was 95.2%. In our study, 8–12 weeks were waited for repair in cases diagnosed early, and our success rates are similar to the literature.<sup>[11]</sup>

The main symptom of VVF is vaginal urine leakage that occurs either continuously or only when the bladder is full.<sup>[12]</sup> After gynecological surgery, urine leakage generally arises after the urinary catheter is removed. The clinic picture of VVF depends on the size of the fistula, its association with the ureter orifices, inflammation around the fistula, and the width of the scar areas.

Diagnosis of VVF should definitely involve cystoscopic evaluation along with vaginal examination, because this would allow the assessment of the fistula localization, size, and relationship with the ureters. In the diagnosis of small fistulas, administering methylene blue to the bladder and then monitoring the passage of the colored fluid into the vagina may be helpful for diagnosis. IVU and/or retrograde pyelography should be performed to exclude ureterovaginal fistula. We have been undertaking the diagnosis with IVU and retrograde over the years but acknowledge that currently, European Association of Urology guidelines recommend CT urogram for diagnosis of VVF. However, if CT is not available, then IVU and retrograde studies can be employed to make the diagnosis.

Methods described in the literature for the closure of small fistulas include transurethral drainage of the bladder, occlusion of fibrin, and use of corticosteroids.<sup>[13–15]</sup> In 10% of the cases, the fistula can close by itself 0.5–2 months after urethral catheterization and anticholinergic drug treatment, especially if the fistula is small in diameter and detected early on, or if an intervention is made on the fistula before epithelization. If the diagnosis is delayed and the fistula is epithelized, closure can be achieved with electrocoagulation of the mucosal layer and 2–4 weeks of catheterization.<sup>[16]</sup> However, if the vesicovaginal septum is thin, the VVF diameter is large, or there is inflammation around the fistula tract, it may cause the size of the fistula to grow, resulting in treatment failure. Although these methods have been proposed and carried out in the literature, conservative methods are unsuccessful in most cases, making surgical treatment necessary. Considering these failures in the literature, we treated all 102 patients in our study surgically.

There are discussions regarding the timing of VVF treatment. Besides arguing for early treatment, there are studies that argue for late treatment (minimum 3 months) too.<sup>[17,18]</sup> In early fistula repair, recurrence is frequently seen owing to tissue necrosis and edema. Considering the literature, it was observed that success

in late treatment is superior to success in the early treatment.<sup>[17,19]</sup> Although all of the patients who presented to our clinic had applied in the early period, we preferred late period treatment, as the inflammation and necrosis that could possibly form in the fistula tract in the early period presented a disadvantage for excision, whereas the formation of fibrous tissue in the late period presented an advantage for the excision of the fistula tract. We provided treatment to all patients who had infections before surgery. We believe that our low recurrence rate (4.9%) and good treatment success was due to the timing of the surgery, the absence of infection in the fistula tract during surgery, and the good closure of the tissues following sensitive and adequate dissection.

Surgical technique in VVF treatment is another subject of discussion. Surgical treatment methods can be transvaginal, transvesical, transperitoneal, endoscopic, laparoscopic, and robotic.<sup>[6]</sup> Most gynecological surgeons prefer the transvaginal approach. Despite the advantages of this approach, such as reduced hospital stay, blood loss, postoperative pain, and unrequired cystostomy, there are some disadvantages as well, such as the difficulty of vaginal approach, inability to fully remove the fistula tract, and the inability to properly close the bladder mucosa and permit additional surgical treatment.<sup>[20,21]</sup> The transvesical approach should be preferred in cases where the vaginal approach is difficult despite the longer hospitalization period, ureteral reimplantation is necessary, and revision of bladder is needed. By taking into account the fistula diameter in our cases, VVF location, and our surgical experiences, we preferred transvesical classical fistula excision in 59.8% of our cases and the O'Connor technique in 40.2% of our cases.

Although the sealing of the fistula tract in a water-tight manner after a good preparation is sufficient in most cases, having a tract length greater than 2.5 cm and the use of tissue flaps in secondary or tertiary cases further increases the success. For this reason, we used the O'Connor technique in our secondary and tertiary cases, and we deduce that the O'Connor's technique is safer and better. Preparing the fistula tract in a good manner can be quite difficult in obese patients. This difficulty was successfully circumvented in our cases with the modification of the method used for transvaginal VVF repair, which we describe in our surgery technique. With this application, the traction/pulling upward of the tissues in patients where we had to work deeper allowed the excision of the tract and the closure of the layers to be performed more easily. This application was first defined in this study.

Transurethral catheters were used in all our patients to ensure postoperative urinary drainage of the bladder. Although cystostomy was initially used, as recommended in the literature, we preferred transurethral drainage without suprapubic catheter on the basis of our own clinical observations in patients who underwent open transvesical surgery for benign prostatic hyperplasia. A clinical study showed that success in open prostatectomy without cystostomy is

similar to that in patients who undergo cystostomy as well.<sup>[22]</sup> However, studies that compare the effect of cystostomy on the success of VVF surgeries have not been reported yet. Our study was the first study to examine and report this effect. Cystostomy showed no increase in the success of the operation, and rather significantly increased the risk of infection at the laparotomy site and/or urinary infection. Therefore, we believe that cystostomy is unnecessary in cases where good transurethral drainage is ensured. We gave second generation cephalosporin to our patients for preoperative prophylaxis. However, there is no information about prophylaxis and postoperative antibiotic therapy in the literature.

In our country, in the last 25 years, because of serious investments in health, plenty of solutions have been provided for the problems related to pregnancy follow-up and birth. However, there are also patients who had VVF because of difficult labor and poor obstetric care. Obstetrics and gynecologists are intervening by transvaginal route because of their experiences and concomitant obstetric injuries. Because of our lack of transvaginal approach and increased transverse-transabdominal experience, we did not repair any VVF cases with transvaginal approach. In addition, we do not have the data of these patients, so they are not included in our study. In the transvesical approach, we think that the complete excision of the fistula tract and the separation of the bladder and vagina walls clearly are more effective. However, because this study does not include the transvaginal approach, it is not possible to make a comparison with the effective excision of the fistula tract. We believe that every surgeon can get more effective and successful results with the method he uses more often and is experienced.

Limitations of our study were the facts that the study was single-centered, retrospective, and not performed by the same surgeon, and that demographic data (body mass index, height, weight) could not be given precisely because of data loss.

In conclusion, the location, size, and time of the fistula in VVF operations are crucial parameters in the timing and technical selection of the operation. Complete excision of the fistula tract and sealing of the layers separately using the water-tight technique are extremely crucial factors to increase the success rate. Pulling the vagina and urinary bladder fistula tracts upwards using the Foley catheter during surgery facilitated the procedures in patients who are obese. In cases where good transurethral drainage is ensured, cystostomy is unnecessary and may increase the risk of infection. More satisfactory results can be achieved through prospective randomized trials with larger patient series.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Atatürk University Faculty of Medicine (Approval number: B.30.2.ATA.0.01.00/269 Date: 30.05.2019).

**Informed Consent:** Verbal or written consent could not be obtained because the study was a file scanning study and retrospective.

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## References

- 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. [\[Crossref\]](#)
- Haferkamp A, Wagener N, Buse S, Reitz A, Pfitzenmaier J, Hallscheidt P, et al. Vesicovaginal fistulas. *Urologe A* 2005;44:270-6. [\[Crossref\]](#)
- Hilton P, Cromwell DA. The risk of vesicovaginal and urethrovaginal fistula after hysterectomy performed in the English National Health Service—a retrospective cohort study examining patterns of care between 2000 and 2008. *BJOG* 2012;119:1447-54. [\[Crossref\]](#)
- Toia B, Pakzad M, Hamid R, Greenwell T, Ockrim J. Surgical outcomes of vesicovaginal fistulae in patients with previous pelvic radiotherapy. *Int Urogynecol J* 2020;31:1381-85. [\[Crossref\]](#)
- El-Azab AS, Abolella HA, Farouk M. Update on vesicovaginal fistula: A systematic review. *Arab J Urol* 2019;17:61-8. [\[Crossref\]](#)
- Dorairajan LN, Hemal AK. Lower urinary tract fistula: the minimally invasive approach. *Curr Opin Urol* 2009;19:556-62. [\[Crossref\]](#)
- Wong MJ, Wong K, Rezvan A, Tate A, Bhatia NN, Yazdany T. Urogenital fistula. *Female Pelvic Med Reconstr Surg* 2012;18:71-8. [\[Crossref\]](#)
- Bangser M. Obstetric fistula and stigma. *Lancet* 2006;367:535-6. [\[Crossref\]](#)
- Sağnak LIA, Kiper A, Yigitbasi O, Ersoy H, Gucuk A. Transvesical approach in the treatment of gynecologic iatrogenic vesicovaginal fistulas. *T Klin J Gynecol Obst* 2001;11:387-90.
- McCurdie FK, Moffatt J, Jones K. Vesicovaginal fistula in Uganda. *J Obstet Gynaecol* 2018;38:822-7. [\[Crossref\]](#)
- Waalwijk K. The immediate management of fresh obstetric fistulas. *Am J Obstet Gynecol* 2004;191:795-9. [\[Crossref\]](#)
- Woo HH, Rosario DJ, Chapple CR. The treatment of vesicovaginal fistulae. *Eur Urol* 1996;29:1-9. [\[Crossref\]](#)
- Davits RJ, Miranda SI. Conservative treatment of vesicovaginal fistulas by bladder drainage alone. *Br J Urol* 1991;68:155-6. [\[Crossref\]](#)
- Tancer ML. The post-total hysterectomy (vault) vesicovaginal fistula. *J Urol* 1980;123:839-40. [\[Crossref\]](#)
- Welp T, Bauer O, Diedrich K. Use of fibrin glue in vesico-vaginal fistulas after gynecologic treatment. *Zentralbl Gynakol* 1996;118:430-2.
- Stovsky MD, Ignatoff JM, Blum MD, Nanninga JB, O'Connor VJ, Kursh ED. Use of electrocoagulation in the treatment of vesicovaginal fistulas. *J Urol* 1994;152:1443-4. [\[Crossref\]](#)
- Iselin CE, Aslan P, Webster GD. Transvaginal repair of vesicovaginal fistulas after hysterectomy by vaginal cuff excision. *J Urol* 1998;160:728-30. [\[Crossref\]](#)
- Sanchez Merino JM, Guillan Maquieira C, Parra Muntaner L, Gomez Cisneros SC, Laguna Pes MP, Garcia Alonso J. Transvesical repair of non-complicated vesicovaginal fistula. *Actas Urol Esp* 2000;24:185-9. [\[Crossref\]](#)
- Nesrallah LJ, Srougi M, Gittes RF. The O'Connor technique: the gold standard for supratrigonal vesicovaginal fistula repair. *J Urol* 1999;161:566-8. [\[Crossref\]](#)
- Angioli R, Penalver M, Muzii L, Mendez L, Mirhashemi R, Bellati F, et al. Guidelines of how to manage vesicovaginal fistula. *Crit Rev Oncol Hematol* 2003;48:295-304. [\[Crossref\]](#)
- Enzelsberger H, Gitsch E. Surgical management of vesicovaginal fistulas according to Chassar Moir's method. *Surg Gynecol Obstet* 1991;173:183-6.
- Hassanpour A, Hosseini MM, Yousefi A, Inaloo R. Cystostomy-free open suprapubic transvesical prostatectomy: Is it a safe method? *Urol Ann* 2016;8:213-7. [\[Crossref\]](#)