Afr. J. Med. Med. Sci. (2022) **5**1(4) 275-285

Microbial pattern in urine samples of post repaired vesico-vaginal fistula patients at Laure Fistula Center, Kano, Nigeria

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Abstract

Background: Vesico-vaginal fistula (VVF) is a major gynaecological problem in developing countries especially Sub-Saharan region and presence of pathogenic microorganisms in the urine of post repaired VVF patients may lead to surgical failure; and chances of successful repair decreases after first attempt; it may also lead to Urinary tract infection (UTI) and its complications.

Objective: This study determined the microbial organisms present in urine samples of post repaired vesico-vaginal fistula patients as well as their antibiotic sensitivity pattern among patients at Laure fistula center (LFC), Murtala Muhammad Specialist Hospital, Kano

*Methods***:** A Cross sectional descriptive study was conducted among post repaired VVF patients at LFC, Murtala Muhammad Specialist Hospital, Kano. Data relating to the study were obtained using a structured questionnaire. Urine samples were collected from an indwelling urethral catheter on day 7 after surgery and were subjected to microscopy, culture and sensitivity, to determine the microbial organisms and their sensitivity pattern. Data obtained were analyzed using SPSS version 20 (SPSS Inc, Chicago, USA, 2009).

Results: The incidence of significant bacteriuria among post repair vesico-vaginal fistula patients from this study was 43.5%. The associated risk factors were previous catheterization, previous fistula repair and duration of labor for more than 24 hours, the association between these risk factors and development of bacteriuria was statistically significant (p values < 0.05). The microorganisms implicated were Pseudomonas aeruginosa, Proteus mirabilis, Escherichia coli and Klebsiella pneumoniae. These organisms showed various levels of sensitivity and resistance to the antibiotics used. All the organisms were highly sensitive to Ciprofloxacin, Cefuroxime, Ceftriaxone and Gentamicin at varying degrees. There was significant resistance to Amoxicillin and Tetracycline; and 100% resistance to Trimetoprim/ Sulphamethoxazole.

*Conclusion***-** The incidence of significant bacteriuria was high after surgical repair. It is therefore clear that vesico-vaginal fistula patients are at risk of developing post repair significant bacteriuria. The use of prophylactic antibiotic before or immediately after surgery is important among these patients.

Keywords: *Vesicovaginal fistula, bacteriuria, post-repair, Laure Fistula Centre*

Résumé

Contexte : La fistule vésico-vaginale (VVF) est un problème gynécologique majeur dans les pays en développement, en particulier dans la région subsaharienne, et la présence de micro-organismes pathogènes dans l'urine des patientes VVF post-réparées peut entraîner un échec chirurgical ; et les chances de réussite de la réparation diminuent après la première tentative ; cela peut également entraîner une infection des voies urinaires (UTI) et ses complications.

Objectif : Cette étude a déterminé les organismes microbiens présents dans les échantillons d'urine de patientes ayant subi une fistule vésico-vaginale après réparation ainsi que leur profil de sensibilité aux antibiotiques chez les patientes du centre de la fistule Laure (LFC), de l'hôpital spécialisé Murtala Muhammad, à Kano.

Méthodes: Une étude descriptive transversale a été menée auprès de patients VVF post-réparés au LFC, Murtala Muhammad Specialist Hospital, Kano. Les données relatives à l'étude ont été obtenues à l'aide d'un questionnaire structuré. Des échantillons d'urine ont été prélevés à partir d'un cathéter urétral à demeure au jour 7 après la chirurgie et ont été soumis à la microscopie, à la culture et à la sensibilité, afin de déterminer les organismes microbiens et leur profil de sensibilité. Les données obtenues ont été analysées à l'aide de SPSS version 20 (SPSS Inc, Chicago, USA, 2009).

Résultats: L'incidence de la bactériurie significative chez les patientes ayant subi une fistule vésico-

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vaginale après réparation dans cette étude était de 43,5 %. Les facteurs de risque associés étaient un cathétérisme antérieur, une réparation antérieure de la fistule et une durée du travail de plus de 24 heures, l'association entre ces facteurs de risque et le développement d'une bactériurie était statistiquement significative (valeurs de $p < 0,05$). Les micro-organismes incriminés étaient Pseudomonas aeruginosa, Proteus mirabilis, Escherichia coli et Klebsiella pneumoniae. Ces organismes ont montré divers niveaux de sensibilité et de résistance aux antibiotiques utilisés. Tous les organismes étaient très sensibles à la ciprofloxacine, au céfuroxime, à la ceftriaxone et à la gentamicine à des degrés divers. Il y avait une résistance significative à l'amoxicilline et à la tétracycline ; et 100 % de résistance au trimétoprime/sulfaméthoxazole.

Conclusion - L'incidence des bactériuries importantes était élevée après réparation chirurgicale. Il est donc clair que les patientes atteintes de fistule vésico-vaginale sont à risque de développer une bactériurie significative après réparation. L'utilisation d'antibiotiques prophylactiques avant ou immédiatement après la chirurgie est importante chez ces patients.

Mots clés: Fistule vésico-vaginale, Bactériurie, post-réparation, Centre Fistule Laure

Introduction

Vesico-vaginal fistula (VVF) is a major gynecological problem in developing countries.[1] especially sub-Saharan Africa. The magnitude to maternal health is immense in the developing countries as such it is considered as a significant public health challenge [2]. Numerous reports have indicated that Nigeria is one of the countries with high rate of VVF [2-5]. The aim of its management is the achievement of continence and prevention of recurrence. The Presence of pathogenic microorganisms in urine of VVF patient may lead to surgical failure and its complication [1].

Bacteria are the prime perpetrators responsible for conferring the infection among humans but the role of certain fungi and viruses cannot be overlooked; though the incidence is very rare [6]. Asymptomatic bacteriuria can progress to UTI, which can either be complicated or uncomplicated [7]. The complicated forms are frequently asymptomatic, they occur in patients with structural or functional abnormality in the genitourinary tract, including instrumentation such as catheterization [7].

Complicated and recurrent UTI are some common problems encountered by patients with VVF after repair [8]. The presence of indwelling urethral catheter after VVF repair as well as the surgical procedure itself can allow easy access of pathogens into the urinary tract which can lead to formation of biofilms and subsequently provide a nidus for infection making it difficult to eradicate [9]. A study conducted in Tunisia showed that the presence of UTI prior to VVF repair is an adverse prognostic factor for a successful repair [10]. This may lead to surgical failure, and chances of successful VVF repair decreases after first repair [10].

The place for prophylactic antibiotic in the management of VVF patients remained a controversial issue in most fistula centers, and there are few literatures that either support or refute it [7]. Some centers give broad spectrum affordable antimicrobial agents such as Cotrimoxazole and Nitrofurantoin after VVF repair and throughout the period of catheterization as prophylaxis for urinary tract infections [11-13], while other centers give antibiotics to these patients only when there is evidence of infection [11,12].

It has been clearly documented that antibiotic sensitivity pattern varies from regions and geographical locations [14]. therefore the knowledge of the microbial organisms present in the urine as well as the sensitivity pattern in every fistula center is important for effective prevention and management of UTI.[15] Use of prophylactic antibiotics before or after fistula repair is not being practice at LFC; a study conducted at same center reported recurrent UTI as one of the complications found among the post repaired patients [8]. Infections might be acquired during surgery or following catheter insertion. This study may justify the use of antibiotics for prophylaxis and the appropriate antibiotics to be used in order to prevent the emergence of resistant bacteria if urinary tract infection sets in. This will prevent surgical failure as well as the complications of UTI among these patients following VVF surgery. This study was therefore conducted to determine the microbial organisms present in the urine samples of post repaired vesicovaginal fistula patients and their antibiotic sensitivity pattern at Laure Fistula Center, Murtala Muhammad Specialist Hospital, Kano.

Subjects and methods

Study design/Setting

The study was a descriptive cross sectional study; which was conducted over a period of seven months among post repaired vesicovaginal fistula patients. Kano state is one of the most densely populated states in Nigeria with a population of 9,383,682million [16]. It comprises an area of 20,760km [2]. It lies between $12^{0}00$ north and $14^{0}31^{'}$ east. The borders of Kano

State are Jigawa State to the East, Katsina State to the North and West, with Kaduna and Bauchi States to the South. The major ethnic groups are Hausa, Fulani, Yoruba and Igbo. The people are highly endowed with skills in the field of Agriculture, craftsmanship, nomadism, industry and administration. Kano state is a commercial center. Kano has always been receiving immigrants from different part of Nigeria and overseas. The major religions are Islam and Christianity.

The Laure fistula center (LFC) is situated within Murtala Muhammad Specialist Hospital, Kano, which is a tertiary health institution owned by the Kano State Government. It is the second largest fistula center in Nigeria and it attracts patients from all over Nigeria and other countries like Niger, Cameroun and Benin Republics. LFC was accredited by International Federation of Obstetricians and Gynaecologists (FIGO) as an international training center in 2014.

VVF repair services in Kano dated back to 1960's, but a comprehensive documentation started in late 80's. LFC came into full existence in 1990 when VVF repair services was flagged off through the effort of the State government and some women organizations. Two other doctors trained to perform surgery at the center; some doctors from Aminu Kano Teaching Hospital visit the center weekly. Kano state government takes care of the surgeries and drugs through its free maternity services; some non-governmental organization notably United Nations Population Funds (UNFPA) and United States of America International Development (USAID) through its program called Fistula Care Plus also contribute to the center.

Laure Fistula Center have a ward consisting of forty beds, managed by six nurses and twelve community health extension workers, and an operating theatre with two trained nurses. Three shifts- morning, afternoon and night are run by the nurses and the community health workers who were trained in VVF nursing care. An average of 400 new cases are seen yearly, about 550 come for follow up visit and 370 on average are admitted out of which about 310 (26/month) are being operated; with a success rate of 86.6%.[17] Outpatient clinics are done on Sundays, while surgeries are done from Mondays to Thursdays. The major method of repair is the vaginal route; transvesical route is done in some few selected cases. Some complications like UTI and stress incontinence following repair have been reported from the centre [17]. Patients are usually discharged on day 15 post- operative to the patients' waiting hostel in Kwalli, Kano city, where they undergo rehabilitation.

Study population

The study populations were VVF patients that had surgical repair during the study period. Post repaired VVF patients not on antibiotics were included in the study, however, Post repaired VVF patients who were on antibiotics on account of any bacterial infection requiring treatment, VVF patients with UTI/ significant bacteriuria before surgery and patients with risks factors for significant bacteriuria such as diabetes mellitus, sickle cell disease, renal disease or retroviral disease were excluded from the study.

Sample size determination

A sample of 141 was determined using Taylor's formula for proportion for estimating minimum sample size for descriptive studies [18].

$n = z^2pq/ d^2$

Substituting the values of standard normal deviate (z) 1.96 at 95% confidence interval and margin of error (d) 0.05 and prevalence (p) from previous study, point prevalence rate of recurrent UTI in VVF patients from a previous study, (9.2%= 0.092) obtained from previous study[8] and a possible attrition rate of 10% were used to calculate the sample size.

Sampling technique

Systematic sampling technique was used to study the eligible patients. Sampling interval of 3 was obtained as the ratio of sample frame (400) to sample size (141).The first respondent was obtained by simple balloting using numbers from 1 to 3 from which 2 was randomly selected. Therefore, the second respondent was the first to be studied. Subsequent respondents were obtained by adding the sampling interval until the calculated sample size was obtained.

Sample recruitment

Selected respondents had urine samples collected for culture and sensitivity; and blood samples for retroviral screening, fasting/random blood sugar and renal function tests (urea, electrolytes and creatinine) pre operatively. This was done to detect the presence of bacteriuria as well as its risk factors in the patients awaiting surgery before recruiting them for the study.

Instrument description and method of data collection

Interviewer administered questionnaire consisting open and closed ended questions was used for data collection. The questionnaire consisted of three sections: Section A elicited information on socio-demographic and reproductive characteristics, section

B asked questions on risk factors while section C was dedicated for reporting laboratory results of respondents.

Urine samples were collected on day 7 post repair by the researcher using aseptic techniques from indwelling Foley's catheter after clipping at the level of bifurcation for 5mins. Samples were collected above the clipped area where urine accumulated using a 10ml plastic syringe. Point of collection was cleaned with chlorhexidine to take care of contamination; and sterile water was then used to clean up the chlorhexidine. All urine samples were collected in the morning. About 10ml of urine specimen was collected in a sterile screw-capped, wide neck container; and each container was labeled using the patient's code (001, 002, etc), date and time of collection. Microbiology request forms were filled for each patient, and were taken together with the samples to the laboratory. The samples were transported to Aminu Kano Teaching Hospital (AKTH) microbiology laboratory unit for analysis. AKTH laboratory is 7km away from Laure Fistula Center; therefore 0.1g (10ml) of boric acid (10g in 1000ml) was added to the urine sample as preservative, to limit bacterial proliferation.

The urine samples were analyzed by the researcher with the assistance of a senior registrar and a laboratory scientist of Microbiology department, AKTH. The culture medium used in this study was Cysteine Lactose Electrolyte Deficient (CLED). A test of performance (control strength) was done using the American Type Culture collection (ATCC) before the culture medium was used.CLED has a PH of 7-7.2 and is deficient of Na and Cl so as to prevent the swimming of Proteus spp which is one of the common organisms found in urine samples. Lactose has bromothymol blue as an indicator. The samples were cultured on the media according to the standard protocol [20,21]. The culture plates were labeled with a marker and incubated aerobically at 37^0C for 24hrs for bacterial isolation.

Colonial characteristics, Gram reaction, catalase and coagulase tests, haemolysis on blood agar medium, lactose fermentation on CLED medium and other biochemical tests such as indole production using peptone water (nutrient broth), citrate utilization, urase activity, triple sugar iron agar test (for glucose, sucrose, lactose fermentation) for enterobacteriaceae, gas and hydrogen sulphide production and oxidase test was conducted for bacterial identification.

The presence of bacteriuria was described as bacteria count of greater or equal to 10 [5] colony forming units/ml of urine [22]. All the results were collected and recorded on a questionnaire already labeled with the patient's code.

Bacteria isolates were subjected to antibiotic sensitivity analysis using the disc diffusion methods [19]. A purity plate which contained sodium hydrocholate (bile salt) to inhibit the growth of Staphylococcus was prepared and incubated for 72hrs to serve as sterility test.

Disc Diffusion Method (DDM)[23]: Using modified Kirby-Bauer technique

This is one of the oldest approaches to antimicrobial susceptibility testing and remains one of the most widely used antimicrobial susceptibility testing methods in routine clinical laboratories. It is suitable for testing the majority of bacterial pathogens, including the more common fastidious bacteria. It is versatile in the range of antimicrobial agents that can be tested and requires no special equipment.

The various steps involve are:

A- *Preparation and storage of media*

- Mueller Hinton agar was prepared according to the manufacturer's instructions; supplementations were added for fastidious organisms.
- Medium had a level depth of 4mm in a Petri dish of 90mm in diameter
- Surface of the agar was dry before use.
- In-house prepared plates were stored at 8 – 10^oC.

B-*Preparation of inoculum*

- Direct colony suspension method was used to make a suspension of the organism in a saline to the density of a McFarland 0.5 turbidity standard.
- Suspension was made from an overnight growth on non-selective medium (primary isolation medium). Several morphologically similar colonies were grown to avoid selecting an atypical variant. 4-5 similar looking colonies were suspended in saline with a sterile loop.
- The test and standard were compared against a white background with black lines.
- The density of the suspended organism was adjusted to McFarland 0.5 by adding saline or more organisms.

C - Inoculation of agar plates

- The suspension was used optimally within 15mins.
- Sterile cotton swab was dipped into the suspension; excess fluid was removed by turning the swab against the inside of the container, to avoid over-inoculation of plates, particularly gram negative organisms.
- Inoculum was evenly spread over the entire surface of the plate by swabbing in 3 directions

- Disk was applied within 15mins (to prevent erroneous reduction in sizes of zones of inhibition).

D- Application of antimicrobial disk
- Disks were stored at temperature of $<8^0$C
- Disks were allowed to warm at room temp before opening the container to prevent condensation
- Disks were applied firmly to the surface of the inoculated and dried agar plate. The contact with the agar was close and even. Disks were not moved when they have been applied to plates as diffusion of antimicrobial agents from disk is very rapid.
- Number of disks on a plate was limited to avoid overlapping of zones. The maximum number of disks used was 6 on a 90mm circular plate.

E- Incubation of plates
- Plates were inverted and incubated within 15mins of disk application. Plates were not left at room temperature after disks have been applied to avoid pre-diffusion (loss of inhibition zones)
- Plates were not stacked in the incubator to avoid uneven heating of plates which will affect the results.
- Plates were incubated at 35 – 37°C for 18-24hrs aerobically
- Susceptible plates were re-incubated and re-read at 24hrs when there was no growth after 24hrs

F- Examination of plates after incubation
- Inoculum and streaked plates resulted in a confluent lawn of growth
- Growth was evenly distributed over the plate to achieve uniformly circular inhibition zone.
- Tests were repeated if individual colonies were seen in a plate.
- The inhibition zones were checked to be sure that they were within the quality control limits.

G - Measurement of zones and interpretation of susceptibility
- Plates were read from the back with reflected light and the plate held above a dark background.
- Diameters of zones of inhibition were measured to the nearest mm with a ruler.
- Zone diameter was interpreted by reference to breakpoint tables using the Clinical and Laboratory standard institute guidelines (CLSI).

Antibiotics used for sensitivity test
For gram positives
Penicillin10ug, Amoxicillin-Clavulanic acid 20/10ug, Erythromycin 15ug, Nitrofurantoin 300ug, Ciprofloxacin 5ug, Gentamicin 10ug, Cefoxitin 30ug, Cefuroxime 30ug and Ceftriaxone 30ug were to be used.

For gram negatives
Meropenem 10ug, Gentamicin 10ug, Ciprofloxacin 5ug, Amoxicillin20ug, Ceftriaxone 30ug, Trimethoprim/ sulphamethoxazole 1.25/23.75ug, Tetracycline 30ug, Cefuroxime 30ug and Levofloxacin were used.

Data management and analysis
Data was analyzed using IBM SPSS Statistics for Windows, version 20 (SPSS version 20, USA 2009).Quantitative variables were summarized using appropriate measures such as mean and standard deviation, or median and range, whereas categorical variables were presented as frequencies and percentages.

Chi-square test was used to test for association between the duration of VVF, previous fistula repair, previous catheterization, mode of delivery and duration of labour; and the presence of pathogenic organisms in urine samples. Statistical significance was considered at $p \leq 0.05$.

Ethical considerations
Ethical clearance was obtained from Health Research Ethics Committee of Aminu Kano Teaching Hospital; Kano with approval number NHREC/21/08/2008/AKTH/EC/1935 dated 3rd May, 2017. Written permission was obtained from the management of Murtala Muhammad Specialist Hospital, Kano. All the principles of research ethics were adhered to throughout the conduct of the study and all costs of investigations were fully paid by the researchers.

Results

Socio-demographic and reproductive characteristics
Table I shows the socio-demographic and reproductive characteristics of the patients. The age of the patients ranged from 15 to 43years with a mean age of 22.83±6.28 years. More than one fourth (35.5%) of the study population were teenagers, and majority (47.8%) of them were between the ages of 20 and 29 years. Amongst the 138 patients recruited for the study, 106 (76.8%) were from the rural areas, and majority (73.9%) of the patients were married. Quranic education was the predominant (59.4%) level attained by them, only 1 (0.7%) had post-secondary education and 11(8.0%) had no education. Ninety eight (71.0%) out of the 138 recruited for the study were housewives who were not gainfully

employed and only 26(18.9%) of these patients were engaged in different kind of trading. Ninety one (65.9%) of the patients recruited for the study delivered once, 16.7% (23/138) delivered two to five, and 15.2% had more than five deliveries. Only 2.2% (3/138) of them were nulliparous.

Table 1: Sociodemographic and Reproductive characteristics of post repaired Vesicovaginal fistula patients at Laure fistula center, Kano.

Characteristics	Frequency	Percentage
1. Age (Years)		
<20	49	35.5
20-29	66	47.8
30-39	20	4.5
≥40	3	2.2
Total	138	100.0
Mean Age ± SD	22.83 ± 6.28 years	
2. Place of Residence		
Rural	106	76.8
Urban	32	23.2
Total	138	100.0
3. Marital status		
Married	102	73.9
Divorced	23	16.7
Separated	11	8.0
Single	2	1.4
Total	138	100.04.
Educational Status		
Quranic	82	59.4
Tertiary	1	0.7
Secondary	12	8.7
Primary	32	23.2
None	11	8.0
Total	138	100.05.
Occupation		
Housewife	98	71.0
Trading	26	18.9
Under care	13	9.4
Student	1	0.7
Total	138	100.06.
Parity		
0	3	2.2
1	91	65.9
2-5	23	16.7
>5	21	15.2
Total	138	100.0

Possible risk factors for bacteriuria among post repaired VVF patients

Table II presents the distributions of the possible risk factors for bacteriuria among the patients recruited for the study. Mode of delivery and duration of labour were recorded among 135 patients because three of the patients in the study were nulliparous, they acquired the VVF via trauma (Gishiri cut). Other variables such as duration of fistula, history of previous catheterization and surgical repair were recorded for all the 138 patients who participated in the study. Most of the patients (70.4%) had spontaneous vaginal delivery while Caesarean section occurred in 40 (29.6%) of them. More than two third of the patients (71.9%) laboured for 24 hours or more during the last delivery and 58.7% lived with the fistula for more than 12 months. Less than half (44.9%) of the patients had catheter insertion prior to the present surgical repair and 37.7% of them had previous surgical repair.

Table 2: Possible Risk factors for bacteriuria among post repaired VVF patients

Risk Factors	Frequency	Percentage
1-Mode of delivery		
Spontaneous vertex delivery	95	70.4
Caesarean section	40	29.6
Total	135*	100.0
2- Duration of Labour (hours)		
<24	38	28.1
≥24	97	71.9
Total	135*	100.0
3-Duration of Fistula (Months)		
≤12	57	41.3
12	81	58.7
Total	138	100.0
4- Previous cathererization		
Yes	62	44.9
No.	76	55.1
Total	138	100.0
5-Previous repair		
Yes	52	37.7
No	86	62.3
Total	138	100.0

**Three patient out of the total study population (138) were nulliparous*

Distributions of the frequency of bacteriuria among possible risk factors

Table III details the distributions of significant bacteriuria among the possible risk factors. One hundred and thirty eight urine samples were analyzed for significant bacteriuria, 60 samples were positive for significant bacteriuria and the remaining urine samples were negative, thus giving an incidence of 43.5% (60/138). Out of the 60 positive samples, 58 samples were those of the parous patients and only two for nulliparous. More than two third (69.0%) of the incidence of significant bacteriuria was recorded among patients who had spontaneous vaginal delivery and 51.7% of the incidence of bacteriuria was found

Table 3: Distributions of the frequency of bacteriuria among possible risk factors

Risk factors	Frequency of bacteriuria	Percentage	Test Statistic
Mode of delivery			
SVD	40	69.0	$X^2 = 0.164$
Caesarean section	18	31.0	P = 0.685
Total	58*	100	
Duration of labour			
<24	27	46.6	$X^2 = 14.654$
≥24	31	53.4	P = 0.000
Total	58*	100	
Duration of fistula (Months)			
≤	29	48,3	$X^2 = 1.807$
≥	31	51.7	P = 0.179
Total	60	100	
Previous cathererization			
Yes	44	73.3	$X^2 = 36.548$
No	16	26.7	P = 0.000
ToTal	60	100	
Previous repair			
Yes	42	70.0	$X^2 = 49.218$
No	18	30.0	P = 0.000
Total	60	100	

**Two samples out of the sixty (60) patients with significant bacteriuria were those of the nulliparous patient*
**p values ≤ 0.05 are statistically significant at 5% significant level.*

Table 4: Microorganisms cultured from 60 urine samples of post repaired VVF patients

Microorganism Isolated	Previous fistula repair and/or catheterization		Frequency	Percentage
	Yes	No		
Pseudomonas aeruginosa	20	1	21	35.0
Proteus mirabilis	14	1	15	25.0
Escherichia coli	6	8	14	23.3
Klebsiella pneumoniae	4	6	10	16.7
Total	44	16	60	100

among those that lived with the fistula for more than 12 months. There was no statistically significant association (p>0.05) between mode of delivery and duration of fistula with the development of significant bacteriuria after VVF repair. More than half (53.4%) of the incidence was found among those patients who laboured for 24 hours or more in their recent childbirth and 46.6% among the women who laboured for less than 24 hours. The highest percentage (73.3%) of bacteriuria was recorded among the patients with history of catheterization and 70.0% among those with previous fistula repair. There was a statistically significant association (p<0.05) between duration of labour, previous catheterization and previous fistula repair with the development of significant bacteriuria after surgery for VVF

Microorganisms cultured from 60 urine samples of post repaired VVF patients

The uropathogens isolated from the 60 out of the 138 urine samples analyzed and their frequencies are as shown on table IV. All the bacteria cultured from the urine samples were Gram negative bacteria, Gram positive bacteria were not isolated and none of the patients had mixed infections. Four Gram negative bacteria were isolated from the 60 urine samples that were positive for significant bacteriuria; Pseudomonas aeruginosa was the most predominant bacteria isolated from 21 (35.0%) urine samples, followed by Proteus mirabilis from 15 (25.0%) urine samples, then Escherichia coli from 14 (23.3%) samples and finally Klebsiella pneumoniae from 10 (16.7%) urine samples. Though all the

microorganisms were found among those with the risk factors for bacteriuria, the frequencies vary. Almost all the Pseudomonas-95.2% (20/21) and 93.3% of the Proteus spp (14/15) were cultured from the urine samples of the patients who had previous

Discussion

The study found the microorganisms implicated in development of significant bacteriuria among post repaired VVF patients at LFC Kano as well as their antibiotic sensitivity pattern. This will allow the use

Table 5: Antibiotic sensitivity pattern of isolated microorganisms

Antibiotics Used	Bacteria isolated from urine samples							
	P. aeruginosa		Proteus mirabilis		Escherichia coli		Klebsiella pneumoniae	
	Sensitivity n (%)	Resistance n (%)	Sensitivity n (%)	Resistance n (%)	Sensitivity n (%)	Resistance n (%)	Sensitivity n (%)	Resistance n (%)
Ciprofloxacin	19(90.5)	2(9.5)	12(80.0)	3(20.0)	13(92.9)	1(7.1)	8(80.0)	2(20.0)
Levofloxacin	4(19.0)	17(81.0)	15(100)	0(0.00)	11(78.6)	3 (21.4)	0(0.00)	10(100)
Gentamicin	6(28.6)	15(71.4)	14(93.3)	1(6.7)	12(85.7)	2 (14.3)	8(80.0)	2(20.0)
Meropenem	15(71.4)	6(28.6)	15(100)	0(0.00)	0(00.0)	14(100)	1(10.0)	9(90.0)
Ceftriaxone	17(81.0)	4(19.0)	7(46.7)	8(53.3)	10(71.4)	4(28.6)	9(90.0)	1(10.0)
Amoxicillin	1 (4.8)	20(95.2)	0(0.00)	15(100)	1(7.40)	13(92.9)	1(10.0)	9(90.0)
Tetracycline	2 (9.5)	19(90.5)	11(73.3)	4(26.7)	0(0.00)	14(100)	1(10.0)	9(90.0)
Cefuroxime	17(81.0)	4(19.0)	10(66.7)	5(33.3)	11(78.6)	3(21.4)	9(90.0)	1(10.0)
STX	0(0.00)	21(100)	0(0.00)	15(100)	0(0.00)	14(100)	0(0.00)	10(100)

STX - Trimetoprim/Sulphamethoxazole, P. aeruginosa - Pseudomonas aeruginosa

history of surgical fistula repair and/or urethral catheterization; whereas 57.1% (8/14) of E.coli and 60% (6/10) of the Klebsiella pneumonia isolated were from the patients who neither had previous fistula repair nor surgery.

Antibiotics sensitivity and resistance of the isolated organisms

The antibiotic sensitivity and resistance of the isolated organisms to the various antibiotics used for the study is as depicted on table V. All the isolated bacteria showed varying levels of susceptibility and resistance to the different antibiotics used for testing in the study. There was high level of sensitivity to Ciprofloxacin, Ceftriaxone and Cefuroxime by the microorganisms though at different levels, with exception of Proteus which showed low level of susceptibility to Ceftriaxone. The Pseudomonas and Proteus spp were sensitive to Meropenem whereas E.coli and Klebsiella shows high level of resistance to it. Susceptibility to Gentamicin was with Proteus mirabilis, E.coli and Klebsiella pneumonia; and only Proteus mirabilis and E.coli were sensitive to Levofloxacin, Proteus mirabilis was the only organism sensitive to Tetracycline. There was high level of resistance to Amoxicillin and total resistance to Trimetoprim/Sulphamethoxazole from all the four bacteria isolated.

of prophylactic antibiotics among this group of patients before surgery so as to prevent surgical failure as well as UTI and its complications.

The incidence of significant bacteriuria among post repaired vesicovaginal fistula patients at Laure fistula center from this study was 43.5%. This incidence is quite high considering the risk of surgical failure and the complications which may arise when the infection proceeds to urinary tract infections, if left untreated. This is not surprising because various studies from some parts of Nigeria indicated that patients with vesicovaginal fistula are susceptible to bacterial colonization of the genitourinary tract [1,5]. Study carried out at Laure fistula center reported 9.2% prevalence of recurrent urinary tract infection among these patients [8] which the authors opined that it may be attributed to the presence of bacteriuria which was left undetected and untreated. The study used only symptoms of UTI not laboratory examination, hence the lower prevalence

The finding from this study is closely in keeping with what was reported from a similar study conducted in south-eastern Nigeria which found a prevalence of 48.5% [24]. A higher percentage (76.1%) of significant bacteriuria among post repaired vesicovaginal fistula patients was recorded from the same region from another study [25]. The higher percentage from the study may be due to lack of restriction at recruitment of the patients who

already had bacteriuria or the risk factors for bacteriuria before fistula repair, as was done in this study; likewise the method of sample collection which was not clearly documented in their study may also be a contributory factor to the higher prevalence [24,25]. The difference may also be attributed to the fact that their study reported the prevalence (new and existing cases) of bacteriuria after VVF surgical repair whereas only incidence (new cases) were reported from this study. This study was interested on new cases of significant bacteriuria after surgical repair for VVF in order to find out if these patients are at risk of developing significant bacteriuria following surgical procedure and as well as the prolonged urethral catheterization following surgery as documented in some literatures [9,24].

Pseudomonas aeruginosa (95.2%) and Proteus mirabilis (93.3%) were the most frequent bacteria isolated from urine samples of the VVF patients who had previous urethral catheterization and surgical repair for their fistula. This is in agreement with the study which reported that Gram negative bacteria are commonly found in urine samples of patients with indwelling catheter [1]. Pseudomonas and Proteus spp being the most common organisms associated with biofilm growth on catheters. The risk factors being long duration on catheterization, absence of antibiotics, female gender and colonization of the urine bags [26]. Pseudomonas and Proteus spp were isolated in high frequencies from the urine samples of these patients in this study, reasons may be the indwelling catheters are left in situ for two weeks, and prophylactic antibiotics were not given pre/post-operative.

The organisms isolated from this study were highly sensitive to Ciprofloxacin, Ceftriaxone and Cefuroxime; but there were less sensitivity with Meropenem, Levofloxacin and Gentamicin. This was in keeping with what was obtained from South-eastern Nigeria [24,25] which reported that the organisms were all sensitive to Ciprofloxacin, Gentamicin, Ceftriaxone, Cefuroxime and Levofloxacin though at varying levels. The findings from Ethiopia [21,27]. were contrary because the organisms showed high level of resistance with Ceftriaxone, Gentamicin and Ciprofloxacin. Proteus mirabilis was 100% sensitive to Meropenem and 73.3% to Tetracycline from this study but the opposite were reported from Abakaliki [24] and Ethiopia [21,27], where the Proteus spp isolated were completely resistant to Meropenem and Tetracycline. The differences in sensitivity from the various studies buttresses the literature which reported that antibiotic sensitivity pattern varies from regions and geographical locations [14].

Most notably, from the finding in this study was that almost all the isolated bacteria were resistant to the commonly used antibiotics such as Trimetoprim/Sulphamethoxazole, Amoxicillin and Tetracycline. There was 100% resistance to Trimethoprim/sulphamethoxazole by all the isolated organisms; as similarly reported from the two studies from Abakaliki where total [24] and high resistance [25] to this drug were reported. The resistance to Tetracycline was reported by other studies reviewed [21,24,25,27]. as was found in this study. It was clearly documented that there is an increase in the level of resistance to commonly used antibiotics worldwide [28].

Conclusion and recommendations

The incidence of significant bacteriuria after surgical repair from this study was high considering the risk of surgical failure and the complications that may follow UTI if develop. The study also showed that VVF patients are at risk of developing significant bacteriuria after surgical repair, the possible risk factors were previous urethral catheterization, duration of labour of more than 24 hrs and previous fistula repair. Gram negative bacteria were implicated and were sensitive to Ciprofloxacin, Ceftriaxone and Cefuroxime; and resistant to Amoxicillin, Tetracycline and Trimetoprim/Sulphamethoxazole with exception of Proteus mirabilis which was sensitive to Tetracycline. Therefore the use of prophylactic antibiotics before or immediately after surgery may prevent the occurrence of bacteriuria which may progress to UTI and its complications as well as breakdown of the surgical correction of the fistula. Policy makers should consider making a policy on use of prophylactic antibiotics before or after surgery for VVF at LFC, Kano in form of protocol for managing VVF patients, ciprofloxacin should be used as the prophylactic antibiotics of choice for VVF patients before or after surgical repair because all the organisms identified were sensitive to it; and it is affordable, well tolerated and readily available and all VVF patients with risk factors for urinary tract infection should be screened and manage appropriately before surgery.

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Received = 16/11/2020
Accepted = 24/10/2021