

Effect of HIV infection on outcomes after surgical repair of genital fistula

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Abstract

Objective: To compare outcomes following surgical repair of genital fistula among Nigerian women with or without HIV.

Methods: A retrospective review was conducted of all genital fistula repair surgeries performed at Evangel Vesicovaginal Fistula Center in Jos, Nigeria, between January 1, 2004, and April 30, 2014. Patient characteristics, HIV status, genital fistula characteristics, and postoperative outcomes were assessed for between-group variance. The odds ratio (OR) and 95% confidence intervals (CIs) were the primary measures used for determining the association between HIV status and surgical outcomes.

Results: Of the 3313 surgeries recorded, 201 (6.1%) were performed among patients with HIV infection. No statistically significant between-group differences were found for patient or fistula characteristics. By contrast, failed vesicovaginal failure (VVF) closure was significantly more common among women infected with HIV than among their HIV-negative counterparts (OR 0.629, 95% CI 0.443–0.894). No between-group differences in failure rates were found for ureterovaginal or rectovaginal fistulas.

Conclusion: Determining HIV status before surgery could aid prediction of outcomes among Nigerian women undergoing repair of VVF. Further studies are required to examine factors that might improve outcomes for women with HIV infection.

KEYWORDS

HIV; Nigeria; Rectovaginal fistula; Surgical outcomes; Urogenital fistula; Vesicovaginal fistula

1 | INTRODUCTION

Genital fistula is characterized by constant and uncontrollable incontinence of urine, feces, or both.¹ Physical injury, continuous stench and wetness, and the frequent social isolation that follow all heap suffering on top of suffering for affected women.²

Women at risk of genital fistula also tend to be at risk of infection with HIV, particularly in Sub-Saharan Africa, where poverty is a major link between these two conditions.^{1,3,4} Women and girls living in poverty face many challenges, including lack of education, increased likelihood of early marriage, limited understanding of sex and sexuality, and poor access to health care. Furthermore, substantial power

differentials between male and female individuals and differences in gender roles in society restrict their ability to control sexuality and childbirth. All these factors increase the risk of genital fistula and HIV infection.^{3–7} Indeed, many countries with high rates of genital fistula also report high rates of HIV infection^{8,9}; therefore, it seems plausible that there is an increased incidence of HIV infection among women with genital fistula.

Individuals infected with HIV have an impaired immune response, which is characterized by reduced numbers of T helper cells that express cluster of differentiation 4 (CD4).^{10–12} Consequently, surgical morbidity and mortality have been observed among HIV-positive women with genital fistula. Early studies of surgical repair reported



markedly increased rates of complications and death among women infected with HIV^{13–15}; however, subsequent studies found the rates to be much lower.^{10,16,17} This improvement probably reflects increased understanding of the disease process, careful selection of patients for surgery, and the substantial impact of antiretroviral drugs on patient health.

The findings of surgical studies conducted in other specialties suggest that the impact of HIV could vary between different procedures and among different patient populations. For obstetric and gynecologic surgeries and anorectal procedures—probably the closest among surgeries to urogenital and rectogenital fistula repair—poor outcomes and increased complication rates have been reported among HIV-positive patients.^{10,18,19} Within the genital fistula specialty, HIV is associated with the development of spontaneous genital fistulas, particularly rectovaginal fistula (RVF).^{20–22} Nonetheless, few studies have examined HIV rates and or investigated surgical outcomes among patients infected with HIV.

Screening patients with vesicovaginal fistula (VVF) for the presence of HIV, whenever possible, is recommended in the 2006 WHO guidelines on genital fistula²³; however, few studies have addressed HIV status among such patients. Frajzyngier et al.²⁴ examined factors influencing the outcomes of genital fistula repair and highlighted the need for further evaluation of the effect of comorbid conditions. If comorbidities such as HIV do indeed influence surgical success rates, it is conceivable that implementation of suitable interventions before surgery might improve patient outcomes.

The aim of the present study was to examine outcomes of genital fistula repair among Nigerian women with or without HIV infection. The hypothesis was that HIV infection would be associated with lowered success rates for surgical repair.

2 | MATERIALS AND METHODS

A retrospective medical chart review was conducted of all patients who underwent repair of genital fistula at Evangel VVF Center (EVC) in Jos, Nigeria, between January 1, 2004, and April 30, 2014. Any patients undergoing surgical repair of conditions other than genital fistula—including urethral dilatation, urethroplasty, pubovaginal slings, and continent urinary diversions—were excluded from the analysis. Approval was granted by the institutional review board of EVC. Individual informed consent was waived because only routinely gathered, de-identified data were used in the present study.

Data extracted from the patients' medical charts included age, date of surgery, genital fistula characteristics, procedures performed, outcomes at the time of hospital discharge, and HIV test results.

All patients who attended EVC for genital fistula repair during the present study period were offered screening for HIV-1 and HIV-2 using commercially available kits with high sensitivity and specificity. The patients received pretest counseling; those who consented to undergo HIV screening were tested on the day before surgery. Positive or indeterminate test results were verified using a different brand of HIV kit; other types of confirmatory test (e.g. western blot)

were not available locally during much of the present study period. Patients were counseled on their test results and, when appropriate, referred to HIV treatment centers before discharge from EVC for further evaluation and management. For the purposes of the present study, all patients with indeterminate test results were included in the HIV-positive group, as were the patients with one positive plus one negative test result.

The outcomes of surgical repair were first analyzed as an aggregate. They were then reanalyzed after stratification by type of genital fistula (high, low, large, ureterovaginal, and RVF). The high fistula group included all supratrigonal fistulas (i.e. juxtacervical, vesicocervical, vesicouterine, and vault). The low fistula group included mid-vaginal, juxtaurethral (including circumferential), urethrovaginal, and lungu fistulas. The term "lungu" is derived from the Hausa word for a dark recess or space hidden around a corner; lungu is used at EVC to classify poorly accessible genital fistulas located behind, and lateral to, the pubic symphysis. Large fistulas were defined as any fistula crossing more than one anatomic boundary, up to and including the entire anterior vaginal wall. Ureterovaginal fistulas are those from one or both ureters to the vagina. The RVF group comprised all genital–fecal incontinent conditions, including RVF, enterouterine fistula, fourth-degree vaginoperineal lacerations, and anal sphincter lacerations.

The data were analyzed using Epi Info version 7.2.0.1 (Centers for Disease Control and Prevention, Atlanta, GA, USA). Categorical data were presented as number and percentage, whereas continuous data were given as the mean and standard deviation. χ^2 or *t* tests were used to examine relationships between the categorical and continuous data sets, respectively. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated by comparing the outcomes by HIV status (positive or negative). *P* < 0.05 was considered statistically significant.

3 | RESULTS

Medical charts were reviewed for a total of 3678 surgeries performed at EVC during the present study period. Of these, 325 were excluded and 40 lacked data on HIV testing. Consequently, 3313 cases were included in the final analysis, 201 (6.1%) in the HIV-positive group and 3112 (93.9%) in the HIV-negative group.

As shown in Table 1, no statistically significant between-group differences were found for age and the characteristics of genital fistula. Likewise, the location and subtype of genital fistula did not differ between the two groups (Tables 2 and S1).

The outcomes of genital fistula repair are shown in Table 3. Outcomes for the HIV-positive group differed from the HIV-negative group for VVF (*P* = 0.002), but not for ureterovaginal fistula (*P* = 0.227) or RVF (*P* = 0.254). Among all VVF surgeries, those in the HIV-positive group were 1.6-fold more likely to have a failed repair than those in the HIV-negative group (OR 0.629, 95% CI 0.443–0.894).

Table 4 shows stratification of VVF into the high, low, and large subtypes. Among surgeries for large VVF, women in the HIV-positive group were 2.7-fold more likely to have failed repair than those in the HIV-negative group (OR 0.366, 95% CI 0.167–0.780).

TABLE 1 Characteristics of the study population (n=3313).^a

Characteristic	HIV-positive group (n=201)	HIV-negative group (n=3112)	P value
Age, y	29.9 ± 8.5 (1–65)	29.3 ± 10.1 (3–85)	0.458
Genital fistula diameter, cm	2.9 ± 2.1 (0.1–11.0)	2.7 ± 2.0 (0.1–12.0)	0.120
Degree of fibrosis ^b			0.300
Mild	31 (17.1)	524 (18.4)	
Moderate	95 (52.5)	1604 (56.4)	
Severe	55 (30.4)	717 (25.2)	

^aValues are given as mean ± SD (range) or number (percentage), unless indicated otherwise.

^bData on fibrosis was missing from the charts of 20 patients in the HIV-positive group and 267 patients in the HIV-negative group.

TABLE 2 Location of genital fistula.^a

Location	HIV-positive group (n=200)	HIV-negative group (n=2987)	P value
Low ^b	68 (34.0)	1172 (39.2)	0.212
High ^c	56 (28.0)	866 (29.0)	
Large ^d	35 (17.5)	514 (17.2)	
Ureterovaginal	14 (7.0)	152 (5.1)	
Rectovaginal	27 (13.5)	283 (9.5)	

^aValues are given as number (percentage) unless indicated otherwise.

^bMidvaginal, juxtaurethral, circumferential, urethrovaginal, and lungu fistulas.

^cJuxtacervical, vesicocervical, vesicouterine, and vault fistulas.

^dFistulas crossing more than one anatomic boundary.

TABLE 3 Outcomes of genital fistula repair.^a

Outcome by type of genital fistula	HIV-positive group (n=201)	HIV-negative group (n=3112)	P value ^b	Odds ratio (95% confidence interval)
Vesicovaginal fistulas			0.002	0.629 (0.443–0.894)
Closed	89/160 (55.6)	1825/2677 (68.2)		
Closed and dry	68/89 (76.4)	1547/1825 (84.8)		
Open	53/160 (33.1)	684/2677 (25.6)		
Unknown	18/160 (11.3)	168/2677 (6.3)		
Ureterovaginal fistulas			0.227	–
Closed	13/14 (92.9)	144/152 (94.7)		
Closed and dry	13/13 (100.0)	140/144 (97.2)		
Open	0	6/152 (3.9)		
Unknown	1/14 (7.1)	2/152 (1.3)		
Rectovaginal fistulas			0.254	1.026 (0.292–3.612)
Closed	22/27 (81.5)	243/283 (85.9)		
Closed and dry	22/22 (100.0)	243/243 (100.0)		
Open	3/27 (11.1)	34/283 (12.0)		
Unknown	2/27 (7.4)	6/283 (2.1)		

^aValues are given as number/total number (percentage) unless indicated otherwise.

^bFrom χ^2 test.

Between-group outcomes for high VVF were found to differ initially ($P=0.012$); however, the results were no longer statistically significant when the cases with unknown results were excluded from the analysis. By contrast, a comparison of the outcomes for juxtacervical VVF only (Table S2) indicated that repair of this subtype of genital fistula was 2.4-fold more likely to fail in the HIV-positive group than in the HIV-negative group (OR 0.420, 95% CI 0.196–0.901). Low VVF did not demonstrate a statistically significant increased rate of failure by HIV status (Table 4). However, despite similarities in closure rates, the likelihood of achieving continence was lower among HIV-positive women than HIV-negative women (OR 0.476, 95% CI 0.284–0.798) (Table S3).

4 | DISCUSSION

The present study demonstrated that outcomes of surgical repair for genital fistula were influenced by the HIV status of affected individuals. Closure of the genital fistula was most likely to fail among the group of HIV-positive women with VVF. Furthermore, women infected with HIV who had low VVF were more likely to experience persistent incontinence than were those without HIV infection, even if the genital fistula was successfully closed.

The rate of HIV in the present study population was 6.1%, which exceeded the rate of 3.1% recorded among the general population in Nigeria.²⁵ Such variance was not entirely unexpected, as many women who are at risk of VVF are also at increased risk of HIV infection.^{1,3,4}

Vaginal location of the genital fistula also seemed to influence the likelihood of successful closure in the present study, with increased surgical failure rates found for both large VVF that crossed more than

TABLE 4 Outcomes of vesicovaginal fistula repair by subtype.^a

Outcome by subtype of vesicovaginal fistula	HIV-positive group (n=159)	HIV-negative group (n=2552)	P value ^b	Odds ratio (95% confidence interval)
Low ^c			0.466	0.725 (0.415–1.266)
Closed	43/68 (63.2)	824/1172 (70.3)		
Closed and dry	27/43 (62.8)	673/824 (81.7)		
Open	19/68 (27.9)	264/1172 (22.5)		
Unknown	6/68 (8.8)	84/1172 (7.2)		
High ^d			0.012	0.670 (0.353–1.273)
Closed	35/56 (62.5)	653/866 (75.4)		
Closed and dry	34/35 (97.1)	628/653 (96.2)		
Open	14/56 (25.0)	175/866 (20.2)		
Unknown	7/56 (12.5)	38/866 (4.4)		
Large ^e			0.014	0.366 (0.167–0.780)
Closed	10/35 (28.6)	275/514 (53.5)		
Closed and dry	6/10 (60.0)	183/275 (66.5)		
Open	20/35 (57.1)	201/514 (39.1)		
Unknown	5/35 (14.3)	38/514 (7.4)		

^aValues are given as number/total number (percentage) unless indicated otherwise.

^bFrom χ^2 test.

^cMidvaginal, juxtarethral, circumferential, urethrovaginal, and lungu fistulas.

^dJuxtacervical, vesicocervical, vesicouterine, and vault fistulas.

^eFistulas crossing more than one anatomic boundary.

one anatomic boundary and one type of high VVF (juxtacervical). The comparatively greater surgical success rates found for the other types of high VVF (vesicocervical, vesicouterine, and vault) could reflect increased vascularity from direct proximity to the uterine vessels and stability of the repair from the uterus and its support structures. However, this finding might have been spurious owing to underpowering among these three types of genital fistula.

Although rates of closure for low VVF did not differ by HIV status in the present study, a statistically significant between-group difference was found for continence rates (43.5% in the HIV-positive group vs 61.9% in HIV-negative group). This finding indicated that an increased likelihood of persistent incontinence might be expected among women with low VVF who are infected with HIV, even when surgical closure of the genital fistula is deemed successful.

In the present study, not all of the surgical repairs performed demonstrated an influence of HIV infection on the outcomes. For example, ureterovaginal fistulas repaired by abdominal ureteroneocystostomy displayed no notable differences by HIV status, suggesting that such cases might be managed without additional concern regarding the HIV test result. Similarly, repairs of RVF lacked variance in outcome by HIV status.

Few studies published to date have discussed the impact of HIV status on the outcomes of surgical repair of genital fistula. Two studies found that all, or nearly all, such repairs failed among HIV-positive patients with spontaneously occurring RVF.^{21,22} By contrast, Osifo et al.²⁰ reported a 100% success rate for closure of genital fistula among three HIV-positive girls who had experienced spontaneous

RVF. The present study primarily assessed RVFs arising from obstetric causes, with a similar success rate recorded in the HIV-positive and HIV-negative groups. However, one case of RVF had occurred spontaneously during infancy and was successfully closed in one surgery.

The outcomes of VVF repair were compared by HIV status at one site in Cameroon over a 3-year period.²⁶ In all, 12 patients tested positive for HIV infection; rates of closure and continence among the HIV-positive women were no worse than those of their HIV-negative counterparts. This discrepancy between the findings of the present study and the Cameroon study could reflect differences in HIV-positive sample size (201 vs 12) or location of the genital fistula, which was predominantly juxtarethral in the study of Tebeu et al.²⁶

A major strength of the present study was the large sample size, both in terms of the total cohort and the HIV-positive group. The large number of patients with HIV infection included in analysis reflected the practice of universal HIV testing for all women undergoing genital fistula surgery at EVC. To our knowledge, this is the first large study to investigate repair outcomes among patients infected with HIV. Additionally, rather than exclude patients with indeterminate HIV test results, such cases were included in the HIV-positive group. This approach could potentially affect the observed outcomes; however, any such effects were expected to involve skewing the data away from statistical significance because at least some of these patients would be uninfected. Moreover, the patient characteristics, genital fistula characteristics, and genital fistula subtypes were similar between the HIV-positive and HIV-negative groups, which suggested that

any statistically significant differences could be interpreted as truly meaningful.

Limitations of the current study included the retrospective design, missing outcome data, lack of information regarding CD4-positive T helper cell counts and the use of antiretroviral treatment at the time of surgery among patients infected with HIV, and a shift in the availability of testing and treatment options within Nigeria that may have affected the outcomes. Data on CD4-positive T helper cell counts were not routinely available at EVC throughout much of the present study period. Some studies have suggested that this measure is a useful prognostic indicator of surgical outcomes,^{13,16,18} whereas others do not.^{19,27} These shortcomings of the present study will be addressed in a future prospective study.

In conclusion, the present study found that the outcomes of VVF repair among women infected with HIV were less likely to be successful than analogous repairs performed among HIV-negative patients. By contrast, the outcomes of repairs to RVF and ureterovaginal fistula were similar irrespective of HIV status, which suggested that these procedures might be undertaken without substantial concern of failure. Consequently, all women scheduled for genital fistula repair should undergo HIV testing in the preoperative period. Women with positive test results should be considered carefully regarding their likelihood of successful repair. Future studies are planned to determine which factors influence surgical success or failure among HIV-positive women, such as antiretroviral therapies and biomarkers of immune and health status.

AUTHOR CONTRIBUTIONS

SNS was involved in the literature search; study design; data collection, analysis, and interpretation; and writing the manuscript. SJL and CVK were involved in the study design; data analysis and interpretation; and writing the manuscript. SAA and OVM were involved in data analysis and interpretation; and writing the manuscript.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

Table S1. Genital fistula locations by classification among women with or without HIV infection.

Table S2. Outcomes and odds of closure of juxtacervical and other types of high vesicovaginal fistula by HIV status.

Table S3. Continence outcomes among the women who underwent repair of low vesicovaginal fistula.