Original Article

Outcome of Urogenital Fistula at National Fistula Centre of Dhaka Medical College Hospital, Bangladesh

Sharmeen Sultana[1], Nilufar Sultana[2], Sayem Hossain[3], Md. Tanuwar Islam Chowdhury[4], Sirajam Munira[5], Rukshana Jalil[6], Mohammad Abdul Barek[7], Moriom Binte Haque[8]

Abstract

Background: Urogenital fistula (UGF) commonly results from prolonged obstructed labour or inadvertent surgical injuries during obstetric and gynecological procedures. Despite being preventable, UGF remains a significant cause of morbidity among reproductive-age women.

Objective: This study aimed to evaluate the clinical profile and surgical outcomes of UGF patients treated at the National Fistula Centre (NFC), Dhaka Medical College Hospital.

Materials and Methods: A retrospective observational study was conducted on 100 patients who underwent surgical repair for UGF at the NFC between January 2017- December 2019. Patients with carcinoma, radiation-induced, congenital, traumatic fistulas, rectovaginal fistulas, or complete perineal tears were excluded. Data were collected using a semi-structured questionnaire and analyzed using SPSS-25.

Result: Of the 100 cases, 47 were obstetric fistulas (Group A), 16 were iatrogenic fistulas following obstetric surgery (Group B1), and 37 were iatrogenic fistulas following gynecological surgery (Group B2). All were vesicovaginal fistulas: mid-vaginal (43%) in Group A, juxtacervical (56%) in Group B1, and vault (100%) in Group B2. Most fistulas were small (<2 cm) and single. Successful closure ("closed and dry") was achieved in 70.2%, 62.5%, and 89.2% of Groups A, B1, and B2, respectively. Significant differences were observed between Groups A and B2 ($p = 0.035$). Multivariable analysis identified etiology, location, size, and circumferential defect as predictors of success. Gynecologic iatrogenic fistulas had higher odds of successful repair (AOR 3.28, 95% CI 1.12–9.63, $p = 0.030$).

Conclusion: Surgical outcomes for obstetric and obstetric-surgery-related fistulas were comparable, while gynecologic-surgery-related fistulas demonstrated significantly better success rates, emphasizing the importance of individualized surgical planning to optimize repair outcomes.

Keywords: Obstetrics Fistula; Surgical Outcome; Urogenital Fistula; Iatrogenic Fistula.

1. Medical officer, Dept. of Gynecology and Obstetrics, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh
2. Professor and Head (Ex), Dept. of Reproductive Endocrinology and Infertility, Dhaka Medical College Hospital, Dhaka, Bangladesh
3. Medical Officer, Dept. of Nephrology, Dhaka Medical College Hospital, Dhaka
4. Medical Officer, Dept. of Medicine, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh
5. Medical Officer, Dept. of Surgical Gastroenterology, National Gastroliver Institute and Hospital, Mohakhali, Dhaka.
6. Junior Consultant, Dept. of Gynecology and Obstetrics, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh
7. Emergency Medical Officer, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh
8. Assistant Registrar, Dept. of Gynecology and Obstetrics, Manikgonj Medical College and Hospital, Manikgonj

Correspondence: Dr. Sirajam Munira, Medical Officer, Dept. of Surgical Gastroenterology, National Gastroliver Institute and Hospital, Dhaka. Email: muniradmck65@gmail.com, Phone: +880 1765953859

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Introduction

Genital tract fistula is a significant global health issue affecting millions of young women, primarily in impoverished regions of Africa and South Asia.[1] A fistula is an abnormal passageway between two epithelial surfaces, often resulting in debilitating conditions. Genitourinary fistulas, specifically, are abnormal connections between the urinary and genital tracts, leading to involuntary leakage of urine into the vagina.[2] These fistulas can be acquired or, rarely, congenital. The main causes are obstetric complications and iatrogenic injuries, with other factors including trauma, sexual assault, congenital anomalies, and cancer. The most prevalent types are vesicovaginal and rectovaginal fistulas, which cause chronic health issues, depression, social isolation, and poverty.[2]

Estimates suggest that at least two million women live with fistulas, primarily in sub-Saharan Africa and South

Asia, with 50,000-100,000 new cases annually.[3] In contrast, Western countries report fewer cases due to better healthcare facilities and referral systems. In Bangladesh, the prevalence of obstetric fistula was 1.69 per 1000 women in 2003 and 0.42 per 1000 women in 2016, with approximately 19,755 women affected.[4] Despite efforts, the treatment rate remains low, with only about 300 surgeries performed annually.[5] Given the present global context, the United Nations General Assembly has called for increased efforts and established a target to eradicate obstetric fistula by 2030.[6]

The COVID-19 pandemic threatens progress, potentially increasing child marriages and home deliveries, thereby raising the risk of obstetric fistulas.[7,8] Surgical intervention remains the primary treatment, with success rates between 75% and 95%.[9,10] While numerous studies focus on obstetric fistulas, there is a notable lack of studies on the outcomes of Urogenital fistula (UGF). Most studies deal with factors associated with obstetric fistula because of their predominance[11]. This study aims to fill that gap by comparing outcomes of obstetric fistula and iatrogenic fistula at the National Fistula Centre of Dhaka Medical College Hospital.

Materials and Methods

A retrospective observational study was conducted on hospital records of patients who underwent surgical repair for urogenital fistulas (UGFs) at the National Fistula Centre, Dhaka Medical College Hospital, from January 1, 2017, to December 31, 2019. After obtaining approval from the Ethical Review Committee and permission from the hospital authority and the Head of the Department of Obstetrics and Gynecology, data from various sources including patient admission files, hospital record sheets (initiated in December 2012 by DGHs with technical support from OGSB and UNFPA), doctors' records, nurses' discharge records, and operation notes were collected while maintaining patient confidentiality.

Patients aged 15-65 years with documented vesico-vaginal fistula (VVF) were included, while those with rectovaginal fistula, complete perineal tear, comorbidities like diabetes mellitus or chronic obstructive pulmonary disease (COPD), and incomplete records were excluded. Data were collected from hospital records, including patient admission files, surgical notes, and discharge summaries, and recorded on individual data sheets while maintaining confidentiality.

Independent variables included BMI, etiology, and duration of fistula, obstetric variables (parity, duration of labour, Ante Natal Care (ANC) schedule), fistula characteristics (size, number, location, scarring, associated problems), previous repair attempts, operative variables (operation time, closure method, suturing method, ureteric catheter), and postoperative complications. The dependent variable was the surgical outcome of fistula classified as closed and dry, closed but incontinent, or failed.

The study classified UGFs into two main groups: Obstetric Fistula (OF) and Iatrogenic Fistula (IF). Group A comprised OF, which resulted from vaginal delivery after prolonged obstructed labour without appropriate obstetric interventions or cesarean section. Group B was divided into two subgroups: Group B1 included IFs occurring after cesarean sections (both elective and emergency) or cesarean hysterectomy, and Group B2 included IFs resulting from gynecologic surgeries such as total abdominal hysterectomy, vaginal hysterectomy, or dilation and curettage (D&C). UGFs resulting from other causes (congenital, malignancy, irradiation) were excluded from this study.

Data collected included socio-demographic characteristics, obstetric and previous surgical histories, fistula characteristics, intraoperative procedures, postoperative management, complications, and surgical outcomes after 21 days. All surgeries were performed at least 3 months after the injury under spinal anesthesia via the vaginal route, utilizing the flap-splitting method for repair. The technique involved wide mobilization of the vaginal mucosa around the fistula, closing the bladder in two layers: the first with interrupted Lembert sutures for the submucosal layer, and the second layer for the muscularis to minimize tension on the initial suture line.

Standard protocols for fistula repair were followed, including adequate exposure and mobilization of the bladder, excision of scar tissue, and protection of the ureters. Postoperative care included bladder catheterization for 21 days and a ureteric catheter for 3 to 7 days. Patients were instructed to drink plenty of water and void frequently. They were discharged 24 hours after catheter removal. Success was defined by the absence of leakage and the ability to hold urine, while failure was indicated by ongoing leakage. Outcomes were categorized as 'Closed and Dry' (successful closure with no incontinence), 'Closed but Incontinent' (successful closure but with stress urinary incontinence), or 'Failed' (failure to close the fistula with leakage post-catheter

removal). Postoperative urinary tract infections were identified by pus cells >5/HPF in urine and the presence of organisms in urine culture.

Data on socio-demographic, clinical, surgical, and outcome variables were recorded, entered, managed, and analyzed. Data were analyzed using SPSS, version 25. Categorical variables were summarized as frequencies and percentages, while continuous variables were presented as mean ± standard deviation (SD). Group comparisons were performed using the Chi-square test, Fisher's exact test, t-test, Mann–Whitney U test, and Kruskal–Wallis test, depending on data type and distribution. Variables with $p < 0.1$ in bivariate analysis were included in a multivariable logistic regression model to identify independent predictors of fistula closure success. Results were expressed as adjusted odds ratios (AOR) with 95% confidence intervals (CI), and a p value < 0.05 was considered statistically significant.

Result

Table 1 presents the distribution of patients based on the etiology of fistula among 100 cases. In Group A, all patients (100%) developed fistula due to prolonged obstructed labour, indicating it as the sole cause in this group. In Group B1, the majority of cases (87.5%) were associated with caesarean section, while peri-partum hysterectomy accounted for 12.5%. In Group B2, most fistula cases (97.3%) occurred following total abdominal hysterectomy (TAH), with only 2.7% resulting from vaginal hysterectomy (VH). These findings highlight surgical procedures, particularly caesarean section and TAH, as major contributors in the respective subgroups.

Table-1: Distribution of the patients according to etiology of fistula (n=100)

Etiology of fistula	No. of patients n (%)
Group A	
Prolonged obstructed labour	47 (100)
Group B1	
Caesarean section	14 (87.5)
Peri-partum hysterectomy	2 (12.5)
Group B2	
Total Abdominal Hysterectomy (TAH)	36 (97.5)
Vaginal Hysterectomy (VH)	1 (2.7)

Table 2 shows the distribution of patients according to BMI and duration of fistula. The mean BMI was 25.28 ± 8.19 kg/m^2 in Group A, 28.09 ± 12.79 kg/m^2 in Group B1, and 24.52 ± 7.18 kg/m^2 in Group B2, with no statistically significant difference among the groups ($p = 0.467$). The majority of patients in all groups had normal BMI. However, the duration of fistula differed significantly between groups ($p = 0.021$). The mean duration was longest in Group A (62.1 ± 78.5 months), followed by Group B1 (47.2 ± 64.9 months) and Group B2 (9.3 ± 9.0 months). The difference in duration was also significant when analyzed by categorical grouping ($p = 0.015$), indicating that patients with obstetric fistula suffered for longer periods before receiving surgical treatment.

Table-2: Distribution of the patients according to BMI

Variables	Group A n=47 n (%)	Group B1 n=16 n (%)	Group B2 n=37 n (%)	P-value
BMI (kg/m2)				
Under weight	7 (14.9)	1 (6.3)	7 (18.9)	
Normal	22 (46.8)	7 (43.8)	16 (43.2)	0.741*
Over weight	8 (17.0)	5 (31.3)	4 (10.8)	
Obese	10 (21.3)	3 (18.8)	10 (27.0)	
Mean ± SD	25.28 ± 8.19	28.09 ± 12.79	24.52 ± 7.18	0.467**
Duration of Fistula				
<6 months	17 (36.2)	2 (12.5)	17 (45.9)	
6-12 months	6 (12.8)	6 (37.5)	17 (45.9)	
12-36 months	7 (14.9)	3 (18.8)	2 (5.4)	0.015*
>36 months	17 (36.2)	5 (31.3)	1 (2.7)	
Mean ± SD	62.10 ± 78.54	47.19 ± 64.88	9.32 ± 9.01	0.021**

*Chi-square test, **Kruskal-Wallis test was done.

Table 3 summarizes the characteristics of the fistula in the three groups. Most of the patients had a single fistula (91.5–97.3%) and a small size (<2 cm). Small-sized fistulas were more common in Group B2 (89.2%) compared with Group B1 (56.3%) (p = 0.043). The anatomical location of the fistula varied significantly according to etiology. In Group A, mid-vaginal fistulas were most frequent (42.6%), while juxta-cervical fistulas predominated in Group B1 (62.5%), and vault fistulas were present in all cases of Group B2 (100%) (p < 0.05). Mild scarring was the most common in all groups, but moderate to severe scarring was more prevalent in Group B1 (50%). Circumferential defects were observed in 29.8% of Group A cases and were absent in all iatrogenic groups. Associated problems such as vaginal stenosis, bony attachment, and excessive urine loss were infrequent and found mainly in obstetric cases.

Table-3: Distribution of the patients according to Fistula Variable

Variable	Group A n=47 n (%)	Group B1 n=16 n (%)	Group B2 n=37 n (%)	P-value (AvsB1)	P-value (AvsB2)
Number of Fistula					
1	43 (91.5)	15 (93.8)	36 (97.3)	0.99*	0.37*
2	2 (4.3)	1 (6.3)	1 (2.7)	0.99*	0.99*
3	2 (4.3)	-	-		-
Size of Fistula					
Small	39 (83)	9 (56.3)	33 (89.2)	.043*	0.42**
Medium	6 (12.8)	5 (31.3)	3 (8.1)	0.13*	0.73*
Large	2 (4.3)	2 (12.5)	1 (2.7)	0.27*	0.99*
Location of Fistula					
Vault	-	2 (12.5)	37 (100)		-
Juxta-cervical	11 (23.4)	10 (62.5)	-	0.01**	-
Mid vagina	20 (42.6)	2 (12.5)	-	0.03**	-
Juxtra-urethral	6 (12.8)	-	-		-
Bladder neck	10 (21.3)	2 (12.5)	-	0.71*	-
Scarring					
None	10 (21.3)	2 (12.5)	15 (40.5)		
Mild	27 (57.4)	5 (31.3)	17 (45.9)	0.34**	0.41**
Moderate	9 (19.1)	8 (50)	5 (13.5)		
Severe	1 (2.1)	1 (6.3)	-		
Circumferential defect-					
Present	14 (29.8)	-	-		
Absent	33 (70.2)	16 (100)	37 (100)		
Associated problem					
Vaginal stenosis	3 (6.3)	-	-		
Bony attachment	4 (8.5)	3 (18)	-		
Excessive loss of urine	5 (10)	2 (12.5)	-		

**Chi-square test was done to measure the level of significance.
*Fisher's Exact test was done to measure the level of significance.

Table 4 presents the operation-related variables among the three groups. More than half of the patients in Group A (54.4%) and the majority in Group B2 (83.8%) had no previous repair attempts, which was statistically significant (p = 0.010). The mean total operation time was similar across the groups (61.5 ± 22.3 min in Group A, 67.5 ± 31.9 min in Group B1, and 64.1 ± 12.6 min in Group B2; p > 0.05). Single-layer closure was the preferred method in all groups, ranging from 68.8% to 83%, and interrupted suturing was the most common technique, particularly in Group B2 (100%), which was statistically significant (p = 0.032). Ureteric catheterization was performed less frequently in Group B2 (8.1%) compared with Group A (27.7%) (p = 0.034).

Table-4: Distribution of patients according to operation-related variables

Variable No. of previous attempt of repair	Group A n=47 n (%)	Group B1 n=16 n (%)	Group B2 n=37 n (%)	P-value A vs B1	P-value AvsB2
No attempt	27 (54.4)	11 (68.6)	31 (83.8)	0.425**	0.010**
One attempt	19 (40.4)	4 (25)	3 (8.1)	0.268**	0.010**
Two attempts	1 (2.1)	1 (6.3)	3 (8.1)	0.446*	0.316*
Total Operation Time (minute)					
Mean ± SD	61.49 ±22.26	67.50 ±31.94	64.05 ± 12.57	0.605***	0.451***
Min-Max	30-120	30-180	60-120		
Method of closer					
Single layer	39 (83)	11 (68.8)	28 (75.7)	0.286*	0.408**
Double layer	8 (17)	5 (31.3)	9 (24.3)		
Method of suturing					
Continuous	6 (12.8)	2 (12.5)	-	0.99*	0.032*
Interrupted	41 (87.2)	14 (87.5)	37 (100)		
Ureteric catheter					
Catheterized	13 (27.7)	2 (12.5)	3 (8.1)		0.034*
Non-catheterized	34 (72.3)	14 (87.5)	34 (91.9)	0.150*	

**Chi-square test was done to measure the level of significance.

*Fisher's Exact test was done to measure the level of significance.

*** An independent samples t-test was done to measure the level of significance.

Table 5 describes postoperative complications and surgical outcomes. Postoperative urinary tract infection (UTI) occurred in 9.4% of iatrogenic cases (Group B1 + B2) compared to 2.1% in obstetric cases (p = 0.052). Wound infection was rare, observed only in 5.4% of Group B2 patients. Overall, 70.2% of obstetric fistula repairs (Group A) resulted in successful closure with continence ("closed and dry"), 6.4% were "closed but incontinent," and 23.4% failed. In Group B1, 62.5% were "closed and dry," 6.3% "closed but incontinent," and 31.3% failed. In contrast, Group B2 showed a significantly higher success rate, with 89.2% "closed and dry," 2.7% "closed but incontinent," and 8.1% failed. The difference between Group A and Group B2 was statistically significant (p = 0.035), whereas no significant difference was observed between Group A and Group B1 (p = 0.567).

Table-5: Distribution of the patients according to post-operative outcome

Variables	Group A (n=47)	Group B1 (n=16)	Group B2 (n=37)	Group B1+B2 (n=53)	P-value (A vs B1)	P-value (A vs B2)	P-value (A vs B1+B2)
Post-operative complication							
UTI	1 (2.1)	0 (0)	5 (13.5)	5 (9.4)	0.99*	0.048*	0.052*
Wound infection	0	0	2 (5.4)	2 (3.8)	-	0.99*	0.99*
Surgery outcome							
Closed and dry	33 (70.2)	10 (62.5)	33 (89.2)	43 (81.1)	0.567**	0.035**	0.202**
Closed but incontinent	3 (6.4)	1 (6.3)	1 (2.7)	2 (3.8)	0.99*	0.627*	0.664*
Failed	11 (23.4)	5 (31.3)	3 (8.1)	8 (15.1)	0.525**	0.062**	0.290**

* Fisher's exact test applied for rare events or small expected counts (<5).

**Chi-square test applied when all expected cell counts ≥5.

Table 6 presents the multivariable logistic regression analysis of factors associated with successful fistula closure. Compared with obstetric fistula (Group A), gynecologic iatrogenic fistula (Group B2) was significantly more likely to achieve successful closure (AOR 3.28, 95% CI 1.12–9.63, p = 0.030). Fistula location and size were also significant predictors of outcome. High-location fistulas (vault or juxta-cervical) were more likely to close successfully than mid or low vaginal fistulas (AOR 3.15, 95% CI 1.21–8.19, p = 0.019), while medium or large fistulas were associated with poorer outcomes compared with small ones (AOR 2.41, 95% CI 1.03–5.65, p = 0.043). The presence of circumferential defects was another negative predictor (AOR 2.97, 95% CI 1.01–8.69, p = 0.048).

Table-6: Multivariable logistic regression analysis of factors associated with successful closure of vesico-vaginal fistula in patients undergoing repair (Group B1/B2 vs Group A)

Predictor Variable	**Category Compared to Ref.**	**Adjusted OR**	**95% CI**	**P-value**
Group B1	B1 vs A	0.68	0.20 – 2.32	0.531
Group B2	B2 vs A	3.28	1.12 – 9.63	0.030
Group B1+B2	B1+B2 vs A	1.92	0.75 – 4.91	0.172
Fistula size	Medium/Large vs Small	2.41	1.03 – 5.65	0.043
Fistula location	High (vault/juxta-cervical) vs Mid/Lower	3.15	1.21 – 8.19	0.019
Scarring	Moderate/Severe vs None/Mild	1.88	0.82 – 4.31	0.135
Circumferential defect	Present vs Absent	2.97	1.01 – 8.69	0.048

Table 7 shows the comparison between successful and failed repairs among all cases. The overall success rate was 76%. Patients with successful closure had lower BMI (24.1 ± 7.2 kg/m^2) than those with failed repairs (30.3 ± 12.4 kg/m^2), though the difference was marginally significant (p = 0.050). Scarring and previous repair attempts were significantly associated with outcome. Mild or no scarring was observed in 84% of successful cases, whereas moderate to severe scarring predominated among failed repairs (p = 0.045). Similarly, success was higher in primary repairs (86.6%) compared with cases with one or more previous attempts (p = 0.035). Other variables such as age, duration of fistula, fistula size, and number showed no significant association with surgical outcome.

Table-7: Distribution of the patients according to success and failure in all groups

Surgery Outcome	Success (n=76)	Failure (n=19)	P-value
Age (year)			
Mean ± SD	37.26 ± 11.67	35.84 ± 13.44	0.646***
BMI (kg/m2)			
Mean ±SD	24.13 ± 7.16	30.31 ± 12.43	0.050***
Duration of fistula			
Mean ±SD	238.49 ± 63.91	41.25 ± 64.95	0.668*
Median	9	11	
Location of fistula			
Vault	31 (93.9)	2 (6.1)	
Juxta-cervical	16 (69.6)	7 (30.4)	
Mid-vagina	18 (81.8)	4 (18.2)	0.566**
Juxta-urethra	4 (66.7)	2 (33.3)	
Bladder neck	7 (63.6)	4 (36.4)	
Size of fistula			
Mean ± SD	1.18 ± 0.48	1.37 ± 0.68	0.280***
Number of fistulas			
Mean ± SD	1.08 ± 0.36	1.11 ± 0.32	0.769***
Scarring			
None	21 (93.8)	1 (6.3)	
Mild	40 (83.3)	9 (16.7)	0.045**
Moderate	13 (60.9)	9 (39.1)	
Severe	-	2 (100)	
No. of previous attempt of repair			
No attempt	58 (86.6)	9 (13.4)	
One attempt	16 (66.7)	8 (33.3)	0.035**
Two attempts	2 (50)	2 (50)	

*The Mann-Whitney U test was done to measure the level of significance.

*** An independent samples t-test was done to measure the level of significance.

Discussion

Prolonged obstructed labour was historically the principal cause of urogenital fistula in both developed and developing countries. Over time, this pattern has shifted, and iatrogenic fistulas caused by surgical procedures are increasingly recognized. The present study observed a nearly equal distribution of obstetric (47%) and iatrogenic (53%) fistulas, reflecting this global trend. A similar study in Pakistan reported iatrogenic and obstetric fistulas in 58.5% and 40.5% of cases, respectively, with the proportion of iatrogenic cases increasing from 43.5% in 2006 to 71.4% in 2018.[12]

In this study, Group A represented obstetric fistulas (47 cases) and Group B represented iatrogenic fistulas (53 cases), further divided into Group B1 (childbirth-related surgery, 16 cases) and Group B2 (gynecological surgery, 37 cases). Multiparity was frequent in all groups, observed in 48.9% of Group A, 81% of Group B1, and 83% of Group B2. Previous research also demonstrated similar trends, suggesting that multiparous women face a greater risk due to repeated childbirth trauma and cumulative pelvic injury.[13]

Prolonged labour was a major etiologic factor in obstetric cases. In this study, 36% of patients laboured

for two days and 14.9% for three or more days. Previous study reported a comparable relationship between prolonged labour and complex fistula formation.[14] Prolonged compression leads to ischemic necrosis of the vesicovaginal septum, resulting in more extensive tissue loss and complex repair.

Regular antenatal care (ANC) was limited in this cohort-14% of Group A and 25% of Group B1 had regular ANC visits. Similar research reported that inadequate prenatal monitoring delays referral and increases injury severity. The mean duration of suffering was longer in Group A and Group B1 compared with Group B2 (p = 0.015). A study in Nepal reported that 25% of obstetric fistula patients endured symptoms for 3–6 months before seeking treatment, whereas 48% of gynecological fistula patients sought care within 2 weeks, which corresponds with the present findings.[13]

To maintain sample uniformity, vesicovaginal fistula (VVF) was analyzed exclusively. The present study observed predominantly single, small (<2 cm) fistulas. The anatomical distribution varied with etiology: 42.6% were mid-vaginal in Group A, 56.3% juxtacervical in Group B1, and 100% vault-level in Group B2. These results are similar to those reported by Sjoveian and team (2010), who identified VVF as the most common type of urogenital fistula[1], and by another study, where mid-vaginal involvement was in 56% of cases[15]. The anatomical explanation lies in the flat bladder base extending from the symphysis pubis to the fourth sacral vertebra, where prolonged pressure during labor causes ischemic necrosis and mid-vaginal fistula formation. A study from Nigeria also showed predominant mid-vaginal fistulas.[16]

In the present study, the outcome of primary repair was more favorable. In Group A, 70.2% of patients achieved closed and dry repair, 6.4% were closed but incontinent, and 23.4% failed; in Group B1, 62.5% were closed and dry, 6.3% closed but incontinent, and 31.3% failed. These success rates are comparable with those reported by similar previous studies.[11,13] The comparable outcomes between obstetric and iatrogenic cases may reflect similar levels of tissue damage due to ischemia or surgical trauma.

Factors such as age, BMI, fistula duration, size, location, and number were not significantly associated with outcome in this study. However, extensive scarring and prior repair attempts were associated with lower success rates. A similar study in Kenya demonstrated that fibrosis and previous operations markedly reduce healing potential and closure rates.[17] In the present study, despite small fistula size not showing statistical significance, many failures occurred among small, high-positioned or stenotic fistulas with prior repairs, suggesting poor surrounding tissue quality.

In this analysis, Group B2 (gynecological surgery) achieved an 89.2% success rate, compared with 70.2% in Group A. Postoperative urinary tract infection occurred in 10% of Group B2 patients versus 2% in Group A. few recent studies also reported similar associations between prior surgeries, extensive fibrosis, and lower repair success.[11,18] A previous Bangladeshi study showed that previous repair attempts significantly affected closure rates in both univariate and multivariate analyses.[19]

The duration of fistula also influenced outcome. In this study, patients with symptoms lasting less than six months had markedly better results than those with longer durations. Another study reported similar findings in India, with multivariate analysis identifying etiology (OR 2.2), fistula location (OR 2.5), and previous repair (OR 2.4) as significant predictors, while urinary infection showed significance in univariate analysis. Similarly, another study also found an overall success rate of 87.1% in 567 women, with no association between age or parity and outcome.[1]

Persistent incontinence after closure occurred in a small proportion of patients across all groups. This may result from residual urodynamic dysfunction following prolonged obstruction. Other study also emphasized that urodynamic evaluation and corrective procedures can address such incontinence.[20] Lo No and team (2018) also found that stress incontinence and detrusor overactivity can persist after repair.[21] Previous study also suggested that labial fat graft interposition as an adjunct to improve bladder neck support and reduce postoperative stress incontinence.[19]

In multivariable logistic regression, etiology, anatomical location, size, and circumferential involvement were significant predictors of success. Gynecologic iatrogenic fistulas (Group B2) had 3.28 times higher odds of successful closure compared with obstetric fistulas (AOR 3.28, 95% CI 1.12–9.63, p = 0.030). High-level fistulas (vault or juxtacervical) had 3.15 times higher odds of closure success than mid- or low-level fistulas (AOR 3.15, 95% CI 1.21–8.19, p = 0.019). Similar studies have demonstrated better outcomes for fistulas located at

higher levels with minimal fibrosis.[22,23] In contrast, larger fistulas and those with circumferential defects showed significantly reduced odds of closure ($p<0.05$), consistent with evidence that extensive defects impair healing.[24,25]

This study had limitations due to its retrospective design during the COVID-19 pandemic, which restricted access to detailed surgical indications and newer classification data. Long-term follow-up information on recurrence and continence was also incomplete. Future research should employ prospective, multicenter designs with larger sample sizes, standardized classification systems, and improved database management to enhance the validity and reproducibility of findings.

Conclusion

The study emphasizes the shifting etiology from obstetric to iatrogenic fistulas, with surgical outcomes being generally favorable for gynecological fistulas compared to obstetric ones. Regular ANC, timely referrals, and addressing factors like scarring and previous repair attempts are critical for improving surgical outcomes. The findings are consistent with global research, indicating that while the etiological trends are changing, the challenges in management and repair remain complex and multifaceted.

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