DETERMINANTS OF THE SUCCESS RATE OF OBSTETRIC FISTULA REPAIR OUTCOMES AMONG PATIENTS TREATED AT GYNOCARE FISTULA CENTRE, ELDORET-KENYA

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ABSTRACT

Objective: To determinant of the success rate of obstetric fistula repair outcomes among patients treated at Gynocare fistula centre, Eldoret-Kenya.

Methods: This was a prospective observational study carried out at Gynocare Fistula Center in Eldoret-Kenya. All women with obstetric fistula who met the inclusion criteria were recruited into the study. Participants were followed up at two weeks after repair of fistula for early postoperative complications, then at three and six month for late postoperative complications and fistula repair outcomes. Interviewer administered structured questionnaire was used to collect data. Data was analyzed using statistical software R core Team 2016. Association between categorical variables was conducted using Pearson's Chi Square test. Logistic regression model was used to study the predictors of fistula repair success. The respective P values and odds ratios (OR) calculated at 95% confidence interval.

Results: Eighty participants were recruited in the study. Seventy six (95%) of them had vesicovaginal fistula whereas four (5%) had rectovaginal fistula. The median age of the participant was 35.0 (IQR: 26.0, 42.2) years. Two thirds of the participants were married 54(67.5%) and 12.5% were divorced after developing fistula. One fifth had no formal education 17 (21.2%), and one third, 23 (28.7%) had at least a secondary level of education. Median age of fistula development was 24.0 (IQR: 19.0, 32.0). Majority were parity one 34(42.5%) at time of fistula development. Married participants had four times increased odds of fistula repair success, OR: 4.61 (95% CI: 1.25-19.31). Fifty nine (73.8%) of the participants had delivered in the hospital and 14 (17.9%) had assisted vaginal delivery which was associated with 81% reduced odds of fistula repair success OR: 0.19 (95% CI: 0.05, 0.76). Twelve (15.0%) of the participants had prior failed fistula repair attempt with half (50.0%) of whom had undergone more than one repair attempts. Prior repair was significantly associated with 98% reduced odds of successful fistula repair, OR: 0.02 (95% CI: 0.00, 0.11). Moderate vaginal stenosis was observed in 16 (21.1%) and this was associated with 83% reduced odds of fistula repair success, OR: 0.17 (95% CI: 0.01, 0.98). older age participants had 9 % reduced odds of fistula repair success OR 0.91 (95% CI: 0.84, 0.99). Prior fistula repair attempt and older age participants were the only variables independently associated with unsuccessful repair.

Conclusion: The postoperative complications were vaginal stenosis, dyspareunia and urethral stricture. The success rate of fistula repair was 86.3%, which falls within the WHO recommendations. Determinants of successful fistula repair outcomes were prior failed fistula repair attempt and older age participants.

Recommendations: Caution should be made for women who have prior attempts. Active surveillance to identify community based women suffering obstetric fistula with provision of fistula care services.

Background

An obstetric fistula is a hole between the vagina and bladder (vesicovaginal fistula) or the vagina and rectum (rectovaginal fistula) that is caused by prolonged obstructed labour, leaving a woman with incontinence of urine or feces, respectively. It develops from prolong obstructed labour that

occurs as a result of fetomaternal disproportion in about 0.5% to 0.6% (1). The fetal head or any other presenting part becomes wedge into the pelvis through which it cannot pass, trapping the women's soft tissue (the anterior vaginal wall, the urethra, bladder and rectum) between two bony plates. This in turn occludes the blood supply to the affected tissues which leads to ischemia and subsequent necrosis resulting in sloughing of tissues that creates abnormal communication. Most commonly fistulas develop as result of obstetric trauma hence the name obstetric fistula.

Prolonged obstructed labor is estimated to account for 76% to 97% of obstetric fistula, and worldwide it occurs in an estimated 5 % of live birth and accounts for 8 % of maternal death (2). Prolong obstructed labour can cause fistula and stillbirths in surviving women (3). Vesicovaginal fistula is caused by other factors such as trauma, congenital malformations, radiation, malignancies, unsafe abortion and sexual abuse (4). Iatrogenic injuries sustained during the course of deliver such as injury to the bladder during laparotomy, cesarean section, use of forceps and female genital cutting or mutilation, may lead to obstetric fistula development (5). Social factors that contribute to obstetric fistula development are poverty which leads to lack of emergency obstetric care, malnutrition, lack of basic education. Early marriage, inadequate family planning contributes to the risk of obstructed labour and obstetric fistula formation. In parts of Sub-Saharan Africa women often marry too young before their pelvis are fully developed for childbearing (6). Fifty to eighty percent of women in developing countries develop fistula the youngest been 12-13 years old. Delaying the age of marriage, preventing unwanted pregnancy and eliminating unsafe abortion will avert one-third of maternal deaths.

Globally, an estimated 2–3 million women live with untreated obstetric fistula. The World Health Organization (WHO) estimates that about 50,000–100,000 women develop obstetric fistula annually with at least 33,000 of these located in Sub-Saharan Africa (7). Prevalence of obstetric fistula has been estimated at 0.2-2%. It is estimated that over 90% of obstetric fistula are of obstetric origin, whereas in the USA and UK over 70% of fistulas are due to pelvic surgery (6). In Kenya, the national incidence of obstetric fistula is estimated at 5,300 new cases every year with only 15% receiving treatment (8). In South Sudan, nearly every risk factor for obstetric fistula is prevalent and approximately 60,000 women and girls are estimated to suffer from obstetric fistula (7). Some in depth studies serve to support the widely held belief that the true number of women living with untreated fistula and suffering the consequent of pain and degradation may have been underestimated suggesting that there may be between 100,000 and one million living with obstetric fistula in Nigeria alone (9) and over 70,000 in Bangladesh.

There are different types of fistula, where it can be managed conservatively or by surgery. The fistula repair may be accompanied by early and late complications depending on the type of the fistula and may require multiple attempts before continence is achieved.

Most of the success rate of VVF repair outcomes depends on first attempt surgery and small fistula size. While determinants of unsuccessful closure depends on large fistula size, small bladder size, prior repair, severe vaginal scaring, circumferential defect, complete urethral involvement, having lived with fistula for more than one year and duration of labour of more than three days (10). In some developing countries, a few specialized fistula hospitals exist but most doctors' lack training in fistula repair where fistula is not treated successfully. Ninety five percent of fistula can be repaired, but they have to operate on up to 10% a second or third time to achieve this figure. Closure of the fistula however does not always mean that the patient will be

dry. Some 15-20% will have severe stress incontinence because the urethra and bladder have been damaged. A few may improve on time, but for those who do not, the operation has failed.

Problem Statement

Obstetric fistula is a public health problem, highly prevalent in Sub Saharan Africa and Eastern Africa, where about 80% of women with obstetric fistula leave without getting treatment. And despite the growing number of studies examining the factors influencing obstetric fistula repair outcomes, there remain limited reliable data and information about the association of socio demographic, fistula and obstetric characteristics with repair outcomes. The global magnitude of the problem is not well known and the surgical outcomes have been poorly studied because most patients seek care after living with the condition for a long time hence favorable outcomes are not easily achieved. Most studies have collected data retrospectively, so results are limited to information available in record being reviewed.

Study Objective

To assess the success rate of fistula repair.

Study Setting

The study was carried out at Gynocare Fistula Centre from October 2015 to October 2016. Gynocare is located in Eldoret Town, Uasin Gishu County. It is non-governmental organization focusing on holistic treatment and rehabilitation of fistula patients. It was established in 2011 and it serves a large population catchment area derived from 3 provinces of Kenya (Rift-Valley, Nyanza and Western) and Eastern part of Uganda.

Gynocare Fistula Centre is one of the few facilities for obstetric fistula research in Kenya. It has one resident gynecologist trained in fistula surgery and a visiting fistula surgeon. Each year over 100 patients are operated since 2011 and this number has steadily increased. This is derived from the log records of theatre operations done at Gynocare.

Study Population

The study population was women diagnosed with obstetric fistula attending Gynocare Fistula center and underwent fistula repair. The target population therefore consisted of women with urine and /or stool incontinence confirmed to have VVF and/or RVF.

Eligibility Criteria

Inclusion Criteria

- Women diagnosed with obstetric fistula and repaired at Gynocare Fistula Center
- Women 13 years old and above
- Agreed to attend follow up visit at three and six month

Exclusion Criteria

- Women with non obstetric fistula

Study Design

This was a prospective observational cohort study for six months post operation. The sampled patients were examined immediately after surgery for early and late postoperative complications at 2 weeks, then 3 and 6 months follow up. All patients were operated by many qualified fistula surgeons.

Sampling Technique

Patients were selected and this was derived from the list of those who were scheduled for surgery. Every patient diagnosed with obstetric fistula at GFC and met the study inclusion criteria were recruited into the study which was conducted for a period of six months.

Data Collection

Data was collected using Obstetric fistula register form/ interviewer- administered structured questionnaire. It was used for every patient. A detailed history covering the patient's socio-demographic, obstetric, medical history and development of fistula were recorded at admission. Additional information captured includes preoperative preparations, intra-operative findings and technique of repair and postoperative recovery. Later follow up of the patients in the outpatient clinic was recorded at 2 weeks, 3 and 6 month.

Data Analysis and Presentation

Data analysis was done using standard software for statistical analysis known as R (R Core Team, 2016). Categorical variables such as education, marital status, family planning use among others were summarized using frequencies and the corresponding percentages. Continuous variables were assessed by Gaussian assumptions. Those that had the assumptions holding were summarized using mean and the corresponding standard deviation (SD) otherwise they were summarized using median and the corresponding inter quartile range (IQR). Gaussian assumptions were assessed using Shapiro-Wilk test and using histograms and density plots.

Body mass index (BMI) was calculated as the ratio of weight in kilograms to square of height in meters. Fistula repair success was derived as participants who did not have positive dye test, had no urethral stricture, had no vaginal stenosis /shortening, without any new fistula development, and without ureteric injury or obstruction. Association between categorical variables was conducted using Pearson's Chi Square test. Factors associated with fistula repair success were assessed using binary and multiple logistic regression models. We reported the odds ratios (OR) and the p value at corresponding 95% confidence interval (95% CI). Results were presented using tables and graphs.

Ethical Considerations

Approval was sought from IREC before the study commenced. The permission to conduct the study was obtained from the management of Gynocare Fistula Centre.

All the participants were notified about the purpose of the study and politely asked without any coercion, or force or pressure to give a signed written informed consent and ascent form before participating. The culturally sensitive questions were designed to address the research objectives

properly and respect the privacy and confidentiality of the participant. Data management practices that ensure adequate confidentiality was maintained and these include storing data in key locked cabinets, password coded databases and consenting in private consultation room. There was no direct financial benefit or compensation for participating in the study. Sound clinical judgment was involved in all stages and aspects of this research.

RESULTS

A total of 80 participants were included in the analysis. The age of the participants was between 19 and 35 years with 50.0% ranging between 19 and 35 years. Close to two thirds of the participants, 49 (64.5%) had normal body mass index (18.5 – 25.0) kg/m^2.

Table 1: Socio-demographic Characteristics

Variable	Categories	Frequencies	Percent
Age	<19	6	7.5%
	19-35	40	50.0%
	>35	34	42.5%
BMI	<18.5	2	2.6%
	18.5 – 25.0	49	64.5%
	25.0 – 30.0	21	27.6%
	>30.0	4	5.3%
Marital Status	Single	10	12.5%
	Married	54	67.5%
	Divorced	10	12.5%
	Widowed	6	7.5%
Religion	Christians	77	96.2%

	Muslims	3	3.8%
Occupation	Unemployed	42	52.5%
	Self employed	33	41.2%
	Employed	5	6.2%
Education	None	17	21.2%
	Primary	40	50.0%
	Secondary	17	21.2%
	Tertiary	6	7.5%

Two thirds of the participants were married, and 12.5% were divorced after developing fistula. Majority of the participants were Christians 77(96.2%), half were unemployed 42 (52.5%). One fifth had no formal education 17 (21.2%), and one third, 23 (28.7%), had at least a secondary and tertiary level of education, and 40(50.0%) had primary level of education.

Table 2: Surgical and Medical History

Variable	**N**	**n (%)**
Hypertension	80	4 (5.0%)
Diabetes	80	0 (0.0%)
HIV Positive	80	6 (7.5%)
Surgery/ Cesarean section	80	33 (41.2%)
Sexual abuse	80	0 (0.0%)
FGC/FGM	80	6 (7.5%)
Trauma	80	0 (0.0%)

Up to 5.0% of the participants were hypertensive and 6(7.5%) were HIV positive. There were 33 (41.2%) who reported history of undergoing cesarean section.

Fistula developed at a median age of 24.0 (IQR: 18.8.0, 32.0) years, with over half of them para 2 or more 46 (57.5%). Interval between delivery and fistula development was 5.0 (IQR: 3.0-7.0) days. The participants have lived with fistula for a median duration of 6.0 (IQR: 1.0, 12.0) years with some who stayed with it as long as 44.0 years

Up to 44 (55.0%) attended antenatal clinic. Labor lasted a median duration of 1.0 (IQR: 1.0, 2.0) days with a minimum and a maximum of 0.5 and 10.0 days respectively.

Hospital delivery happened for 59 (73.8%) of the participants with 14 (17.5%) undergoing assisted vaginal delivery.

Three quarters of the participants were attended to by skilled birth attendant, 60 (75.0%), and the outcome was FSB or MSB for 44 (53.8%) of the babies.

Participants stay as far as a median distance of 10.0 (IQR: 5.0, 20.0) kilometers from the maternity clinic with one third (31.3%) staying a distance less than 5 kilometers from the health facility.

There were 12 (15.0%) participants who had a failure of the prior fistula repair attempt with half having undergone more than one repair attempts.

There were 31 (40.8%) participants who had the fistula not involving the closing mechanism of the urethra, and 11 (14.5%) who had the ureteric and exceptional fistula.

Up to 34 (44.7%) of the participants had the fistula involving the closing mechanism of the urethra. Of this, 21 (61.8%) had type II B fistula type alone or in combination with type IIa or type IIb.

The distribution of the location of the fistula from the urethral meatus show that one third of the participants were within 2.5 cm, 27 (36.5%). The fistula size was 2.0 cm or more for over 80% of the participants, 61 (81.3%), and 71 (92.2%) had multiple fistulas.

Moderate and severe vaginal fibrosis or scaring was observed in 16 (21.1%) and 4 (5.3%) respectively.

The dye test was positive for 63 (78.8%) of the participants.

Immediate Post-Operative Complications

There were 26 (32.5%), 11 (13.8%) participants who experienced post spinal headache and nausea complications of anesthesia immediately after surgical repair of the fistula.

Other complications include fever 3 (3.8%), hemorrhage 2 (2.5%), and bladder spasm.

Late Postoperative Complications

There were 14 (17.5%), 9 (11.2%), and 4 (5.0%) participants who reported leakage of urine after fistula repair at weeks 2, month 3 and month 6 respectively. Dye test was performed and was positive for 6 (42.9%), 5(55.6%) and 4(100.0%) at two weeks, three months and six months post-surgical repair respectively. The positive dye test indicates failed fistula repair or unsuccessful repair. RSI was 8(57.1%) and 4(44.4%) for participants with successful repair at two weeks and three month respectively. There were no participants who reported RSI at six month follow up.

Those who were positive for dye test or with unsuccessful repair were assessed and was discovered that 16.7%, 20.0%, and 25.0% had new fistula development at week two, month 3 and month 6 respectively (Table 7).The other complications include urethral stricture, vaginal stenosis/shortening, and dyspareunia. Vaginal stenosis presented in 7.5%, 8.8%, and 6.2% of all the participants at week 2, month 3, and month 6 respectively. Dyspareunia was reported by 2(2.5%) of participants at 3 month and 3(3.8%) at 6 month despite the participants been advised to resume sexual intercourse after six month of following repair.

Of the 14 (17.5%) participants who had leakage of urine at week 2, one participants relapsed at month 3 and 4(5%) recovered at month 3 but still with RSI, with 5 (55%) had unsuccessful repair. By month six, one participants out of the 5 recovered and four persist with leakage of urine. Four participants had unsuccessful repair at six month follow up.

The proportion of urethral stricture, vaginal stenosis/shortening, and development of new fistula remained constant over the follow up period. There was no participant who presented with ureteric injury/ obstruction and hematometria throughout the follow up period.

Table 3: Association between social demographic characteristics and outcomes

Variable	**Median (IQR) / n (%)**	**OR (95% CI)**	**P value**	**PP value**
Age (Years)			**0.000**	
<19	(7.5%)			

19-35	(50.0%)	0.97(0.93,1.02)	0.000	
>35	(42.5%)			
Marital status				
Single	10 (12.5%)			
Married	54 (67.5%)	4.61 (1.25,19.31)	0.548	0.548
Divorced	10 (12.5%)			
Widowed	6 (7.5%)			
Education				
None	17 (21.2%)			
Primary	40 (50.0%)	1.09(0.28,5.35)	0.440	0.44
Secondary	17 (21.2%)			
Tertiary	6 (7.5%)			
Occupation				
Unemployed	42 (52.5%)	1.10 (0.30,4.14)	0.224	0.224
Self employed	33 (41.2%)			
Employed	5 (6.2%)			

Association between age of the participants and the outcome was statistically significant p value 0.000, where the proportion of participants between ages 19 to 35 was higher. Marital status, education and occupation were not significantly associated with the outcomes.

Table 4: Association between obstetric characteristics and outcomes

Variable	Median (IQR) or n (%)	OR (95% CI)	P value	OR (95% CI)	P value
Age at the time fistula developed				1.07 (0.98,1.19)	0.235
<19	23(28.8%)				
19-35	48(60.0%)	1.07 (0.98,1.19)	0.235		
>35	9(11.3%)				
Antenatal care					
Yes	44(55.0%)	2.41(0.67,9.94)	0.169		
No	36((45.0%)				
Duration of labor (Days)					
<5days	78(9.5%)	0.91 (0.65,1.47)	0.487		
>5days	2(2.5%)				
Mode of Delivery					
Assisted vaginal delivery	14 (17.5%)	0.24(0.12,1.89)	0.582		
Spontaneous	27 (33.8%)	0.14(0.02,0.34)	0.582		

delivery					
Emergency C/S	39 (48.8%)	0.19 (0.05,0.76)	0.011		
Birth Attendant					
Skilled	60 (75.0%)	0.26 (0.01,1.52)	0.790		
Unattended	2 (2.5%)				
Unskilled (TBA)	18 (22.8%)				
Duration since fistula developed	6.0 (1.0, 12.0)	1.25 (0.95,1.71)	0.124		
Range	0.0 – 44.0				

There was a significant association between mode of delivery and the outcome p value 0.011, where the proportion of the participants who delivered by emergency cesarean section was higher (48.8%) compared to those who delivered spontaneously or by assisted delivery.

Table 5: Association between obstetric characteristics and outcomes

Variable	**Median (IQR) or n (%)**	**OR (95% CI)**	**P value**	**OR (95% CI)**	**P value**
Urethral involvement				1.07 (0.98,1.19)	0.235
Not involving closing mechanism	31(40.8%)	0.28(0.01-5.12	0.421		

Involving closing mechanism	34(44.7%)	0.65(0.15-8.48)	0.794		
Ureteric and exceptional fistula	11(14.5%)	0.38(0.32,4.13)	0.904		
Fistula location					
1.5 cm	12(16.2%)				
1.6- 2.5 cm	15(20.0%)				
2.6-3.5 cm	24(32.4%)	1.91(0.48,7.56)	0.450		
>3.6cm	23(31.1)				
Fistula size					
Small (< 2.0 cm)	14 (18.7%)				
Medium (2.0 - 3.0 cm)	39 (52.0%)	0.35 (0.09,1.42)	0.966		
Large (4.0 - 5.0 cm)	13 (17.3%)				
Extensive (>6.0 cm)	9 (12.0%)				
Number of fistula					
One	6 (7.8%)				

Multiple	71 (92.2%)	0.29 (0.05,2.31)	0.654		
Degree of vaginal fibrosis/scaring					
none	25 (32.9%)	0.54(0.24,1.59)	0.751		
mild- moderate	31 (40.8%)	0.17 (0.01,0.98)	0.031		
moderate-severe	16 (21.1%)	0.94(0.88,2.32)	0.327		
severe	4 (5.3%)	0.82(0.02,1.00)	0.920		
Prior fistula repair attempt	12 (15.0%)	0.02 (0.00,0.11)	0.002		

There was a significant association between degree of fibrosis and outcome p value 0.02, where the proportion of participants with mild to moderate degree of fibrosis was high (40.8%). In addition the prior fistula repair attempts were found to be statistically associated with treatment outcome p value 0.002.

Table 6: Multivariate Logistic Regression Assessing Determinants of Fistula Repair Success

Variable	**Unadjusted OR (95% CI)**	**Adjusted OR(95% CI)**	**OR (95% CI)**	**P value**
Age < 19		0.91 (0.84, 0.99)		

19-35 > 35	0.97 (0.93, 1.02)			
Mode of Delivery	0.19 (0.05, 0.76)			
Assisted vaginal delivery				
Spontaneous vaginal delivery				
Emergency caesarean delivery				
Degree of vaginal fibrosis/scaring	0.17 (0.01, 0.98)			
None				
Mild- moderate				
Moderate-severe				
Severe				
Prior fistula repair attempt	0.02 (0.00, 0.11)	0.01 (0.00, 0.09)		

Adjusted odds ratio was obtained after adjusting for variables; age of participants and prior fistula repair attempt. Multivariate logistic regression tests were used to produce adjusted p value. Multiple logistic regressions including the significant variables in the bivariate logistic regression analysis showed that the variables that can explain the success of fistula repair were older age participants and prior fistula repair attempt.

The results show that the participants who had failure in the previous fistula repair attempt had 99% reduced odds of success of fistula repair, OR: 0.01 (95% CI: 0.00, 0.09).Older participants were associated with 9% reduced odds of fistula repair success, OR: 0.91 (95% CI: 0.84, 0.99).

The overall fistula repair success percentages over the follow up period were as shown in the figure below. Fistula repair outcome showed that 60 (75.0%), 65 (81.3%), and 69 (86.3%) healed by weeks 2, months 3 and 6 respectively.

Of the 60 who were successful at two weeks one relapsed at six months, and another at three months but recovered by month six. Thus there were 6 (7.5%), and 5 (6.3%) new participants who recovered at month 3, and month 6 respectively.

Table 7: Association between successful repair at six months and previous fistula repair attempts

	Successful Fistula Repair at six months		**Fisher's Exact test**
Variable	**No**	**Yes**	**P-value**
Had previous surgical repair attempt			
No	3 (4.4%)	65 (95.6%)	
Yes	8 (66.7%)	4 (33.3%)	<0.001
Number of previous surgical repairs			
One	3 (50.0%)	3 (50.0%)	
Two	1 (50.0%)	1 (50.0%)	0.269
Three	4 (100.0%)	0 (0.0%)	

Previous surgical repair attempt was highly associated with successful repair at six months. The findings show that a smaller proportion of participants who had undergone previous repair

attempt were successfully repaired compared to those who had not undergone previous attempt (33.3% vs. 95.6%, p <0.001).

The number of previous attempts were however not associated with successful repair at six months (p = 0.269).

Discussion

Socio Demographic Characteristics

The median age of the participants with obstetric fistula was 35.0 years ranging between 16-67 years, and this is similar to a study done in Rwanda which found a median age of participants 34.6 years, ranging between 16-78 years among the participants (11). Same findings were observed in different studies in Zambia (12).

One third of participants 23(28.7%) had at least secondary and tertiary level of education and 40(50.0%) had primary level of education. Our findings are lower than the findings from Mbarara (10) and MTRH (13) which found 61% and 60% respectively. It is obvious that women with obstetric fistula gave up their education to get married. However other studies reported high numbers of women with no formal education (14).

Half of the participants 54(67.5%) in the study were still married despite having fistula, compared to findings observed in Mbarara (10) which found 45.5% and in Zambia which found 75.5% (12). This differs from previous studies which seemed to suggest that women with obstetric fistula were neglected by their husbands (15).

Determinants of Fistula Repair Success at 6 Month

Bivariate logistic regression assessing the determinants of fistula repair success showed that among the participants, the married women compared to single, divorced or widowed had more than four times increased odds of fistula repair success. Study in Benin found married women were 3.7 times more likely to have a successful fistula repair (26).

The study found that those who underwent assisted vaginal delivery 14 (17.5%) compared to those who underwent emergency caesarean delivery 39(48.8%) or spontaneous delivery 27 (33.8%) had up to 81% reduced odd of success. This findings are similar to study done in

Guena, and West Africa, in which in the bivariate analysis, they found the mean age at presentation, mode of delivery, vaginal scarring, status of urethral involvement were statistically significant associated with failure of fistula closure. However in multivariate analysis, only mode of delivery, status of urethra and repair hospital was independently associated with failure of fistula closure (27).

Mild, moderate or severe fibrosis was associated with 83% reduced odds of fistula repair success. Similar findings in other study found that women with moderate severe vaginal scaring were twelve times more likely to have unsuccessful fistula closure than those with mild or no scaring. Browning found that women with scaring had 2.4 times the odds of residual stress incontinence following successful closure (95%CI: 1.5-4.0) adjusting for patient and fistula characteristics. This is probably because tissue has a poor blood supply hence less likely to heal. Also scarred fistula is difficult to mobilize from the surrounding tissues like vagina and pubic bone making a tension free repair nearly impossible. Failed previous fistula repair was associated with 98% reduced odds of success of fistula repair, OR: 0.02 (95% CL: 0.00, 0.11).

Multiple logistic regressions including the significant variables in the bivariate logistic regression analysis showed that the variables that can explain the success of fistula repair were failure of prior fistula repair attempt adjusted for age. Participants who had failure in the previous fistula repair attempt had 99% reduced odds of success of fistula repair. The same findings observed in Rwanda where 13.8% of fistula repairs were conducted on women with prior failed repair attempts compared to first time repair attempts (11). It is plausible that each additional fistula repair attempt leads to additional tissues damage and scarring and therefore, multiple repair attempts would reduce the chance of restorative physiological function. Older participants were associated with 9% reduced odds of fistula repair success. Similar findings were observed from study in Benin (26). The reason could be attributed to that older women might have stayed with fistula for longer duration which made the tissues more fibrotic an less amenable for surgery.

Success Rate of Fistula Closure

The study found that the success rate of fistula repair outcomes was 86.3% among 76 of the participants and the unsuccessful repair was 13.7% among 4 participants at six month post repair.

The same finding was found in Burundi; at 3 and 6 month follow up of surgical outcomes at hospital discharge, where success rate of 87% was achieved (28). The successful rate of closure is higher than that of the WHO, targets of > 85% as a measure of good quality of care.

In previous studies conducted in comparable setting, mixed finding with lower closure rates of 78% in a Uganda (10) and 73% in a Zambian (12) were reported. While another study in Uganda reported higher rates of 90% (17). This deference in rates of successful repair could be attributed to difference in severity of cases handled per health facility, skill of surgeons, as well as difference in quality of fistula repair services. Findings from our study found that previous surgical repair attempt was highly associated with successful repair at six months. The findings show that a smaller proportion of participants who had undergone previous repair attempt were successfully repaired compared to those who had not undergone previous attempt (33.3% vs. 95.6%, $p < 0.001$). The number of previous attempts were however not associated with successful repair at six months ($p = 0.269$).

Conclusion

1. The postoperative outcomes:

- Success rate is 86% at 6month, which meets the WHO target for good quality care of fistula.

- 6.2% of the participants had vaginal scarring.

2. Prior fistula attempt and older age participants were independently associated with reduce chances of successful.

Recommendations

- Caution should be made for women who have prior attempts since prior attempts are associated with reduce chances of repair.

- Active surveillance to identify community based women with obstetric fistula with provision of fistula care, because older age participants might stayed with fistula for

longer duration due to lack of knowledge of fistula treatment which requires the community to intervene and capture all women who are suffering in silence.

- Longitudinal study to assess long term outcomes for a minimum of 1 year.

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