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**ORIGINAL ARTICLE**

**Repair of vesicovaginal fistula: Single-centre experience and analysis of outcome predictors**

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**KEYWORDS**

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**ABBREVIATION**

VVF, vesicovaginal fistula

**Abstract Objectives:** Data from 80 patients with a vesicovaginal fistula (VVF) were collected and analysed, to define the probable factors affecting the outcome of surgery.

**Patients and methods:** In a retrospective study, the records of 80 women with a mean (SD) age of 35.8 (9) year were assessed; 40% of the VVF occurred after abdominal hysterectomy, 30% after Caesarean section, 15% after difficult vaginal delivery and 11.25% after forceps vaginal delivery. Fifteen women (18%) had a previous failed repair. The median duration of the VVF was 11.5 months.

**Results:** Of the 80 VVF, 41 were high, 30 were low, four combined high and low and five were at the bladder neck. Nine cases had multiple openings on pan-endoscopy. An abdominal approach was used in 54 patients, vaginal in 20 and a combined approach in six. The median (SD) catheter duration was 14 (3.9) days. Ureteric stents were left in 59 patients. At a mean (SD) follow-up of 33.02 (65.7) months, the VVF was cured in 65 (81%) patients. Univariate analysis of variables possibly affecting the success of surgery showed that the duration of VVF, surgical approach, previous repair and position of the VVF were significant factors. Only previous intervention and surgical approach maintained significance in multivariate analysis.

**Conclusion:** An abdominal approach seems to give superior results. Previous failed repair had a significant negative effect on success. An earlier repair (< 6 months) is associated with higher success rates.

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**Introduction**

Prolonged and obstructed labour was long considered to be the leading cause of vesicovaginal fistula (VVF) in women in



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developing countries. In developed countries iatrogenic VVF is a complication of many procedures, comprising up to 90% of VVF in those countries [1]. In Egypt, as well as in other countries, obstetric trauma was considered the leading cause of VVF. In an important report, Mahfouz [2], a pioneer of obstetrics and gynaecology, reported on almost 1000 cases of VVF, most of them caused by pressure necrosis during difficult prolonged or obstructed vaginal deliveries. In the last three decades, obstetric trauma has become less important as a major cause of iatrogenic VVF. The aim of the present report was to assess factors possibly affecting success of surgical correction of VVF.

### Patients and methods

This retrospective study included 80 patients with VVF, who had complete records between 1983 and 2003, and who had been treated by surgeons who had done at least 10 cases each. At the time of diagnosis all patients had a local examination, basal biochemical profile (complete blood count, serum creatinine and urine analysis). The IVU or renal ultrasonography report was used to document the reno-ureteric configuration. An ascending cystogram with anteroposterior and lateral views was taken. The three-gauze test with methylene blue instilled in the bladder to detect fistulae undetected on the cystogram was also used. Pan-endoscopy at the time of surgery was a routine step. In the evaluation of the patient records, the duration of the VVF, the cause and any previous repair were all documented. The duration of urethral catheter drainage and the

use of bilateral ureteric catheters was also recorded. The site and the number of fistulous openings was also recorded; the VVF was considered 'low' when the fistulous opening was below the inter-ureteric ridge, 'high' when above this line, and a fistula at the bladder neck was considered as a separate entity. The approach (abdominal or vaginal) was recorded and the use of an interposition flap was checked.

In the abdominal approach we used a midline infra-umbilical incision and transvesical approach, while in a vaginal approach we identified the fistulous opening using an Auvard weighted vaginal retractor, insertion of a small calibre Foley catheter in the fistulous tract and complete excision of the tract, with a two-layer closure of the bladder and vaginal mucosa. Discharge data were reviewed and only those patients who were reported continent were considered as a success.

The mean (SD, range) age of the patients was 35.8 (9, 18–55) year; 32 (40%) patients had a VVF after an abdominal hysterectomy, 24 (30%) after Caesarean section, 12 (15%) after a difficult vaginal delivery and nine (11%) after forceps delivery. A partial cystectomy for benign bladder ulcer, anterior bladder wall (Tanagho's) tube repair for female epispadias, pelvic fracture and vaginal hysterectomy were the underlying causes in one patient each (4%). In all, 15 (19%) patients had a previous failed repair of the VVF elsewhere; 11 patients had one, one had two and three had had three previous repairs.

A univariate analysis was used to assess individual variables, with the chi-squared test; those variables significant on univariate analysis were considered in a multivariate analysis,

**Table 1** Univariate analysis of local variables affecting the success of VVF repair.

Variable	Failed, <i>n</i> (%)	Success, <i>n</i> (%)	Total, <i>n</i> (%)	<i>P</i> , chi <sup>2</sup>
Previous repair				
No	8 (12)	57 (89)	65 (81)	
Yes	7 (47)	8 (53)	15 (19)	0.002*
Duration of VVF, months				
< 6	1 (5)	21 (96)	22 (28)	
> 6	14 (24)	44 (76)	58 (73)	0.045*
Site of fistula				
High	3 (7)	38 (93)	41 (51)	
Low	11 (37)	19 (63)	30 (38)	
High and low	1/4	3/4	4 (5)	
Bladder neck	0	5/5	5 (6)	0.013*
Fistulous openings				
Single	13 (18)	58 (82)	71 (89)	
Multiple	2/9	7/9	9 (11)	0.77
Approach				
Abdominal	5 (9)	49 (91)	54 (68)	
Vaginal	6 (30)	14 (70)	20 (25)	
Combined	4/6	2/6	6 (8)	< 0.001*
Catheter duration, days				
< 14	1/15	14/15	15 (19)	
14–21	9 (17)	43 (83)	52 (65)	
> 21	5/13	8/13	13 (16)	0.089
Ureteric stents				
No	6 (29)	15 (71)	21 (26)	
Yes	9 (15)	50 (85)	59 (74)	0.180

\* Significant.

using logistic linear regression. In all tests, significance was indicated at  $P < 0.05$ .

## Results

The median (SD, range) duration of the VVF until treatment was 11.5 (37.2, 3–228). On pan-endoscopy, 41 VVF (51%) were high, 30 were low (38%), four (5%) were combined high and low, and five (6%) were at the bladder neck. One patient also had a ureteric fistula. All VVF but nine (11%) were single.

An abdominal approach was used in 54 cases (68%), with interposition of omental (26 cases) or peritoneal (seven cases) flaps, according to the surgeon's discretion. Vaginal repair was contemplated in 20 (25%) cases and combined abdominal-vaginal in six (7%). Interposition of a Martius flap was used only in one case.

A urethral catheter was left in situ after the repair for a variable duration, for a median (SD, range) of 14 (3.9, 7–21) days (according to the surgeon's rating of the difficulty of surgery). Ureteric catheters, as a method of urinary diversion, were used in 59 (74%) of the cases. Again, the only indication for a ureteric catheter was the surgeon's preference.

Based on discharge data and subsequent follow-up visits, the initial success rate was 81% (65 patients). Those who were initially failures (15 patients, 19%) were followed up using the hospital database. One patient was lost to follow-up, another reported continence at 6 months after discharge and a cystogram was taken confirming the disappearance of the VVF. In four patients a second procedure failed; three of them eventually had a urinary diversion and one was lost to follow-up. Nine patients (of the 15 failures) had a subsequent successful repair of the VVF. The results were analysed at a mean (SD, range) follow-up of 33.0 (65.7, 1–276) months, where the success rate of surgery was last reported in patients who had had a successful first repair.

We considered the following variables to be important risk factors, and were available for all patients; a history of previous repair, duration of the VVF until treatment ( $<$  vs  $>$  6 months), position of the VVF on pan-endoscopy (high, low, high and low, or low and bladder neck), number of VVF (single vs multiple), and approach of surgery (abdominal, vaginal or combined abdominal-vaginal), duration of urethral catheterisation ( $<$  14 days, 14–21 days or  $>$  21 days) and the adjunctive use of a ureteric catheter.

In a univariate analysis, previous repair, the duration of VVF until treatment, surgical approach and the position of the VVF had a significant effect on the success of surgery, with  $P = 0.002$ , 0.045,  $<0.001$  and 0.013, respectively. Table 1 shows the results of the univariate analysis. Among those variables significant on univariate analysis, only previous repair and surgical approach had a significant effect in the multivariate analysis using logistic linear regression (Table 2).

## Discussion

In their analysis, Wall et al. [3] found the leading cause of VVF to be obstetric trauma. They considered the age of the 'typical patient' to be 15.5 year. In another study from Ethiopia [4], 40% of patients in the study cohort of 193 were teenagers, and 95.3% of the VVF resulted from obstetric trauma. In the current study, there was a distinct pattern of VVF in this

**Table 2** Multivariate analysis, using logistic linear regression.

Variable	Regression estimate, <i>B</i>	SE	ExpB	<i>P</i>
Previous repair				
No	–	–	1	–
Yes	1.5	0.72	4.5	0.04
Approach				
Abdominal	–	–	1	–
Vaginal	2.5	1.04	12.6	0.015
Combined	1.4	1.05	4.13	0.180
Constant	–1.5	1.02	–	0.13

Egyptian population; iatrogenic factors accounted for 70% of cases and the median age was  $>$  35 year.

Different techniques of repair have been reported, with an initial success rate of 95.2% when Waaldijk [5] tried immediate closure, and 86.8% in a study by Gessesew and Mesfin [3]. In our patients the cure rate was 81%, with a median duration of the VVF of 11.5 months.

Among factors compromising the success of surgical correction of VVF were tissue ischaemia, radiation and recurrence [6]. None of our patients had had previous pelvic irradiation, yet 19% of them had one or more previous failed repair. Previous VVF repair was a significant factor affecting the outcome of surgery in both the uni- and multivariate analysis. Another potentially important factor was the long median duration of the VVF (11.5 months). Intuitively, large untreated VVF might be associated with defunctionalisation of the bladder, in the same way that an indwelling urethral catheter can affect bladder function, when left in situ for a long time. Defunctionalisation of the detrusor affects bladder function and possibly the healing of the bladder. Of the present patients, 22 had the VVF for  $<$  6 months (Table 1) and in this subgroup the success rate was 95%. At least in infants, Podesta et al. [7] found that primary valve ablation resulted in higher capacity bladders with lower end-filling pressure and better compliance than those who had proximal diversion and delayed valve ablation. However, the duration of the VVF had no effect on the cure of the VVF when assessed in a multivariate analysis.

While an abdominal approach is considered by some to be the reference treatment for simple and complex VVFs [8,9], others consider the vaginal route as a routine approach for repair, considering the morbidity of the abdominal route [10]. However, in their report, Eilber et al. [10] concluded that the approach chosen for VVF repair should be that with which the surgeon is most comfortable. Our analysis clearly showed that the surgical approach affected the outcome of surgery. Vaginal (or combined abdominal and vaginal) repair were associated with higher failure rates than the abdominal approach. This effect was apparent on logistic regression and continued to be significant in multivariate analysis. Possibly this is because abdominal repair is easy to learn, considering that the present patients were managed by several urologists over a long period.

In conclusion, the causes of VVF in Egypt have changed significantly in the last three decades. Surgical correction of VVF is more successful when done earlier, probably in the first 6 months, the abdominal approach seems to be more successful in our hands, and recurrent VVF are particularly complex, being associated with lower success rates than primary cases.

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## Editorial comment

This study is by no means epidemiological, but rather an important report of the developing aetiology of VVF in Egypt. This centre is in the middle of the Nile delta, a true suburban environment, which gives it validity as a snapshot of this devastating medical and social problem. The obstetric cause of VVF accounts for a quarter of these patients (including forceps delivery); while significantly lower than in sub-Saharan African countries, Egypt is still lagging behind developed countries.

Wadie and Kamal analysed the surgical outcome of 80 patients by 10 different experienced surgeons, over more than two decades. They identified previous repairs, a high fistula, chronic fistula for > 6 months, and the vaginal approach to repair as predictors of failure. The latter predictor requires further discussion, in view of modern changes and emphasis on female pelvic medicine and reconstructive surgery training. The vaginal approach is associated with minimal morbidity, significantly less blood loss, a shorter hospital stay and a more rapid recovery, making it an attractive option for repair.

In this study, there is a clear bias towards abdominal repair vs. vaginal repair. The latter was used in only 20 patients, with a high failure rate (30%). Conversely, of 30 patients with a low VVF, most of them suitable for the vaginal approach, in a third the surgery failed. This might reflect an ingrained surgical training in one approach (abdominal) over the other (vaginal) in the same centre. While there are clear indications for abdominal repair, such as the need for ureteric re-implantation, augmentation cystoplasty, involvement of other organs, and a narrow or deep vagina, most fistulae can be repaired vaginally, with success rates as high as 96% reported [1,2]. A surgeon experienced in female pelvic floor reconstruction should be familiar with both approaches, with or without the use of different graft interposition, and apply each approach judiciously. As the greatest chance of success is at the first attempt, the approach is dictated by the surgeon's preference and experience.

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