Sarcouncil Journal of Medicine and Surgery

ISSN(Online): 2945-3534

Volume- 04| Issue- 02| 2025

Research Article **Received:** 01-01-2025 | **Accepted:** 20-01-2025 | **Published:** 01-02-2025

Vesicovaginal Fistulas: A Combined Gynecological and Urological Perspective on Surgical Management and Outcomes

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Abstract: Vesicovaginal fistulas (VVFs) are a distressing condition that has been shown to have a detrimental effect on the quality of life of those affected (Smith *et al*., 2022). The present study aims to evaluate and compare a variety of surgical procedures for the treatment of VVFs with postoperative results. Methodology: A retrospective analysis of patients diagnosed with VVF and subjected to surgical repair from various hospitals in Iraq between May 1, 2023, and March 1, 2025, was conducted. The surgical techniques employed encompassed vaginal repair, abdominal repair, and flap repair techniques. Preoperative assessment included imaging studies, i.e., MRI or cystoscopy, to define the site and size of the fistula. Postoperative assessment was based on healing rate, complications, and quality of life as reported by patients. The mean age of the participants was found to be 35.6 ± 8.1 years, and no statistically significant difference was observed between the two groups (laparoscopic: 35.2 ± 8.3; open: 36.1 ± 7.9) (p = 0.43). The duration of incontinence was also examined. The average duration for the entire group was 12.8 ± 6.0 months, with no significant difference observed between the two groups (Laparoscopic: 12.4 ± 5.8; Open: 13.1 ± 6.3, p = 0.51). The distribution of patients according to the type of fistula is as follows: Congenital Fistula: Laparoscopic: 5 (4.3%), Open: 3 (2.6%), Total: 8 (3.5%) (p = 0.62) and Acquired Fistula: Predominantly represented, Laparoscopic: 110 (95.7%), Open: 112 (97.4%) (p = 0.62). Postoperative complications were observed in 10 (8.7%) of the laparoscopic group and 20 (17.4%) of the open group (p = 0.03). There was no significant difference in the incidence of infectious complications between the two groups (p = 0.21), with five (4.3%) cases observed in the laparoscopic group compared to 10 (8.7%) in the open group. Reoperation was necessary in 11 (9.5%) cases. The laparoscopic group did not undergo any reoperations, in contrast to two (1.7%) in the open group (p = 0.50). The average age of the participants was found to be 35.6 ± 8.1 years, with no statistically significant difference observed between the groups (p = 0.43). The duration of incontinence was also analysed. The average duration for the entire group was 12.8 ± 6.0 months, with no significant difference observed between the two groups (Laparoscopic: 12.4 ± 5.8; Open: 13.1 ± 6.3, p = 0.51). The distribution of patients according to the type of fistula is presented in Table 1. Congenital Fistula: Laparoscopic: 5 (4.3%), Open: 3 (2.6%), Total: 8 (3.5%) (p = 0.62) and Acquired Fistula: Predominantly represented, Laparoscopic: 110 (95.7%), Open: 112 (97.4%) (p =0.62). Postoperative complications were found to be lower in the laparoscopic group (10 [8.7%]) than in the open group (20 [17.4%]) (p = 0.03) for the cohort with infectious complications. However, no significant difference was observed (p = 0.21), with the laparoscopic group experiencing 5 (4.3%) cases compared to the open group's 10 (8.7%). Reoperation was necessary in: No reoperations were recorded in the Laparoscopic group, compared to two (1.7%) in the Open group (p = 0.50). The conclusions drawn from this study are as follows: The results suggest that patient-specific surgical approaches can increase closure rates and decrease complications associated with VVFs. The findings underscore the significance of integrating pre-operative imaging and collaborative surgical approaches in optimizing patient outcomes. Further studies may be warranted to understand long-term recovery and psychosocial consequences on the patient for whom the vesicovaginal fistula was treated.

Keywords: Gynecological, Urological, Surgical Management, vesicovaginal fistulas (VVFs), Quality of life, MRI, Fistula.

INTRODUCTION

Vesicovaginal fistulae, or VVF, are abnormal connections between the bladder and vagina that have a major impact on the quality of life of the sufferer. Normally they occur due to obstetric trauma, surgical complications, or malignancies, with the involuntary leakage of urine through the vaginal canal being the major symptom. VVFs mostly affect women in resource-poor settings worldwide, where obstetric care could be far from ideal (Malik, M.A. *et al*., 2018). However, it can also affect women in developed countries after experiencing complications in surgery following pelvic surgeries. The multifactorial nature of VVFs makes it imperative that a thorough understanding of etiology and, management and postoperative outcomes should be applied to VVFs, including both gynecological and urological approaches (Hadley, H.R, 2002).

VVF treatment histories should be promulgated in gynecology (Stamatakos, M. *et al*., 2014). Most traditional surgical intervention measures are directed towards excising the fistulous tract, rebuilding the vaginal and bladder walls, and repositioning surrounding tissues to restore normal anatomy and function. One of the most important

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DOI- https://doi.org/10.5281/zenodo.19458926

surgical techniques is the Martius flap, which uses the labial fat pad for vascularized tissue reinforcement. Interdisciplinary collaboration between urologists and gynecologists is increasingly being recognized as necessary to improve surgical outcomes (Eilber, K.S. *et al*., 2003). The urologist would bring valuable expertise to very complex cases regarding the assessment and management of important detrusor instability or associated bladder dysfunctions or urological complications (Wall, L.L, 2006). Combined surgical approaches not only maximize the chances of successfully closing the fistula but also minimize the chances of recurrence and improve overall urinary function (Härkki-Sirén, P. *et al*., 1998; Adetiloye, V.A. & Dare, F.O, 2000; Barratt, R, 2022).

Complicated and oftentimes individualized treatment plans are needed in cases of VVF management by surgery, considering such factors as the patient's obstetric history, size and site of the fistula, and accompanying anomalies of the urinary system (Bhat, V. & Kumar, A., 2022; Bhutani, N. *et al*., 2020). With recent advances in imaging techniques like magnetic resonance imaging (MRI) and cystoscopy, accurate diagnosis is now readily available to tailor surgical management for intervention applicable to the specific features of the fistula (Chandna, A. *et al*., 2020; Cheikhrouhou, T. *et al*., 2023). Clear understanding of the anatomy involved, along with the function of the pelvic floor, enables elucidation during surgery; hence, the opportunity for involvement of both the gynecologists and urologists lends to the provision of a well-integrated patient care component (El-Azab, A.S. *et al*., 2019).

The outcomes of surgical intervention for VVFs exhibited variability among cases, typically determined by the complexity of the fistula, the expertise of the surgical team, and the availability of postoperative care (Han, G. *et al*., 2023). The extant literature demonstrates that while the repair of VVFs by primary means yields closure rates in excess of 90%, the recurrence of symptoms and the development of new urinary dysfunction remain a concern (Goodwin, W.E. & Scardino, P.T, 1980). A combined approach, integrating the expertise of gynecology and urology, is likely to enhance healing rates and patient satisfaction, particularly in cases where conventional methods have proven ineffective. Furthermore, the integration of psychological support, education, and rehabilitation services within the management framework is recommended to facilitate the management of patients affected by VVFs, ensuring comprehensive care and well-being (Zacharin, R.F, 2000).

The primary objective of this study is to examine contemporary surgical methodologies and their resultant outcomes from the perspectives of the two specialties.

METHODOLOGY

This study was a prospective, comparative cohort study conducted from different hospitals in Iraq from 1 May 2023 to 1 March 2025. The objective of the study was to evaluate the surgical management and outcomes of vesicovaginal fistulas using laparoscopic and open surgical techniques. A total of 230 patients diagnosed with vesicovaginal fistula participated in the study, and patients were divided into two groups according to the surgical technique used:

• Laparoscopic group: 115 patients underwent open surgical intervention, and 115 patients underwent open surgical intervention.

Inclusion criteria:

• Adult females aged 18 years and over with a diagnosis of vesicovaginal fistula.

• Patients willing to participate in the study. Exclusion Criteria:•: Patients unwilling to participate in the study.

Exclusion criteria included:

• Patients with significant comorbidities contraindicating surgery.

• Patients rejecting intervention.

Data Collection Preoperative, intraoperative, and postoperative data were collected. The setting and collection of patient demographics, clinical history, surgical outcomes, and postoperative complications were verified.

The following variables were assessed: Age, height, weight, Body Mass Index (BMI), Fistula Causes, Symptoms of the Fistula, Previous Attempts at Repair, Smoking Status, Level of Education and Social Standing, Duration of Incontinence, Fistula Classification: classification of the various types of fistulas was based on clinical evaluation.

Surgical outcomes comprise the following metrics:

- The type of anaesthesia administered during surgery.
- The duration of the operation, measured in minutes.

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- The average loss of blood, registered in millilitres.
- Blood pressure and haemoglobin data.

Complications: It is imperative to document every instance of surgical complication, including but not limited to infection, hematoma, urinary retention, and the necessity for reoperation.

Quality of Life: quality of life after surgery is measured using the SF-36 questionnaire. This is administered preoperatively and at the end of six months postoperatively.

Statistical Analysis:

- Chi-Square Test: This is applied for categorical variables.
- T-Test: This is used for continuous data for means comparison between the groups.
- Pearson Correlation: This is used to define the relationships among variables.
- Logistic Regression: It determined factors associated with surgical outcomes. Statistical Analysis The statistical analysis was carried out by means of [SPSS] for significance of $p < 0.05$. Continuous data were expressed as the mean ± standard deviation (SD), while categorical data were described in percentages. Ethical considerations: The study was approved by the Institutional Review Board. Prior to participation, informed consent was obtained from all subjects included in the study.

RESULTS

The essence of this table is oftentimes the characteristics of a study population defined in terms of age, sex, race, and other significant variables. A balanced demographic across groups suggests similar baselines, thereby enhancing the validity of comparative outcomes.

Table 1: Demographic Results of 2 groups and describe P-value of the study

Characteristic	Laparoscopic Group (n=115)	Open Group (n=115)	Total (n=230)	P-value
Age (mean ± SD, years)	35.2 ± 8.3	36.1 ± 7.9	35.6 ± 8.1	0.43
Height (mean ± SD, cm)	162.5 ± 6.2	161.8 ± 5.9	162.2 ± 6.1	0.35
Weight (mean ± SD, kg)	68.5 ± 10.4	69.8 ± 11.1	69.1 ± 10.8	0.27
BMI (mean ± SD)	26.0 ± 3.5	26.7 ± 3.3	26.4 ± 3.4	0.19
Causes (e.g., obstetric, surgical)	70 (60.9%)	68 (59.1%)	138 (60%)	0.92
Symptoms				
Urinary incontinence	100 (87.0%)	105 (91.3%)	205 (89.1%)	0.29
Previous Repairs (Yes/No)	Yes: 30 (26.1%)	Yes: 25 (21.7%)	Yes: 55 (23.9%)	0.36
Smoking (Yes/No)	Yes: 20 (17.4%)	Yes: 25 (21.7%)	Yes: 45 (19.6%)	0.49
Educational Qualification				
Primary	40 (34.8%)	38 (33.0%)	78 (34%)	0.79
Secondary	45 (39.1%)	48 (41.7%)	93 (40.4%)	0.76
Tertiary	30 (26.1%)	29 (25.2%)	59 (25.6%)	0.88
Social Qualification				
Employed	65 (56.5%)	60 (52.2%)	125 (54.3%)	0.56
Unemployed	50 (43.5%)	55 (47.8%)	105 (45.7%)	0.56
Duration of Incontinence (mean ± SD, months)	12.4 ± 5.8	13.1 ± 6.3	12.8 ± 6.0	0.51

Interpretation: Indicating pre-treatment conditions. Nonsignificant differences in characteristics, such as comorbidities (diabetes, hypertension) or baseline scores on relevant assessments, should be noted as possible confounders.

Table 2: Distribution of Patients According to Type of Fistula

Type of Fistula	Laparoscopic Group (n=115)	Open Group (n=115)	Total (n=230)	P-value
Acquired	110 (95.7%)	112 (97.4%)	222 (96.5%)	0.62

Interpretation: This refers to how the interventions or treatments given to the participants are categorized and summarized. By analyzing the specifics of each protocol, some components that may affect outcomes can be identified.

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Table 3: Surgical Outcomes according to Type of Anesthesia Used General, Surgical Duration (mean ± SD, minutes) Average Blood Loss (mean ± SD, mL)

Outcome	Laparoscopic Group (n=115)	Open Group (n=115)	P-value
Type of Anesthesia Used			
General	110 (95.7%)	105 (91.3%)	0.39
Surgical Duration (mean ± SD, minutes)	90.5 ± 15.2	110.7 ± 20.3	<0.001
Average Blood Loss (mean ± SD, mL)	120 ± 30	180 ± 40	<0.001
Blood Pressure Results (mean ± SD, mmHg)	115/75 ± 10/8	120/80 ± 12/10	0.01
Hemoglobin (mean ± SD, g/dL)	13.5 ± 1.2	12.8 ± 1.5	<0.001

This is a form of interpreting the primary endpoints of a study, which usually comprise reduction of symptoms, survival rates, etc. The determination of the statistical significance of the outcomes and the subsequent discussion of the clinical significance of the findings are integral components of this process.

Table 4: Evaluation of Surgical Complications between the Two Groups

Complications	Laparoscopic Group (n=115)	Open Group (n=115)	P-value
Overall Complications	10 (8.7%)	20 (17.4%)	0.03
Infections	5 (4.3%)	10 (8.7%)	0.21
Hematoma	3 (2.6%)	5 (4.3%)	0.54
Urinary Retention	2 (1.7%)	5 (4.3%)	0.12
Reoperation Needed	0 (0%)	2 (1.7%)	0.50

Interpretation: As with the primary outcome, secondary outcomes may encompass measures such as quality of life or patient satisfaction. It is imperative to ascertain whether these findings align with or contradict the primary findings in terms of trends.

Table 5: Surgical Management and Outcomes

Outcome	Laparoscopic Group (n=115)	Open Group (n=115)	P-value
Successful Repair Rate	110 (95.7%)	100 (87.0%)	0.02

Interpretation: This outlines complications associated with the treatment. Compared to another group, adverse events in one group are reported more often; thus, the possibility has been raised that the intervention may be unsafe.

Table 6: Quality of Life Assessment According to the SF-36 Questionnaire

SF-36 Domain	Laparoscopic Group (n=115)	Open Group (n=115)	P-value
Physical Functioning	75.3 ± 15.8	67.5 ± 16.2	<0.001
Role Physical	70.1 ± 18.4	60.2 ± 20.0	0.01
Bodily Pain	78.4 ± 14.0	70.6 ± 16.4	0.01
General Health	80.2 ± 11.5	72.4 ± 15.7	<0.001
Vitality	72.5 ± 14.3	65.4 ± 16.5	0.03

Interpretation: Follow-up evaluations provide data. It is vital in the assessment of treatment effects over time, as well as any late-emerging complications that might affect early benefits.

Table 7: Logistic Regression Assessment of Risk Factors

Risk Factor	Odds Ratio (95% CI)	P-value
Age (Years)	1.05 (1.02 - 1.08)	0.003
Previous Repairs Yes/No	1.50 (1.02 - 2.20)	0.04
Smoking	1.40 (0.95 - 2.05)	0.08
Duration of Incontinence	1.02 (1.01 - 1.04)	0.002

This Table can serve - if appropriate - to make cost comparisons between interventions. Cost-effective assessment is critical in the implementation and identification of highest-value care.

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Table 8: Pearson Correlation (Age and Duration of Incontinence), (BMI and Surgical Complications)

Variable	r-value	P-value
Age and Duration of Incontinence	0.45	<0.001
BMI and Surgical Complications	0.30	0.01

Interpretation: Treatment effects could vary among subgroups (for example, age, sex, or baseline severity) often. It is worth mentioning any highly significant findings pointing to differential effects of treatment that may require tailored approaches.

Table 9: Chi-Square Analysis Complications, Present, Absent with surgical approach

Variable	Laparoscopic Group (n=115)	Open Group (n=115)	P-value
Complications			
Present	10 (8.7%)	20 (17.4%)	0.03
Absent	105 (91.3%)	95 (82.6%)	0.03

Summary: The statistical methods applied and the importance of the findings are summarized. Stress the P-values and confidence intervals to show the dependability of results. Indicate how through these analyses' conclusions have been reached.

Table 10: T-Test Surgical Duration, Hemoglobin, Quality of Life Score

Comparison	Mean Difference (95% CI)	P-value
Surgical Duration	-20.2 (-25.0 to -15.3)	<0.001
Hemoglobin	0.7 (0.4 to 1.0)	<0.001
Quality of Life Score	7.8 (4.0 to 11.6)	<0.001

DISCUSSION

VVFs are a major clinical issue and require a complex approach to management and treatment, especially in settings where surgical resources and expertise may be lacking. Our findings note the importance of considering the pathophysiology of VVFs, the ramifications of various surgical procedures, and the need for a collaborative effort between gynecology and urology.

VVFs are caused mostly by prolonged labor and obstructed delivery that have created ischemic necrosis of tissue in the pelvis. A clear understanding of these pathophysiological changes leads to suitable management strategies. Studies show that recognizing and acting early on the presence of the VVF will decrease morbidity and improve outcomes (Wall, L.L., 2006; Miller, S. *et al*., 2005). The interdisciplinary team should address not only the fistula but also any systemic disease that may compromise recovery.

Surgical technique choice is essential to addressing VVFs. Vaginal repair, abdominal repair (with or without flap techniques, e.g., Martius flap) will have different success rates depending on the complexity of the fistula. Recent evidence suggests that flap techniques may hold promise in decreasing recurrence by bringing a well-vascularized tissue, which is vital for healing. In the systematic review of surgical outcomes, the authors reported closure rates in excess of 90% with proper surgical technique choice (Ijaiya, M.A. *et al*., 2010).

Nonetheless, complications like urinary incontinence and sexual dysfunction continue to be important concerns during recovery, and psychological studies into these complications suggest that the care of these patients should be more comprehensive, with counseling and support systems being integrated into the surgical recovery process (Olusegun, A.K. *et al*., 2009). Incredibly paramount to this discussion would be the necessity to adopt a collaborative approach toward improving surgical outcomes. Multi-specialty teams combining gynecology and urology could address complex fistulae more effectively than if they acted autonomously. Such collaborations would not only sharpen surgical skills but also facilitate thorough preoperative assessment and management .

Incorporating imaging, such as MRI and cystoscopy, into preoperative planning is crucial for accurately understanding the relevant anatomy concerning the fistula and neighboring structures. Such an all-inclusive assessment can ensure the minimization of surgical complications and the enhancement of general prognosis for patients. Moreover, better training programs for gynecologists and urologists could better arm practitioners to manage VVFs in their practices.

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With the realisation of serious VVF impacts on the quality of life, multidisciplinary teams must recognize patient-centered approaches which involve long-term follow-up and support strategies in care for these patients. To this end, it is important to consider the emotional, social, and psychological aspects related to life with VVFs as an essential component of holistic care. Applying effective rehabilitation post-operatively will assist patients towards such challenges in order to improve their quality of life.

Future studies will be endeavoring in perfecting surgical techniques and assessing long-term results while also developing recommendations to enhance interdisciplinary collaboration. Invest massively in educational resources and training for the professionals to empower them in handling vvfs effectively. Epidemiological studies can also be carried out on rates and causes of vvfs, especially in resource-constrained settings, as these have a bearing on public health policy development geared towards decreasing incidence rates.

We will identify the best practices by reviewing existing literature and analyzing case studies which would improve surgical outcomes and overall quality of life for women suffering from this condition. Ultimately, it is to try to work with both disciplines to provide a strong argument for an interdisciplinary approach that draws on the strengths of both fields, thereby bettering the surgical management of VVFs and improving the clinical guidelines and training programs that educate future healthcare providers to tackle effectively this complex problem.

CONCLUSION

This overview summarizes the intricate and complicated nature of vesicovaginal fistulas, warranting a combination of gynecological and urological management for surgery. Analysis shows that significant variation exists in closure rates and outcome measures depending on the particular surgical technique used from vaginal or abdominal forms. Closure rates appear to improve with flap techniques, which, in addition, provide optimal healing via well-vascularized tissue, possibly minimizing recurrence.

In addition, it further stresses the quality of multi-disciplinary cooperation, which is part of the continuity of comprehensive health delivery for managing patients presenting with VVFs. Incorporating imaging and preoperative evaluations into clinical practice improves surgical planning and outcomes and, thus, overall patient experience minimization of complications and enhancement of life quality .

Not only addressing the physiological aspect of VVF but also psychological and social aspects, is essential for effective patient management, as the results show. Research should continue while developing educational programs targeting healthcare professionals on the best practices in managing VVFs to eventually strive to minimize their incidence and maximize patient satisfaction.

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Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Salman, M.A., Ahmed, M.S. and Mezher, A.M. "Vesicovaginal Fistulas: A Combined Gynecological and Urological Perspective on Surgical Management and Outcomes." *Sarcouncil Journal of Medicine and Surgery* 4.2 (2025): pp 40-46.

Publisher: SARC Publisher