# Which factors affecting the success of iatrogenic obstetric vesical fistulas?

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**Which factors affecting the success of iatrogenic obstetric vesical fistulas?**

AIM: *In developing countries, surgery, birth traumas, and especially gynecological procedures are the most common cause of vesicovaginal fistulas (VVFs). We retrospectively evaluated our treatment modalities for VVF repair caused by obstetric causes and compared with the current literature.*
MATERIALS AND METHODS: *We compared the surgical approach preferences and their results with patient characteristics as well as fistula size and location for the management of VVFs. We retrospectively reviewed and prospectively collected data on 63 women who had uterovesical fistulae or VVF surgical repair between October 2004 and November 2017 at our university hospital in southeastern Turkey.*
RESULTS: *A total of 63 patients with a diagnosis of obstetric fistula were primaries. Most of the patients had a total abdominal hysterectomy in 37 cases. After the cause of VVF, the mean time to the operation was 28±11 (range: 15-96) days. The average fistula tract size was 15.2±7.7 (range: 3-33) mm. Patients were followed up for a mean of 12 (range: 6-20) months. The patient who received antibiotic treatment due to urinary tract infection before surgery was 16 (25.3%). In seven (12.9%) patients whose fistula diameter was greater than 2 cm, a recurrence was observed. The overall success rate was 87.1%. The average operative time was 94,5±24,3 (range: 50-150) minutes for a layered closure, 75 (range: 50-80) minutes for an omental flap and 120 minutes (range: 100-150) for a martius flap. There were no intraoperative complications.*
CONCLUSION: *Obstetric VVFs are highly successful with surgical repair. Surgical success rates are especially high in fistula tract sizes of less than 20 mm and in patients with no history of urinary infection.*

KEY WORDS: Abdominal fistula repair, Transvaginal fistula repair, Vesicovaginal fistula

## Introduction

Urogenital fistulae are among the most unwanted complications in obstetrics and gynecology, constituting a major surgical challenge for urologists. Moreover, obstetric fistulae (OF) affect nearly 2 million women worldwide [1]. A vesicovaginal fistula (VVF) is uncommon, but its effects on one's social life results from persistent infections and leakage of urine. The overall incidence varies between 0.5% and 1.5%, and bladder injuries are more common than other iatrogenic fistulas [2]. Moreover, the morbidity and burden of disease inherent to urogenital fistulae are associated with certain complicating conditions, such as amenorrhea, dermatoses, gynatresia and bladder calculi [3,4]. Although surgical interventions have been shown to be effective for OF, not all women undergoing these procedures regain continence. Rates of fistula closure reported in the literature vary widely between 41% and 100%, with an average of 85% [5]. The VVF is the most common, and the vesicouterine fistula the least common, among the variety of genitourinary fistulae [6].

Most OFs are caused by ischemic necrosis of the bladder wall due to fetal head impaction during prolonged obstructed labor. A total hysterectomy and Caesarean section (CS; C-section) are other causes. Rarely, radiation therapy and neoplastic infiltration cause the condition.

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Clinical features include leakage of urine from the vagina and excoriation of the vulva. A swab test, cystoscopy, retrograde ureterography, and intravenous urography (IVU) may be done for diagnosis [7].

In the present study, we aimed to investigate how each patient should have been evaluated and treated when considering the factors affecting surgical success, such as the time of the fistula formation, the location of the fistula, width of the fistula tract and surgical success was assessed also in patients who had undergone cystoscopy before surgical repair.

## Materials and Methods

We retrospectively reviewed and prospectively collected data on a total of 63 women who had a uterovesical or VVF surgical repair between October 2004 and November 2017 at the university hospital in southeastern Turkey.

After approval of the local ethics committee; all patients had undergone gynecological surgery, such as a hysterectomy or CS. A detailed history, physical examination results, cystoscopy, and vaginal examination findings were noted from hospital records. Clinical complaints from patients included vaginal urination and continuous incontinence. The etiology, time to operate, and complaints were revealed. If the fistulae were suspicious, the area should have been inserted with a ureteral catheter or placement of a vaginal tampon. Intravenous pyelography was performed to evaluate the upper urinary tract and to detect ureteral extravasation. All patients had urine examinations and cultures. After the gynecologic surgery, patients were referred to our urology clinic and the operation was performed after the fistula diagnosis. These time periods were also investigated. Renal function tests, abdominal ultrasonography (USG), IVU, cystourethroscopy (Fig. 1 a,b,c), vaginoscopy to assess the site, the number size of the fistula, and its position in the bladder were examined (Table I). The size and location of the fistula were the determining factors in the surgical approach. In the transvaginal approach, in the lithotomy position, the suprapubic and vaginal areas were sterilized with antiseptic solution before surgery and a small balloon catheter was placed in the fistula tract to help with the excision. A vaginal incision was made using a J and U incision, which combined the base of the fistula in the flap. The fistula was incised around the tract, but extensive excision was not performed. The fistula tract was closed with 3/0 vicryl sutures. This created a vaginal flap and perivesical fascial layers were closed. A vaginal mucosal flap with the vaginal wall, which the U or J incision was used to repair the vaginal mucosal defect with 3/0 vicryl sutures and this procedure was terminated by placing a urethral catheter and vaginal tampon.

In the transvesical approach, the midline incision was inserted in the supine modified lithotomy position, and the bladder was opened to reach up to the level of the fistula. The bladder and vagina were separated by dissection. A full excision of the fistula tract was achieved. The bladder and vaginal septa were closed with 3/0 vicryl sutures and a well vascularized omental flap was placed between them. A urethral catheter and drain were inserted, and the procedure was terminated. The patients were followed up for at least one year and information was recorded concerning recurrent fistulae or complications. The Harran University Ethics Committee and Review Board approved this study. This study was performed in accordance with the ethical standards described in an appropriate version of the 1975 Declaration of Helsinki, as revised in 2000.

### Statistical Analysis

Mean, standard deviation, median lowest, highest, frequency and ratio values were used in the descriptive statistics of the data. The distribution of the variables was measured by the Kolmogorov Simirnov test. Independent sample t test and Mann-Whitney u test were used in the analysis of quantitative independent data. Chi square test was used in the analysis of qualitative independent data. The effect level and cut off value were investigated by ROC curve. The level of influence was investigated by univariate and multivariate logistic regression. SPSS 22.0 program was used in the analyzes.




Fig. 1: The cystoscopic views of vesicovaginal fistulas.

## Results

A total of 68 patients with an OF diagnosis were primaries. The patients had a total abdominal hysterectomy in 37 cases, a CS in 12 cases, and a fistula in 9 cases after vaginal delivery. From the moment of damage, the mean time to the operation was 28 ± 11 (range: 15-96) days. We performed a urethral catheterization for at least two weeks in the nine patients with fistulas, which were less than 2-3 mm. Five of these patients were treated after catheter administration. The remaining 63 patients were evaluated by vesicovaginal surgery. In total, 40 (63.5%) patients with supratrigonal fistulas and/or narrow vaginas underwent abdominal open surgery, while 20 (36.6%) patients were repaired with a vaginal approach. There were 16 (25.3%) patients who had previously received infection treatment. The general characteristics of the patients are shown in Table I. The age of the patients was not significant (p> 0.05) in the group with and without surgery success. The fistu-

TABLE I - *General characteristics of the patients who underwent surgical repair*

| | Min-Max | Median | Mean ± s.s./n-% |
|---|---|---|---|
| Age (year) | 32,0 - 96 | 49,0 | 50,3 ± 11,5 |
| Fistula tract size (mm) | 3,0 - 33 | 13,0 | 15,2 ± 7,7 |
| Operation time (min) | 50,0 - 150 | 90,0 | 94,5 ± 24,3 |
| Foley Catheter application period (day) | 7,0 - 17 | 10,0 | 10,6 ± 3,0 |
| Duration of Hospital Stay (day) | 1,0 - 6 | 3,0 | 3,4 ± 1,2 |
| Vaginal Repair | (-) | | 40 63,5% |
| | (+) | | 23 36,5% |
| Abdominal Repair | (-) | | 23 36,5% |
| | (+) | | 40 63,5% |
| Patient with recurrence | (-) | | 53 84,1% |
| | (+) | | 10 15,9% |
| Cystoscopy before surgery | (-) | | 22 34,9% |
| | (+) | | 41 65,1% |
| Patient who had previously received infection treatment | (-) | | 47 74,6% |
| | (+) | | 16 25,4% |
| Post-Surgical Incontinence | (-) | | 37 58,7% |
| | (+) | | 26 41,3% |

TABLE II - *Surgical success rates of patient and surgical characteristics*

| | | Surgical Success (-) Mean ± s.s./n-% | Median | Surgical Success (+) Mean ± s.s./n-% | Median | p |
|---|---|---|---|---|---|---|
| Age | | 46,4 ± 8,4 | 47,0 | 51,0 ± 12,0 | 49,0 | 0,252 [t] |
| Fistula tract size (mm) | | 25,6 ± 7,0 | 27,5 | 13,3 ± 6,1 | 12,0 | ***0,000*** [m] |
| Surgical time | | 105,5 ± 28,3 | 100,0 | 92,5 ± 23,2 | 90,0 | 0,155 [m] |
| Foley Catheter application period (day) | | 11,5 ± 3,1 | 10,0 | 10,4 ± 2,9 | 10,0 | 0,263 [m] |
| Duration of Hospital Stay (day) | | 4,4 ± 1,2 | 4,5 | 3,2 ± 1,2 | 3,0 | ***0,004*** [m] |
| Vaginal Repair | (-) | 9 90,0% | | 31 58,5% | | 0,058 [X²] |
| | (+) | 1 10,0% | | 22 41,5% | | |
| Abdominal Repair | (-) | 1 10,0% | | 22 41,5% | | 0,058 [X²] |
| | (+) | 9 90,0% | | 31 58,5% | | |
| Patient with recurrence | (-) | 1 10,0% | | 21 39,6% | | 0,071 [X²] |
| | (+) | 9 90,0% | | 32 60,4% | | |
| Cystoscopy before surgery | (-) | 2 20,0% | | 45 84,9% | | ***0,000*** [X²] |
| | (+) | 8 80,0% | | 8 15,1% | | |
| Patient who had previously received infection treatment | (-) | 6 60,0% | | 31 58,5% | | 0,929 [X²] |
| | (+) | 4 40,0% | | 22 41,5% | | |

[t] t test / [m] Mann-whitney u test / [X²] Ki-kare test

| | | | | | | |
|---|---|---|---|---|---|---|
| Patient with recurrence | (-) | 0 | 0,0% | 53 | 100% | ***0,000*** [X²] |
| | (+) | 10 | 100% | 0 | 0,0% | |

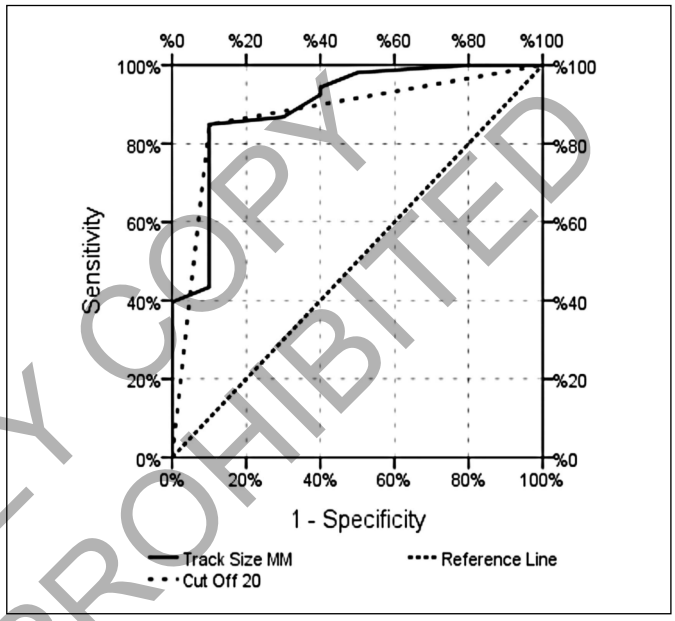
TABLE III - *Significant characteristics of patients .n the univariate and multivariate logistic regression model*

| | Uniivariate Model | | | Multivariate Model | | |
|---|---|---|---|---|---|---|
| | OR | % 95 GA | p | OR | % 95 GA | p |
| Fistula tract size (mm) | 0,771 | 0,666 - 0,892 | ***0,000*** | 0,695 | 0,536 - 0,900 | ***0,006*** |
| Duration of Hospital Stay (day) | 0,471 | 0,270 - 0,822 | ***0,008*** | | | |
| Patient who had previously received infection treatment | 0,044 | 0,008 - 0,249 | ***0,000*** | 0,010 | 0,000 - 0,319 | ***0,009*** |

TABLE IV - *Rates of patients with postoperative incontinence complaints*

| Postoperative incontinence complaints | Abdominal approach | Vaginal approach | Total incontinence rate |
|---|---|---|---|
| Urge incontinence | 5 | 4 | 9 (16.6%) |
| Stress incontinence | 2 | 4 | 6 (11.1%) |
| Mixed incontinence | 7 | 3 | 10 (18.5%) |

la tract size was significantly lower in the group with surgical success (p <0.05) than the group without surgical success. Hospital survival was significantly lower in the group with surgical success (p <0.05) than in the group without surgical success. Surgical duration, foley catheter longevity, vaginal repair rate, abdominal repair rate, cystoscopy rate before surgery and incontinence development rate after surgery were not significant (p> 0.05). In the group with surgical success, the infection rate was lower than the group with no surgical success (p <0.05). (Table II) We had no intraoperative complications. Urinary tract infections were seen in only three patients after surgery. A blood transfusion was not required in any of the patients. Prophylactic antibiotics were continued parenterally for the first 48 hours postoperatively, and orally until the catheter was removed.
In the univariate logistic regression model, there was significant (p <0.05) efficacy of the fistula tract size, hospitalization time, prior infection. In the multivariate logistic regression model, independent efficacy of the fistula tract nodule was significant (p <0.05). (Table III) The efficacy of the fistula tract size in distinguishing between successful and non-successful patients was observed [0.896 (0.5783-1.00) under the curve). A 20 mm cut off value of the fistula tract size at the discrimination of the successful and non-successful patients was observed [activity under the curve 0.875 (0.752-0.997)]. Sensitivity was 84.9%, positive predictive value was 97.8%, specificity was 90.0%, negative predictive value was 52.9% (Graphic 1)




Graphic 1: Graphic about relationship between fistula tract size and surgical success

## Discussion

In developed countries, 80% of the VVFs have been reported to be after a hysterectomy. It has also been reported that VVFs developed after a transvaginal approach have less incidence than VVFs after a transabdominal approach [8]. Approximately 10% of patients with VVFs can be treated with conservative approaches. Several cases have been reported in small series with small fistulas in which healing was achieved with proper drainage using a urethral catheter for 2-3 weeks [9-10]. It has also been reported that the success rate of a spontaneous fistula tract closure with a bladder catheterization is low, varying between 13% to 23% [11]. We also performed catheterizations 9 patient which fistula tract less than 3 mm at least 2 weeks. Five of these patients had no complaints after catheterization. We did not any catheterization which fistula size larger than 3 mm. Thus, we were more successful in patients with this treatment. Patients usually present with complaints of postoperative urine from the vagina within 10 days. If the diagnosis of a small fistula is established late, and the fistula is epithelized, electrocoagulation of the mucosal layer and catheterization may lead to closure in up to 75% of cases.12 We have not done this practice because we have no experience with fistula electrocoagulation in our clinic. A VVF diagnosis can be easily detected by physical

examination and pad test after intravesical methylene blue instillation. Determination of the appearance, size, and location of the fistula tract by performing cystoscopy helps in planning the operation decision and operative pattern. In 10-15% of patients, a ureteral injury may accompany the VVF. Therefore, an evaluation of the upper system with intravenous or retrograde pyelography is recommended for patients with fistulae [13].

Success rates after transvaginal and transabdominal repair are similar in the literature with rates of 87% [14,15].

When we looked at the recurrence rates in our patients, we observed that there were more abdominal repair patients, but this ratio was not significant. Even though we preferred a more abdominal approach, this ratio was significant (36/18). In addition, fistula size, vaginal scarring, and urethral involvement are considered factors for postoperative incontinence.16 In our case, the fistula size of recurrent patients was above the general average (2.15 ± 35 cm vs. 1.45 ± 0.46 cm, respectively), and most of them were supratrigonally located. The transvaginal approach is favored by surgeons due to the lower complication rate and shorter duration of postoperative recovery. Singh et al. reported a success rate of 86% in a study involving 102 VFF transvaginal repairs and reported that the chances of success in fistulas after radiotherapy were lower [17]. The success rate was higher in patients in whom we performed the transvaginal approach (94.4%). Postoperative vaginal shortening, stenosis, and fistula recurrence are complications of vaginal repair. We only had a recurrence in one patient and no other complications were observed. However, dyspareunia was the most common complaint (83%) during the first visit.

A transabdominal approach can be applied intraperitoneally, extraperitoneally, or transvesically. Longer hospital stays and recovery times occur with the transabdominal approach compared to the transvaginal approach. Additionally, there are other disadvantages that include excessive morbidity rates. The classic method was defined by O'Connor et al., and the success rate of this method is approximately 87% [18]. We also performed abdominal surgery with a transvesical approach in all our patients, and our success rate was compatible with the literature (83%). Five patients required blood after the operation (9.4%). However, patients who underwent transvaginal repairs did not need blood transfusions. The transabdominal study required significantly more blood transfusions for repairs, at the literature [19].

There is no consensus on the duration of fistula repair times. It has been suggested that the operation should be postponed in the presence of unhealthy, necrotic, inflamed tissues [20]. We started antibiotic treatment with care in all the diagnosed patients and, under sterile conditions, we performed the surgery as soon as possible. The mean time to the operation from the moment of damage was 28 ± 11 (range: 15-96) days.

Patients may present with urinary incontinence after surgical repairs. Murray et al. reported on 30 women who had persistent urinary incontinence (55%), stress incontinence (31%), mixed incontinence (20%), and urge incontinence (4%) [21]. In our study, the rate of patients who complained of postoperative incontinence was 46.2%. Mixed (18.5%) and urge (16.6%) incontinence were the major complaints in our control patients (Table IV). In this case, pelvic muscle exercises were recommended first, followed by medical treatment, if necessary.

In our study, surgical success rate was lower in patients who underwent urinary tract infection after the development of VVF fistula.

## Conclusion

Obstetric VVFs are highly successful with surgical repair. The location and size of the fistula tract is important for surgical success. It is important to perform cystoscopy for all patients to determine both the diagnostic and surgical approaches. We recommend that appropriate antibiotic treatment be given to the patients who are diagnosed with VVF for surgery success.



## Riassunto

Nei paesi in via di sviluppo l'etiologia delle fistole vescico-vaginali (VVFs) sono gli interventi chirurgici, in particolare le procedure ginecologiche, ed i traumi ostetrici. Abbiamo valutato retrospettivamente la nostra esperienza nella riparazione delle VVFs di origine ostetrica ed il confronto con la letteratura attuale. Abbiamo paragonato gli approcci chirurgici prescelti con i relativi risultati in rapporto alle caratteristiche delle pazienti, alle dimensioni e sedi delle fistole. Per questo abbiamo raccolto i dati retrospettivi e prospettici di 63 donne sottoposte a riparazione chirurgica per fistola utero-vescicale o vescico-vaginale nel nostro ospedale universitario del sud-est della Turchia nel periodo compreso tra ottobre 2004 e novembre 2017.

In 37 casi le pazienti erano state sottoposte ad isterectomia totale per via addominale. Dopo l'insorgenza della VVF l'intervallo per l'intervento riparativo è stato di 28 ± 11 giorni (da 15 a 96). Le dimensioni del tramite fistoloso era di 15,2±7,7 mm (da 3 a 33). Le pazienti sono state seguita per una media di 12 mesi (da 6 a 20).

In 16 pazienti (25,3%) è stato adottato un trattamento antibiotico preliminare all'intervento chirurgico perché affette da infezione urinaria. In sette pazienti (12,9%) la cui fistola aveva un diametro superiore ai 2 cm si è avuta una recidiva. In generale il risultato positivo è stato del 87%. La durata media dell'intervento chirurgico è stato di 94,5±24,3 minuti (da 50 a 150) per la chiusura a strati, di 75 minuti /da 50 a 80) per la chiusura con lembo omentale, e di 120 minuti (da 100 a 150)

per la confezione di un lembo secondo Martius. Non si sono osservate complicazioni intraoperatorie.
In conclusione la riparazione chirurgica delle fistole vescico-vaginali ha un alto tasso di successo specie per dimensioni del tragitto urinario inferiore ai 20 mm in pazienti prive di infezioni urinarie.

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