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Outcome and predictors of failure of abdominal surgical repair of high vesico-vaginal and vesico-uterine fistulae at Gezira Hospital for Renal Disease and Surgery

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Abstract

Background Urogenital fistula can arise from various causes, leading to the development of diverse surgical procedures. The prevention and treatment of obstetric fistula continue to pose challenges in low-income countries.

Aim To assess the outcomes and predictors of failure of surgical repair for urogenital fistulas, specifically high vesico-vaginal fistula (VVF) and vesico-uterine fistula (VUF), within our context.

Methods Conducted a prospective hospital-based study involving 100 female patients with urogenital fistula (95 VVF and 5 VUF) who underwent abdominal surgical repair at Gezira Hospital for Renal Diseases and Surgery from 2018 to 2023. Collected data encompassing demographics, obstetric history, fistula etiologies, Swab test, cystoscopy findings, urine diversion, ureteric re-implantation, and repair outcomes.

Results The majority of women were aged 20–29 years (39%), illiterate (62%), and had a low socio-economic status (87%). Lack of antenatal care was noted in 77% of patients. Fistula etiologies were predominantly obstetric (70%), mainly due to spontaneous vaginal delivery (SVD), with the remaining 30% attributed to gynecological causes (hysterectomy). In terms of fistula characteristics, all patients had a high-level fistula, 95% had a single fistula, and 69% had a posterior wall fistula. Successful closure was achieved in 84% of cases, with 11% experiencing ureteric involvements. The analysis of failures pointed to recurrent fistulae (50%), larger fistula size (31%), and the presence of multiple fistulae (19%) as notable predictors of unsuccessful repair.

Conclusion VVF was the prevalent type of urogenital fistula in our population. Risk factors included being in the third decade of life, illiteracy, low socioeconomic status, and a lack of prenatal care. Obstetric causes, particularly prolonged and obstructed labor through SVD, dominated the etiology. Surgical procedures resulted in successful closure in 84% of cases. Recurrent fistulae, larger size, and multiple occurrences emerged as predictors of surgical repair failure.

Keywords Urogenital fistula, Vesico-vaginal fistula, Vesico-uterine fistula, Gezira Hospital for Renal Diseases and Surgery, Sudan

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1 Background

Urogenital Fistula refers to an abnormal opening connecting a woman's vagina to the bladder (vesico-vaginal fistula, VVF), uterus or cervix to the urinary bladder (vesico-uterine fistula, VUF), vagina to the rectum (recto-vaginal fistula, RVF), or both bladder and rectum (VVF + RVF) [1]. This condition, resulting from obstructed labor, leads to uncontrollable urine leakage and remains a serious health concern. Despite global and local efforts, addressing VVF and VUF remains challenging in low-income countries with insufficient access to emergency obstetric care and skilled birth attendants [2, 3].

In sub-Saharan Africa, the lifetime prevalence of VVF and VUF ranges from 1.60 to 3.0 cases per 1000 women of reproductive age [4, 5]. Fistulae commonly arise from prolonged or obstructed labor, causing necrosis of tissues and subsequent fistula formation. Additionally, iatrogenic fistula during obstetric surgery is on the rise [6].

Diagnosis involves clinical examination, verified by a dye test or cystoscopy, and the primary treatment is surgical through transvaginal or transabdominal techniques. While reported surgical closure rates are as high as 90%, they vary among repair hospitals, influenced by factors such as repair technique, surgeon expertise, fistula characteristics, and post-operative care. Discrepancies also exist in defining outcomes, with some studies focusing on fistula closure rates and others distinguishing closure and continence following surgery [7].

Studies in various contexts highlight factors influencing repair outcomes, including complete urethral destruction, severe vaginal scarring, small bladders, and previous repairs [8–10].

2 Methods

2.1 Study design

A prospective hospital based study.

2.2 Study duration

This study was conducted in the period from 2018 to 2023.

2.3 Study settings

The study was conducted in Gezira Hospital for Renal Diseases and Surgery, Wad-Medani, Gezira State, Sudan.

2.4 Study population

Adult female patients with high VVF and VUF were recruited for the study.

2.5 Inclusion criteria

- Adult female
- High VVF or VUF
- Patients who underwent abdominal repair at Gezira Hospital for Renal Diseases and Surgery
- On regular follow-up

2.6 Exclusion criteria

- Low VVF
- Refusal to participate

2.7 Sample size

The study encompassed the entire population of eligible female patients with high vesico-vaginal fistula (VVF) and vesico-uterine fistula (VUF) during the study period from 2018 to 2023. Consequently, the sample size for this study comprised 100 patients.

2.8 Data collection tools and methods

The principal investigator conducted data collection using structured questionnaires covering demographics, obstetric history, fistula etiologies, Swab test results, and cystoscopy findings, details of urine diversion, ureteric re-implantation, and outcomes of the surgical repair.

2.9 Study variables

- Demographics: Age, education and socioeconomic status
- Obstetric history: Antenatal care (ANC) attendance, Personnel of ANC
- Etiologies of fistula
- Intraoperative obstetrical and gynecological complications
- Postoperative obstetrical and gynecological complications
- Swab test
- Cystoscopy findings
- Ureteric involvement
- Ureteric re-implantation
- Fistula repair outcomes

2.10 Statistical analysis

The data underwent analysis utilizing the Statistical Package for Social Sciences (SPSS V. 26.0) computer program. The outcomes of the analysis were then visually presented in tables and figures crafted using Microsoft Excel 2010.

3 Results

This study prospectively examined 100 female patients with urogenital fistula. A significant proportion, 39% (n = 39), fell within the 20–29 age group, were illiterate (62%), and had a low socioeconomic status (87%) (Table 1).

The majority of urogenital fistula cases were vesicovaginal fistulas (VVF) in 95% of patients, with vesicouterine fistulas (VUF) observed in 5% (Fig. 1).

The research findings indicate that 45% of fistulae were less than 1 cm in size, 37% measured between 1.5 and 3 cm, while 18% exceeded 3 cm in diameter (Table 2).

Sixteen percent of fistulae were recurrent fistulae while 84% presented for the first time. Multiple fistulae were 5% (Figs. 2 and 3 respectively).

In terms of obstetric history, only 23% attended antenatal care, with 77% lacking prenatal care (Table 3).

Fistula etiologies were predominantly obstetric, with 70% attributed to spontaneous vaginal delivery (42%), cesarean section (24%), and assisted vaginal delivery (4%). Hysterectomy was the cause in 30% of cases (Trans-abdominal in 16% and Trans-vaginal in 14%) (Table 4).

Intra-operative obstetrical complications predominantly involved bleeding, affecting 29% of patients (Fig. 4).

In postoperative complications, leakage was the dominant complication in 89(89%) patients which was the main presenting symptom (Fig. 5).

Swab tests yielded positive results in 54% of cases (Fig. 6).

Cystoscopy findings revealed a high level of fistula in all patients, with 95% having a single fistula, and 69% located in the posterior wall (Table 5).

Ureteric involvement was identified in 11% of cases (Fig. 7), leading to ureteric diversion and later intra-operative re-implantation in 11% of patients (Fig. 8).

Table 1 The demographics demographic characteristics of female patients with high VVF and VUF (N = 100)

	Frequency	%
Age (Years)		
< 20	23	23
20–29	39	39
30–39	32	32
40 +	6	6
Education		
Illiterate	62	62
Literate	38	38
Socioeconomic status		
Low	87	87
High	13	13

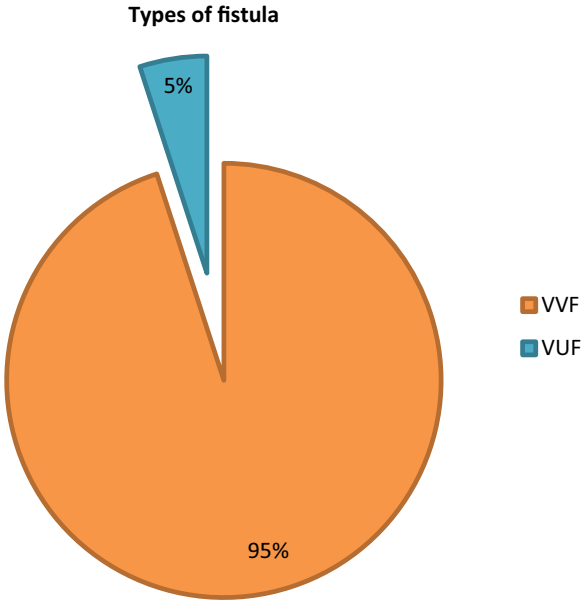

Fig. 1 The distribution of fistula types among female patients (N = 100)

Fistula repair outcomes indicated successful closure in 84% of subjects (Fig. 9).

Among failed surgical repairs, 8(50%) had recurrent fistula, 5(31%) were more than 3 cm in diameter, and 3(19%) presented with multiple fistulae (Table 6).

4 Discussion

This prospective study examined 100 females diagnosed with urogenital fistulas (95 with high VVF and 5 with VUF) at Gezira Hospital for Renal Diseases and Surgery from 2018 to 2023. The aim was to discern fistula characteristics, risk factors, and repair outcomes.

The study revealed that the majority of patients (39%) were aged 20–29 years, aligning with Demisew et al. [6] in Ethiopia who reported the mean age of 25 (± 6) years. This supports young age at delivery as a significant risk factor for fistula as reported by Tebeu PM et al. [11].

Additionally, low education levels were identified as a risk factor, with 62% of cases being illiterate, consistent with studies in Africa [7, 12] and India [13]. Addressing this, health education should target women with low or

Table 2 The classification of fistulae according to size among patients with high VVF and VUF (N = 100)

Size	Number	%
Less than 1.5 cm	45	45
1.5–3 cm	37	37
More than 3 cm	18	18

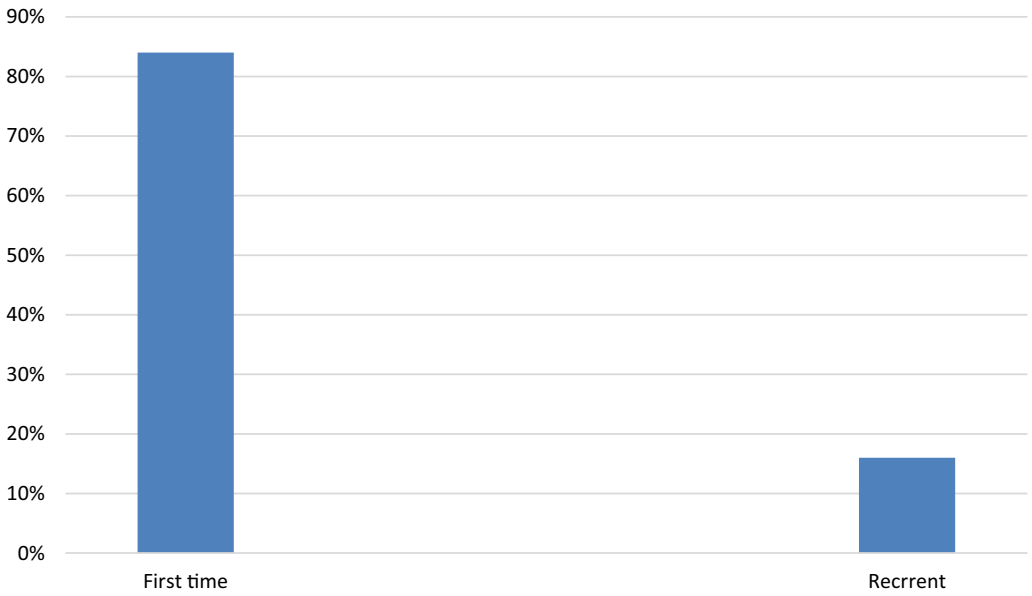

Fig. 2 The fistula classification according to recurrence among female patients with high VVF and VUF (N = 100)

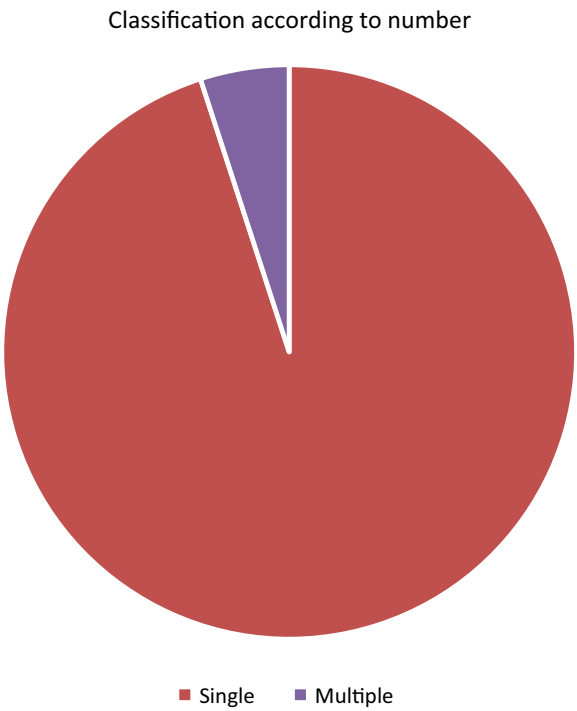

Fig. 3 The fistula classification according to number among female patients with high VVF and VUF (N = 100)

Table 3 The obstetric history of female patients with high VVF and VUF (N = 100)

	Frequency	%
Antenatal care (ANC)		
Yes	23	23
No	77	77
Personnel of ANC		
Primary health care center	10	10
Midwives	7	7
Obstetrician	6	6

Table 4 The distribution of fistula etiologies among female patients (N = 100)

Causes of fistula	Frequency	%
Obstetric	70	70
Spontaneous vaginal delivery	42	42
Emergency cesarean section	18	18
Assisted vaginal delivery	6	6
Elective cesarean section	4	4
Hysterectomy	30	30
Trans-abdominal	16	16
Trans-vaginal	14	14

no education, emphasizing the importance of skilled attendance during delivery. Policy-wise, promoting education programs beyond primary levels could be a strategy to control and eliminate obstetric fistula in Sudan.

Socioeconomic status emerged as another risk factor, as 87% of women had a low socioeconomic status, echoing findings in a systemic review concluded by Tebeu PM

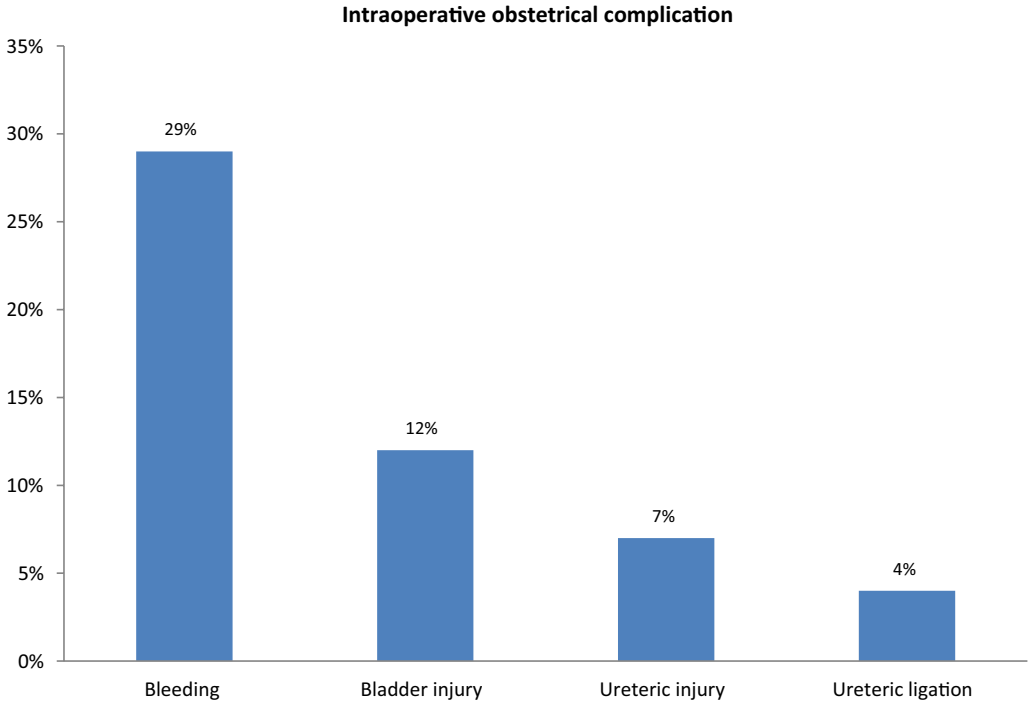

Fig. 4 The intraoperative obstetrical complications among female patients with high VVF and VUF (N = 100)

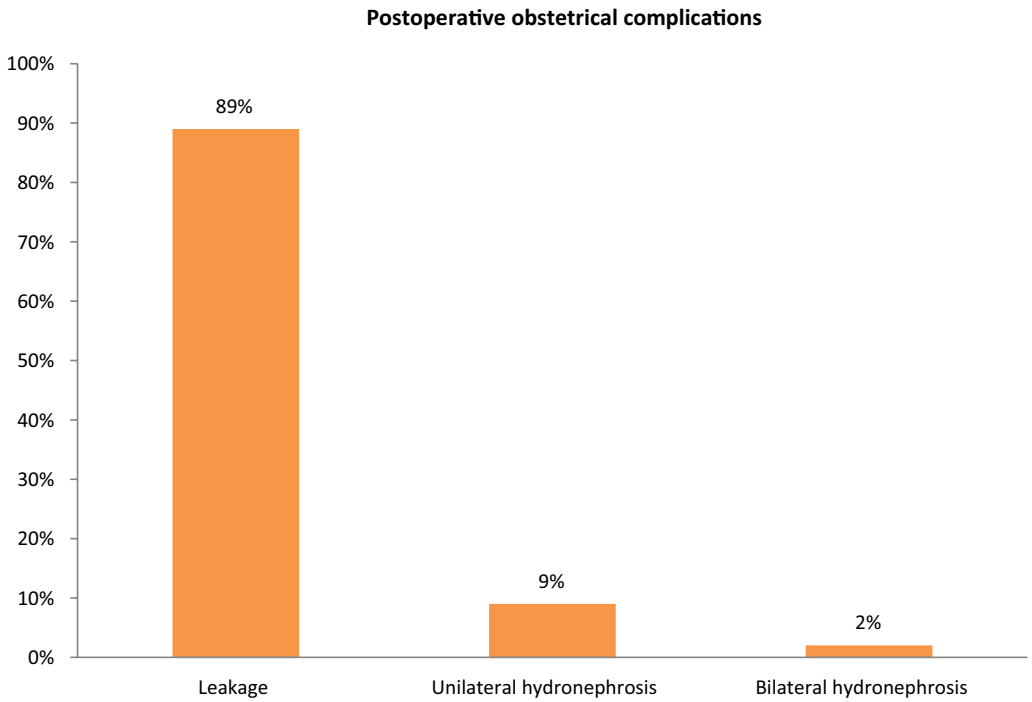

Fig. 5 The postoperative complications among female patients with high VVF and VUF (N = 100)

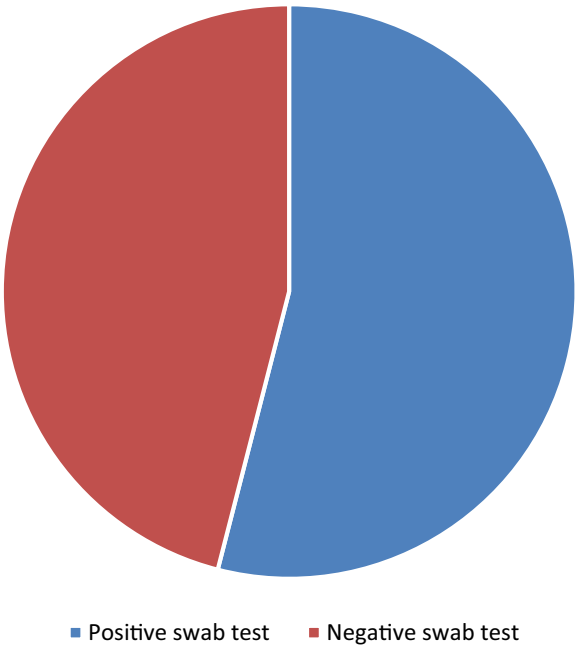

Fig. 6 The swab test findings of female patients with high VVF and VUF (N = 100)

Table 5 The cystoscopy findings of female patients with high VVF and VUF (N = 100)

Cystoscopy	Frequency	%
Level of fistula		
High	100	100
Number of fistula		
Single	95	95
Multiple	5	5
Site of fistula		
Posterior wall	69	69
Trigon	20	20
Domal	9	9
Lateral wall	2	2

et al. [11] and Dharitri et al. [13] study in India associating fistula with low family income.

The study highlighted the predictive role of attending antenatal care, with 77% of subjects lacking prenatal care. Similarly, other studies in Africa have found that failure to attend antenatal care is a risk factor of fistula [11, 14]. This underscores the need to enhance the quality of antenatal care, encouraging women to avail themselves of these services.

Fistula etiologies were predominantly obstetric (70%), mainly due to spontaneous vaginal delivery (SVD), while 30% were gynecological, involving hysterectomy. This suggests that fistulas in this series resulted from prolonged and obstructed labor. Comparable observations were noted in Zambia [15]. Also, observations were similar to the study of Manoj et al. [16] in India who reported obstetric cause, due to obstructed labour, was the most common cause of fistula formation (68.96%), while remaining (29.31%) were attributed to hysterectomy. In contrast, Justus et al. [12] in Uganda identified caesarean section (adjusted odds ratio (AOR) = 13.30, 95% CI 6.74–26.39) as a significant risk factor.

Regarding fistula characteristics, all patients had a high-level fistula, 95% had a single fistula, and 69% had a posterior wall fistula, aligning with findings in Africa [8].

Ureteric involvement were reported in 11%, similar to the study of Demisew et al. [6] in Ethiopia (8.9%).

Surgery is the definitive treatment for urogenital fistulas, with this study reporting a successful closure in 84% of subjects, consistent with literature (55%–95%) [17]. Also, our figure was consistent with Manoj et al. [16] in India (84.1%) and Demisew et al. [6] in Ethiopia (93.4%). As well our successful closure rate was higher than the studies of Alexandre et al. [7] in Guinea (67%) and Somaia et al. [18] in Saudi Arabia (74%). Success rates varied, potentially influenced by factors such as urethral involvement, size, location, and number of fistulae, scar tissue, bladder capacity, and prior repair history [17].

Our analysis identified that half of the failed surgical treatments were cases of recurrent fistulae. This indicates the difficulty and challenge in treating cases with prior failed repairs. Also failed repairs included 31% of fistulae that were larger than 3 cm in diameter because bigger fistulas may create problems during surgical closure, affecting the success rates. Another factor was the complexity as cases with multiple fistulae represented 19% of failures. Treating multiple fistulas at the same time may raise the complexity of the surgical procedure.

These findings are consistent with existing literature, highlighting the importance of fistula features in forecasting repair results [9, 10]. The variation in success rates could be explained by factors such as urethral involvement, scar tissue, and the surgeon's skill [17].

While the overall success rate in our study was similar to international figures, it is essential to comprehend and address these causes of failure for improving surgical methods and patient results.

5 Conclusion

Our findings indicate that vesico-vaginal fistula (VVF) was the predominant urogenital fistula type in our population. The third decade of life, illiteracy, low socioeconomic status, and lack of prenatal care emerged as major risk factors for fistula development. Obstetric causes, particularly prolonged and obstructed labor

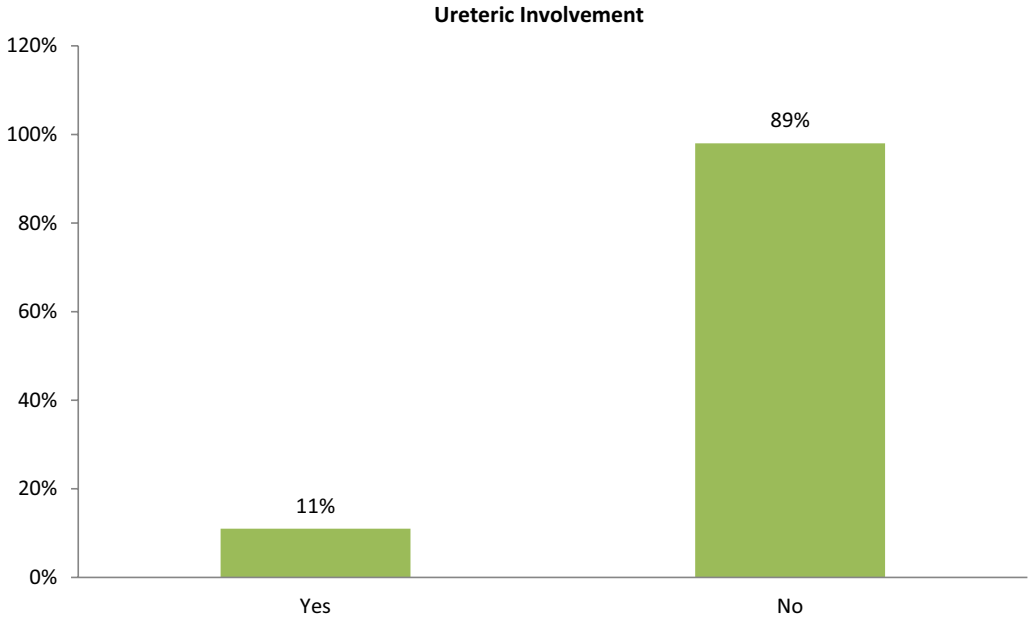

Fig. 7 Ureteric Involvement among female patients with high VVF and VUF (N = 100)

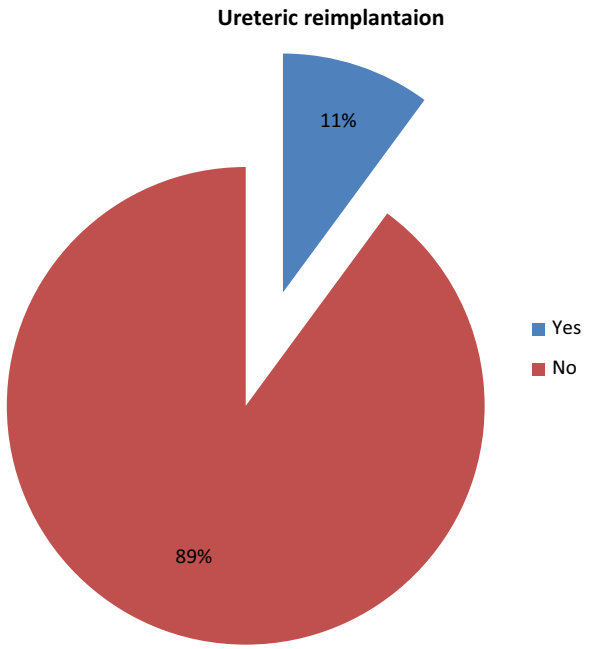

Fig. 8 Ureteric re-implantation among female patients with high VVF and VUF (N = 100)

spontaneous vaginal delivery (SVD), were the primary etiological factors. The success rate of abdominal surgical treatment was 84%, however, the failure analysis revealed that recurrent, large, and multiple fistulae were important factors influencing the repair outcome.

6 Limitations

1. Single-Center Study: The research was conducted at Gezira Hospital for Renal Diseases and Surgery, limiting the generalizability of findings to a broader population.
2. Sample Size: The study's sample size of 100 patients, while informative, may not capture the full diversity of urogenital fistula cases, necessitating caution in extrapolating results.
3. Surgical Outcome Variability: Surgical success rates may vary based on factors such as surgeon expertise and techniques, introducing potential variability in the reported closure outcomes.
4. Temporal Considerations: The study spans from 2018 to 2023, and advancements in healthcare practices during this period might influence outcomes, limiting the study's temporal relevance.

7 Recommendations

1. Tailored Surgical Approaches: Surgeons should adapt their approaches for cases with recurrent or multiple fistulae and those with bigger fistula sizes, as these were the observed predictors of failure. Personalized surgical planning, taking into account these factors, may increase the chance of successful closure.

Fig. 9 The fistula repair outcomes among female patients with high VVF and VUF (N = 100)

Table 6 Causes of failure of abdominal surgical repair in patients with high VVF and VUF (N = 16)

Cause	Frequency	%
Recurrent fistula	8	50
Size > 3 cm	5	31
Multiple fistulae	3	19

2. Quality Improvement in Antenatal Care: Improving the quality of antenatal care is vital, as our study found that a lack of prenatal care was a major risk factor. Initiatives aimed at enhancing access to and utilization of antenatal care services can have a positive effect on fistula prevention.
3. Surgeon Skill Enhancement: Ongoing training and skill development for surgeons involved in fistula repair are necessary. This can lead to better outcomes, especially in cases with difficult factors like recurrent or multiple fistulae.
4. Future Research: Considering the limitations of this single-center study, future research efforts should involve multi-center studies with larger sample sizes. This would offer a more comprehensive understanding of urogenital fistula dynamics and help to improve prevention and treatment strategies.

Abbreviations

ANC Antenatal care
AOR Adjusted odds ratio
OR Odd ratio
RVF Recto-vaginal fistula
SPSS Statistical package for social sciences
SVD Spontaneous vaginal delivery
VUF Vesico-uterine fistula
VVF Vesico-vaginal fistula

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Author contributions
Concepts, Literature search: MSAY, IGAM. Clinical studies, Experimental studies: IGAM, MO. Data acquisition, Data analysis, Statistical analysis: YMO, ASAY. Manuscript preparation, Manuscript editing, Manuscript review: MEMA, MSAY. Final Approval of the version to be published: All authors.

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Availability of data and materials
The materials collected from Gezira Hospital for Renal Diseases and Surgery are available upon request.

Declarations

Ethics approval and consent to participate
Ethical approval was granted by the Ministry of Health, with acceptance from the hospital authority. All patients consented to participate. To protect patient confidentiality, data was anonymized using identity numbers instead of names. The information is securely stored in a separate file, with study reports avoiding any reference to individual participants. Subject identities are exclusively known by the study staff.

Consent for publication
We hereby grant permission to African Journal of Urology to publish this paper. We understand that this publication may be distributed in print and/or online.

Competing interests
No competing interests are declared.

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