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# Common Genitourinary Fistulas in Rural Practice: Treatment and Management

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## Abstract

Acquired genitourinary fistulas are common in rural practice. They are pathological communications between the urinary and genital tracts, or between either of the tracts and gastrointestinal tract or skin. Vesicovaginal fistula is the commonest and most devastating. They may result from prolonged and obstructed labor, injuries during obstetric, gynecologic, pelvic and urologic procedures, circumcision, fall from heights, road traffic accidents and female genital mutilation. They present as urinary leakage with characteristic odor. Diagnoses are mainly clinical and confirmed by dye tests, contrast radiography and endoscopy. Treatment is individualized according anatomic sites and etiology. Timing of repair is of essence; delayed repair for obstetric and early for focal injuries. Multidisciplinary team approach and cooperation is encouraged in the management of some of these cases. The sustenance of the 2 – way referral system is emphasized in cases beyond the scope of rural practice. Repairs when undertaken by skilled compassionate fistula surgeons with attention to principles of fistula management and surgical treatment, success rate can approach 90%. Interposition of vascularized grafts have improved success rate. The burden of this condition will be reduced through integration of rural practitioners in the preventive strategies of health education of the public and girlchild; improvement of healthcare, education and transportation infrastructures.

**Keywords:** Common, Genitourinary, Fistula, Rural, Practice

## 1. Introduction

Genitourinary fistulas are abnormal tracts between the genital and urinary tracts. Abnormal tracts connecting the urinary system to any structure of the pelvic floor [1], gastrointestinal tract and the skin are also regarded as urinary fistulas [2]. Obstetric fistula is an abnormal hole connecting the vagina to the bladder (VVF), the rectum (RVF), the ureter (UVF) or a combination of these which leads to uncontrollable leakage of urine or feces or both through the vagina, and resulted usually as a complication of difficult labor. Urinary fistulas are severe physical, social and psychological debilitating conditions [3]. It presents as a surprise, taking the patient and caring physician unawares. The commonest type, vesicovaginal fistula (VVF) is still very common in the rural areas especially in Northern Nigeria, [4] and Ethiopia [5]. Thus, this condition is basically a rural disease. Rural area is characterized by meager earnings, low education and poor infrastructure [6]. In the

developing countries the attending healthcare worker may be a Traditional Birth Attendant (TBA), traditional healer, quack, midwife, medical officer, obstetrician and gynecologist, surgeon or urologist. In the context of this work, the rural practitioner is a qualified medical doctor practising in the rural area, and is available and accessible to those who suffer from genitourinary fistulas.

The questions are, “will the integration of rural practitioners in the efforts towards elimination of obstetric fistulas reduce the prevalence and burden of the conditions?” What roles will the rural practitioner play in the treatment and management of genitourinary fistulas?

The true incidence of genitourinary fistulas in the developing countries is not known, [7] but some authors have put rates for VVF at 1–3 per 1000 deliveries [8], 3.5 per 1000 births [9] and 5–10 per 1000 deliveries [10]. In contrast VVF is no longer common in the developed countries as a result of improved obstetrics care; and results mainly as a complication of pelvic surgery, malignancy and radiotherapy [11].

This chapter will dwell on fistulas caused by trauma, including obstetric and iatrogenic, and its aim is to highlight the strategic position of rural practitioners in the prevention of genitourinary fistulas, the benefits that will be derived from their education and training on the subject matter, and to suggest a framework for their roles in the treatment and management of these conditions.

## 1.1 Objectives

The objectives of this work are to:

- a. Rekindle attention to the burden of genitourinary fistulas in the rural areas.
- b. Emphasize the importance of preventive strategies and stratify them for easy identification of roles and levels of participation by rural practitioners and specialized centers.
- c. Empower the rural practitioner with information to identify and specify complex fistula varieties that require referral to specialized centers.
- d. Prepare the rural practitioner to initiate informed early treatment and care for the genitourinary fistula patient.
- e. Rekindle advocacy and solicit for regular fistula missions to reduce the prevalence and number in the waiting list.
- f. Engage and train interested rural practitioners on effective preventive strategies and efficient fistula surgery, as they are more available and accessible to these rural fistula patients.

## 2. Etiology

### 2.1 Causes of genitourinary fistulas

Obstructed labor is the main cause of VVF in the rural areas accounting for between 56 and 97.88% in some series [4, 12–16].

Other causes of genitourinary fistulas in the developing world are well reported, [4, 5, 7, 9, 10, 12–17], and shown on **Table 1**.

SN	Etiology	Type(s)
1	<b>Obstetric</b> Obstructed labor. Injury to the bladder during cesarean section. Uterine rupture into the bladder. Perineal tear during childbirth. Forceps lacerations	Vesicovaginal fistula, Rectovaginal fistula, urethrovaginal fistula. VVF, vesicocervical fistula. Vesicouterine fistula. Rectovaginal fistula. VVF, RVF urethrovaginal fistula.
2.	Gynecologic surgery. Abdominal hysterectomy. Vaginal hysterectomy. Myomectomy. Surgery on the cervix	VVF, ureterovaginal fistula. VVF, ureterovaginal fistula. Vesicouterine Vesicocervical fistula.
3	Other pelvic surgery	VVF, ureterovaginal ureterocervical.
4	Harmful cultural practices. Gishiri cut, female circumcision	VVF, Urethrovaginal fistula
5	Miscellaneous Prolonged and neglected suprapubic catheter. Male circumcision Malignancy Infections Coital injury	Vesicocutaneous fistula Urethrocutaneous fistula. VVF, RVF VVF, VVF

**Table 1.**  
*Etiology of genitourinary fistulas in rural practice.*

**Table 2** summaries the etiology of genitourinary fistulas encountered by the author in rural practice from January 2000 to December 2020. Two of the VVF cases were associated with big vesical calculi; one of them had also vesicocutaneous fistula. Urethrovaginal fistulas are not common as noted in **Table 2**. They were complications of vaginal hysterectomy and consequences of vaginal procedures by quacks and homeopaths.

Rectovaginal Fistulas and other urinary fistulas are less common. RVF resulted from trauma mostly, and when it occurred during obstructed labor, it was associated with VVF. Urethrocutaneous fistulas in infants resulting from circumcision mishaps were not rare. These procedures were performed by traditional health attendants, hospital attendants, nurses, midwives and medical officers. The surgical residents at the Federal Medical Center Owerri, Nigeria perform circumcision under the supervision of team consultants since 2000. The less commonly occurring vesicouterine fistula (VUF) and vesicocervical fistula are complications of difficult cesarean sections (CS) [16], and uterine rupture. When urinary fistula occurs as a complication of treatment the effect is devastating to the trained care giver even though the propensity for medicolegal litigation is very low in the rural areas. The patient often stays isolated, withdrawn, miserable and depressed. The husbands and relatives of patients in my experience have been supportive and cooperative in contrast to other reports especially from northern Nigeria [3–10, 18].

### 2.1.1 Risk factors

The risk factors related to the development of urogenital fistulas in the rural areas that appear in the literature, [7, 12, 14, 16, 23] are enumerated in **Table 3**. Other factors especially in the developed world include periurethral bulking, Burch Culpo suspension, urethral diverticulum repair, and loop excision of the cervix [24–28]. Endometriosis, gynecologic cancer, pelvic irradiation, schistosomiasis, intrauterine device and neglected pessary have also been reported [12, 14].

SN	Etiology	Type(s) of Fistulas(s)	No. of cases	Remarks	
1.	Obstetrics Obstructed labor	VVVF 30, RVF 2	32	Referred by medical officers, obstetrician and gynecologists, midwives or directed by relatives or friends. There were attempted repairs in 19. The RVFs occurred in association with VVF.	
a	Cesarean section	VVF 9, UVF 7, VUF2	18		
b	Uterine rupture into the bladder	VUF 2, VCF 2	4		
c	Perineal tear	RVF 6	6		
d	Forceps injury	VVF 2, RVF 1	3		
2	Post gynecologic surgery	UVF 6, VVF 4 VCF 2	12	Referred or invited by gynecologists	
a	Abdominal hysterectomy	VVF4, Ur VF 3, EVF 1	8		Referral from gynecologists.
b	Vaginal hysterectomy	VVF 4	4		
c	Myomectomy				
3	Pelvic and inguinal surgeries	VCuF 2	2	The fistulas from urology procedures arose from the wounds of suprapubic cystostomies that failed to close spontaneously after removal of catheter.	
a	General surgery	RUF 1, VCuF 8	9		
b	Urology	VCuF 7	7		
c	Inguinal herniorrhaphy	VVF 2	2		
4	Complications of procedures by unqualified personnel	VVF 2, UrVF 1	3	Injury to bladder sliding with hernial sac. Treating cystocele Treating Uterovaginal Prolapse	
a	Homeopaths				
b	Quacks				
4	Circumcision	Ur C F 12	12	Infants.	
5	Fall From height	VRF 2, RUF 2	4	Fell astride sharp pointed object. All males	
6	Violence	RUF4, UrCF3, VEF2,	10	One patient was shot with locally made hand shotgun forcefully inserted in his anus by armed robbers One patient was pinned in a bent over position at the waist and stabbed through the anus with a dagger.	
a	Gunshot	VCuF 1: from base of bladder to upper left thigh.	2		
b	Stab injury	RUF 2			
7	Miscellaneous	VVF 1	1	Lady farmer fell onto a cassava stem stump while harvesting cassava root by uprooting method.	
a	Retained gauze	RVF 1	1		
b	After vaginal surgery	UrCF 1	1		
c	Occupational hazard	UrVF 1	1		
d	Infection	142			
	Foreign body in the urethra				
	Total				

Key: VVF = Vesicovaginal fistula, RVF = Rectovaginal fistula, VUF = Vesicouterine fistula, UVF = Ureterovaginal fistula, VCF = Vesicocervical fistula, UrVF = Urethrovaginal fistula, RUF = Rectourethral fistula, VRF = Vesicorectal fistula, UrCF = Urethrocutaneous fistula, VCuF = Vesicocutaneous fistula, EVF = Enterovaginal fistula, VEF = Vesicoenteric fistula.

**Table 2.**  
*Genitourinary fistulas encountered by the author in rural practice.*

Contributory factors to this burden are poor transport infrastructure, lack of skilled medical personnel and collapsed public healthcare delivery system [6]. Specialists in surgery and obstetrics and gynecology show little interest in fistula surgery, and rarely practice in rural areas. Bad roads prolong the time interval between onset of labor and arrival to hospital or make it impossible for the journey [7, 9].

SN	RISK FACTORS
1	<b>Sociocultural and general considerations</b>
	Young age [7–10].
	Early marriage [3–10, 18].
	Early pregnancy [3–10, 18, 20, 21].
	Pregnancy [14–18].
	Cephalopelvic disproportion [7].
	Female genital mutilation [3–7].
	Ignorance [18].
	Illiteracy [7–18, 21, 22].
	Poverty [18].
	Late presentation to hospital [14–18].
	Violence, youth restiveness, armed robbery banditry, armed conflicts.
	Cultural restrictions of women's movement [18].
	2
Prolonged labor [3–5, 9, 21, 23].	
Obstructed labor [3–5, 9, 12].	
Cesarean hysterectomy [12–15].	
Cesarean section [10–12].	
Repeat Cesarean Section.	
Operative vaginal delivery [12].	
Unskilled obstetrics care [14, 18].	
Inappropriate obstetrics care (labor at home, in the church).	
3	<b>Gynecologic</b>
	Hysterectomy [4, 5, 9, 12, 15, 21, 23].
	Anterior colporrhaphy.
	Myomectomy.
	Induced abortion.
	Urinary bladder stone.
	Infections: Schistosomiasis, Tuberculosis, Lymphogranuloma venereum.
	Vaginal foreign body.
	Retain gauze after vaginal surgery.
Urethral and bladder foreign body.	

**Table 3.**  
*Risk factors related to the development of genitourinary fistulas in rural areas.*

In southern Nigeria many roads are not passable during the peak of rainy season: July–September. Brain drains affect developing countries seriously as their trained healthcare professionals relocate or emigrate to Europe, America, Canada, Saudi Arabia for greener pastures [29, 30]. In this situation, these hapless young pregnant women turn to the familiar, available and accessible traditional healers, quacks, traditional birth attendants and poorly trained midwives whom they can afford their services for obstetrics care.

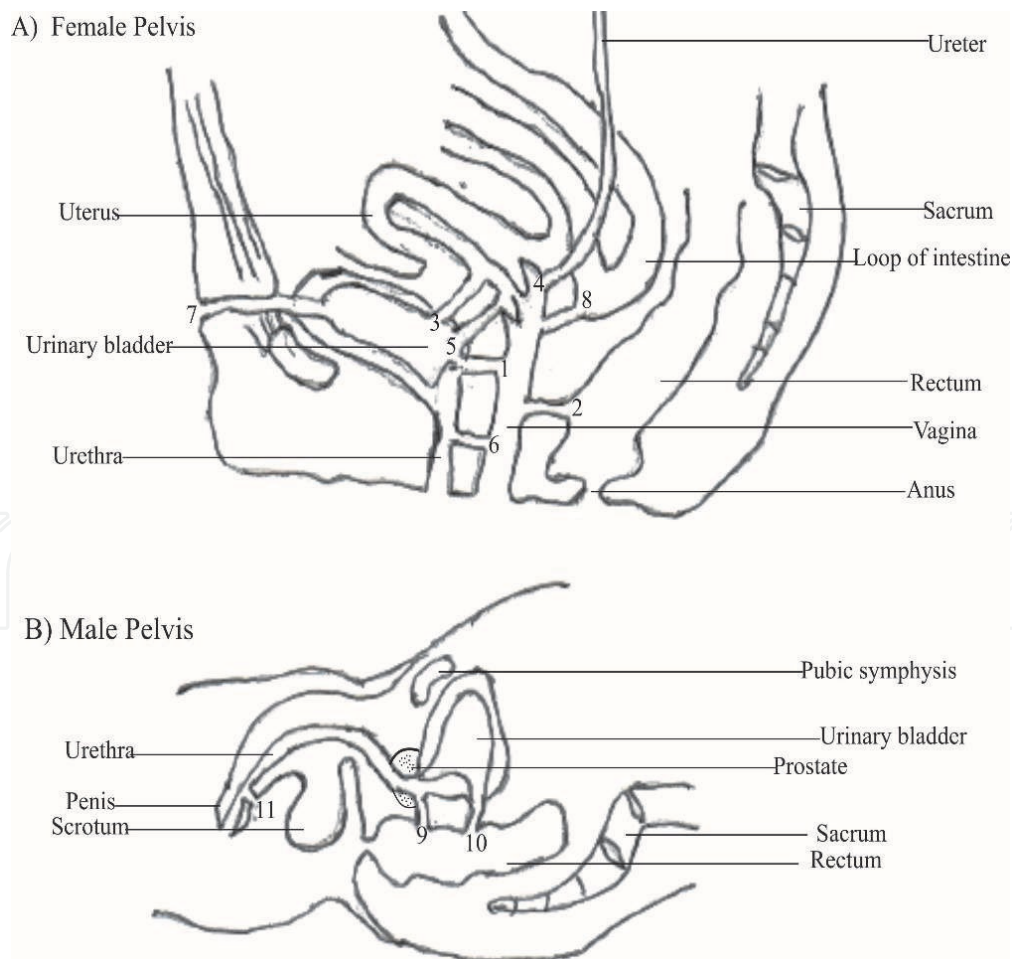


## 2.2 Classification and pathogenesis of genitourinary fistulas

The anatomic classification of urinary fistulas has been mentioned in **Table 2**. **Figure 1** shows them graphically.

The exact pathological mechanism in the formation of obstetric fistula is not clear. However, the compression of maternal soft tissues of bladder base, urethra, cervix vagina and rectum posteriorly, against the unyielding pubis and sacral spine during prolonged obstructed labor; with the resultant ischemia, epithelial necrosis and subsequent sloughing had been postulated as the pathophysiologic process in the formation of obstetric fistulas by many workers in the developing world [4–10, 14, 16, 20–22, 24].

Arrowsmith et al. described obstetric fistula formation within the spectrum of “obstructed labor injury complex” [20]. Urinary fistulas arising from surgical complications, wounding from accidents and stabbing are focal injuries [7]. Gunshots are more complex as they are associated with the phenomena of “tract cavitation and expansion” injuries [31]. Fistulas resulting from obstetric and high velocity gunshot injuries are larger. Ischemia, erosion and migration maybe responsible for the formation of fistulas by foreign bodies in the vagina, bladder, urethra or retained gauze during vaginal surgery.



**Figure 1.**

(A and B): Anatomic sites of Urinary fistulas. 1-Vesicovaginal fistula, 2-Rectovaginal fistula, 3-Vesicouterine fistula, 4-Ureterovaginal fistula, 5-Vesicocervical fistula, 6- Urethrovaginal fistula, 7- Vesicorectal fistula, 8- Enterovaginal fistula, 9-Rectouethral fistula, 10-Vesicorectal fistula, 11-Urethrocutaneous fistula, Vesicoenteric fistula is not shown.

### **3. Clinical features**

#### **3.1 Clinical presentation**

Leakage of urine is the usual complaint. Discharge of feces from the vagina indicates rectovaginal fistula, alone or in association with VVF. The genitourinary fistulas are associated with offensive urine odor. There may be leakage of urine from the vagina, anus or through a hole in the skin depending on the type and location of the fistula. The patient may give a history of prolonged or obstructed labor prior to the leakage by 3 to 10 days in the case of VVF. History of assisted vaginal delivery, before the leakage may indicate VVF [17]. Cesarean section, hysterectomies or any other pelvic surgery may precede the urinary leakage by 10--14 days. VVF, UVF, VCF, VUF, VCuF and RUF may result from these obstetric and pelvic surgeries. The differential diagnoses of VVF include stress, urge and over flow incontinence. Pain is not usually associated with VVF, and urinary leakage in VVF may commence immediately after catheter is removed.

VVF may present many weeks after pelvic surgery. A 65 years old lady presented to the author with offensive vaginal discharge and urinary retention 10 weeks after vaginal hysterectomy by a gynecologist. It turned out to be VVF resulting from eroding infected gauze that migrated into the bladder and pointing at the tip of the urethra. The gauze probably used to pack away the bladder must have been forgotten in the wound during the surgery. The patient may present with with a referral letter indicating the definitive or provisional diagnosis. In developing countries difficult urinary fistulas are referred to the urologist or fistula centers. Frequency, urgency, dysuria, vaginal discharge, bleeding or pain during coitus may be present. There may be irritation, rash or dermatitis and whitish crystal formation on the skin surrounding the fistula, **Figure 2**.

History of accidentally falling astride a sharp object, stab, or gunshot injury and sustaining a penetrating injury in the perineum or suprapubic region may be elicited; leakage of urine from the anus may suggest VRF or RUF.

#### **3.2 History**

History from clinical presentation as noted above will guide the clinician towards the likely fistula he/she is dealing with.

#### **3.3 Physical examination**

A general examination should be performed noting nutritional state of the patient and comorbidities. In rural practice nutritional anemia is common and they need to be addressed to enhance wound healing.

#### **3.4 Pelvic examination**

Inspection of the perineum for sinuses, fistulas or associated tears; followed by digital bimanual and bivalve speculum examination which assist in identifying the fistula; and provides the opportunity to note the location, size, number and whether simple or complex. An idea about inflammation, fibrosis and pliability of tissue surrounding the fistula and that of the introitus and vagina are ascertained during the examinations. Stenosis and fibrosis of the introitus and vagina sometimes complicate VVF [7, 32].





**Figure 2.**  
*Vesicocutaneous fistula showing whitish phosphate crystals.*

Ongoing inflammation, infection and induration around the fistula are contraindications for immediate repair.

#### **4. Assessment and diagnoses of genitourinary fistulas**

##### **4.1 Dye test in VVF management**

###### Indications

- i. Confirmation or identification of small and hidden fistulas that cannot be verified by direct vision examination.
- ii. To differentiate between VVF and UVF
- iii. Differentiate between urogenital fistula and urinary incontinence

###### Method

It can be performed in the treatment room or theater. Methylene blue or indigo carmine is mixed with sterile water and instilled into the urinary bladder under gravity without spillage. A sterile gauze or cotton ball is placed at the vault, mid and distal vagina. Patient is asked to walk about and return for inspection after 30 minutes.

## Interpretations

- If the gauze at the vault is wet and not stained, a ureterovaginal fistula is suspected.
- If the gauze at the vault is stained, a high VVF is suspected
- If the gauze at the mid vagina is stained a mid-vesicovaginal fistula is suspected
- Staining at the most distal part of the gauze in the distal vagina near the introitus suggests urinary incontinence.
- If the staining of the gauze at this distal vagina spares the most distal portion a urethrovaginal fistula is suspected.
- In the case where UVF is strongly suspected the vagina is carefully cleaned and test is performed again with fresh gauze in the vagina and intravenous indigo carmine given. Blue staining of the proximal end of the gauze confirms UVF. An intravenous urogram can also be used to confirm it where it is available.

## 4.2 Cystoscopy

Ideally cystoscopy should be performed for patients presenting with VVF. However, in the setting of rural practice in developing countries of Africa, such necessary services are not always available. The author uses a hand-held battery-operated portable cystoscope, **Figure 3**, to scope urinary fistula patients whenever necessary in the rural setting. It is very cheap to operate. Apart from visualizing the fistula, it helps in assessing the location, and size, whether simple or complex, and location of the ureteric orifices in relation to the fistulas. This is important in planning and choosing the approach for the repair [2, 32].



**Figure 3.**  
*Portable hand-held battery-operated cystoscope (TRICOMED Surgical Limited, England).*



**Figure 4.**  
*Retrograde urethrogram showing a fistulous connection between bulbo-membranous urethra and rectum.*

### 4.3 Imaging

Imaging may be needed, but most hospitals in rural practice lack imaging facilities. Patients who could afford contrast studies are referred to facilities that have them to access studies as intravenous urogram, with cystogram in UVF and VVF, retrograde urethrogram (RUG), **Figure 4** and micturating cystourethrogram (MCUG) in RUF, urethrovaginal, urethrocutaneous, and vesicocutaneous fistulas; barium enema, vaginography in RVF, and contrast CT scan. Many of our patients are poor and cannot afford these tests. In the rare situation where the fistulas could not be identified with office procedures despite a suggestive history, Rony A Adam [32] described a process where the patient is given phenazopyridine. (Pyridium) and wear a series of gauze at home over a long period. The gauze balls are placed separately in different plastic bags and brought for inspection later. Patients are instructed on proper conduct of the test in order not to contaminate the gauze during insertion.

## 5. Prevention

Urinary fistulas especially obstetric when they occur is associated with misery and isolation, expensive and difficult to treat. Healthcare financing is low in many developing countries [33] and may not be able to accommodate the management of genitourinary fistulas. Nigeria is perceived to bear the world's heaviest burden of obstetric fistulas, followed by Ethiopia, Uganda and Sudan [34]. In Nigeria, 12,000 fresh cases occur annually while 150,000 in the pool await repair [35]. Only 43% of births are attended to by skilled medical personnel in Nigeria [36]. Thus, some of these common genitourinary fistulas are avoidable. Hence some authors, National strategic Framework for Elimination of Obstetric Fistula in Nigeria, Fistula Foundation, and Professional groups recommended preventive strategies for genitourinary fistulas [34, 36]. The rural area is the veritable ground for it, and rural practice is one of the best channels to use.

Three perspectives can be recognized: primary, secondary and tertiary.

### 5.1 Primary prevention

The goal is to remove or stop the factors known to cause or contribute to urinary fistula formation. Health education and improvement on community health.



Involve community healthcare stakeholders as traditional rulers, village heads, women, youth and religious leaders, teachers and traditional birth attendants, traditional healers and heads of healthcare facilities in this program. Emphasis should be to discourage girlchild marriage, early pregnancy, delivery at home or in the church, conducting labor for a long time before referring to a superior facility, and female genital organ mutilation. Educate the community to embrace the attitude to have deliveries in suitable and efficient healthcare facilities. Encourage the girlchild to go to school and be able to comprehend the dangers in early marriage and pregnancy. Government to upscale health and transportation infrastructures to ensure timely comprehensive emergency obstetric care to all women as is obtainable in developed countries where the condition is eradicated. Effective training of midwives to conduct safe vaginal deliveries, and medical doctors to conduct safe vaginal deliveries, cesarean sections, gynecologic and pelvic surgeries. Regular workshops for public and private primary healthcare staff to monitor and recognize prolonged labor for quick referral. Multidisciplinary team approach for anticipated difficult cases. It can be rewarding to invite an experienced specialist or expert to the local center. The author has been invited by gynecologists and medical officers to join their surgeries in more than 35 instances. Part time or visiting appointments can be offered to such experts.

## 5.2 Secondary prevention

The goal is to recognize and repair injuries caused to urinary and genital tracts during surgeries; and to offer early attention and treatment to genitourinary injuries from other causes. The use of appropriate suture material and size in the surgery on urinary tract; and safe surgical conduct. Improved operating light is very important. Many theaters in rural practice use improvised theater lamp [6]. The author uses LED head light gear, **Figure 5** to augment whatever light that is available. It is pertinent for the pelvic surgeon to appreciate the applied anatomy of pelvic structures, and note that the trigone is situated at the anterior aspect of upper 1/3 of the vagina, and the cervical os is at the base of the trigone (inter ureteric ridge).



**Figure 5.**  
*Rechargeable LED operating headlight gear.*

### 5.3 Tertiary prevention

Involves interventions geared towards prevention of complications from urinary fistulas. Treat infections, skin care, nutritional support, correction of nutritional deficiencies and anemia, social support and community reintegration to avert depression, abandonment and divorce. Advocacy for bilateral cooperation and collaboration to sponsor obstetric fistula repairs and training for more fistula surgeons. Repairs should be undertaken by skilled fistula surgeons. Nigeria|Fistula Foundation in her recent report stated that it has provided 9,464 fistula repair surgeries to Nigeria women since 2010 [36].

## 6. Treatment

### 6.1 Principles of fistula management

In addition to thorough evaluation of the genitourinary fistula patient, the following management principles are important. They should have adequate nutrition, successful treatment of infection, effective urinary drainage, removal or by pass of any distal obstruction and rule out any associated malignancy [2, 32, 37]. Adherence to the principles of surgical repair of urogenital fistulas is paramount to successful repair [2, 4, 5, 7–10, 14, 32, 37]. These include optimal operating light, adequate exposure of the fistula, excision of devitalized and ischemic tissues, removal of foreign bodies from the fistula, careful dissection, keeping to anatomical plane between organ cavities, use of small sized delayed absorbable sutures on small automatic needles, water tight closure, use of well vascularized flaps for repair and support, multilayer closure, non-overlapping tension free suture lines, stenting of urinary tract, adequate drainage after repair, prevention and treatment of infection, and adequate hemostasis.

### 6.2 Treatment of vesicovaginal fistula

#### 6.2.1 Conservative method

Conservative treatment though not popular may be attempted when patient presents early and while waiting for infection and inflammation to subside. The author has recorded success on a few cases that ranged from 0.5 cm – 1.5 cm, **Table 4.** Small fistulas with oblique tracts have been reported to be amenable to conservative management [2].

#### 6.2.2 Surgical repair of VVF

VVF is commonly classified as vesicocervical, juxtacervical, midvaginal suburethral, VVFs [8]. Other classification methods exist [38, 39].

Fistula repairs should be undertaken by “tutored and trained fistula surgeon” who has passion to ameliorate the suffering of patients. Some medical officers belong to this group [38]. The best opportunity to achieve a successful repair is at the first attempt [2–8]. There should be no room for trial and error. The trainee surgeon should be assisted and monitored by experienced fistula surgeons. In rural surgery for VVF, the best outcomes do not often come from trained specialists as obstetrician and gynecologists; general surgeons, urologists and plastic surgeons.

Timing of repair



SN	Age	Sex	Etiology	Type	Time between onset of symptoms or injury and presentation (Days)	Intervention	Duration of treatment (weeks)
1	65	F	Erosion of retained vaginal wound gauze into the bladder.	VVF	8	Extraction of the gauze, urethral catheterization, appropriate antibiotic cover.	5
2	28	M	Stab injury through the anus	Rectourethral fistula	4	Urethral catheterization/stent	4
3	12	M	Fall from height with penetration of stick stump through the rectum into the bladder	Vesico-rectal fistula	3	Suprapubic cystostomy with continuous bladder drainage, defunctioning colostomy, appropriate antibiotics.	6
4	13	M	Accidental gunshot injury to the pelvis with exit wound at the perineum	Vesico-rectal fistula.	2	Defunctioning colostomy, Suprapubic cystostomy with continuous bladder drainage. appropriate antibiotics cover.	6

**Table 4.**  
*Cases of genitourinary fistulas treated with conservative method.*

In rural practice, obstetric fistula is commonest. Patients arrive late [18–10]. In the case of those who arrive early, we allow 8–12 weeks. If the fistula was iatrogenic or resulted from any other focal injury, we close the fistula as soon as infection is controlled. Controversies surround the timing of repair of VVF [4, 8, 14, 37, 38].

#### Approach

Whoever is undertaking VVF repair must be familiar with both vaginal and abdominal approaches, techniques and maneuvers. One approach may not be suitable for every case [40]. Most surgeons in the developing world use the vaginal approach [4–9, 12, 16, 37, 38].

#### 6.2.2.1 Anesthesia

Anesthesia should be simple, safe and easy in rural practice. Heavy 0.5% Bupivacaine spinal and intravenous (iv) Ketamine anesthesia; conscious sedation with diazepam and pentazocine injections with local infiltration anesthesia of 1 or 2% lidocaine or lignocaine with or without adrenaline are commonly used. Sometimes iv Ketamine is used to supplement spinal anesthesia in lengthy surgical sessions. Ketamine is safe, 1–2 mg/kg for induction and 25–50 mg iv boluses in titrated doses [41]. Atropine 0.6 mg, diazepam 5 mg stat and given 30 minutes before the start of operation. Atropine prevents secretions and bradycardia, while diazepam prevents dysphoria and psychotomimetic effects during recovery. Bupivacaine spinal anesthesia may last up to 3 hours and is superior to 2% heavy lidocaine spinal

anesthesia which may last for 90 minutes. Endotracheal intubation anesthesia is rarely used in rural practice [6].

#### 6.2.2.2 Tools for VVF-repair

Tools for VVF repair is shown on **Table 5**. Two assistants are required in prone position. One will be holding up the posterior vaginal wall with a Sim's speculum [37].

#### 6.2.2.3 Preoperative counseling

It is done in the language she will understand when conservative management has failed. Expectations are discussed, especially that the repair may fail, but hope will not be lost. The need for catheterization for 2–3 weeks, length of hospital stays; possible post-operative frequency, urgency, urgency incontinence for some time after removal of catheter. Patient is counseled thoroughly on informed consent and reminded that challenges may warrant change of plans intraoperatively.

SN	Item	Average quantity required
1	Operating table with stirrup accessories	1
2	Size 3, 12 cm, Bard parker handle	2
3	Sizes 10, 11 and curved 12 surgical blades	2 each
4	Medium and large sim's speculum	1 each
5	Short-blade Auvard (weighted) vaginal speculum	2
6	Long-blade Langenback retractors	2
7	Mosquito artery forceps: curved and straight	4 each
8	12 cm curved slender artery forceps with fine tips	4
9	Tissue forceps: Vulsellum, Allis	2 each
10	Curved 20 cm (McIndoe) light scissors	2
11	Straight stitch scissors	2
12	Standard needle holders	2
13	2- way foley catheters: sizes 16, 12, 10, 8	2 each
14	Methylene blue	1 bottle
15	Sterile water or normal saline	1, 000 mls
16	A small funnel for the catheter	1
17	Good suction machine with tubing	1
18	Sutures: 5/0 poliglecaprone (monocryl) or polyglyconate (Maxolon) or polydioxanone (PDS II); 4/0 polyglactin (vicryl) or polyglycolic acid (Dexon), 3/0 polyglactin .	6 each
19	Adrenaline 1: 1000	1 ampule
S20	2% lidocaine: plain and with Adrenaline	1 bottle each
21	Assistants	2
22	Scrub Nurse	1

**Table 5.**  
Tools for VVF repair.

#### Choice of suture materials

Small size delayed absorbable sutures ranging from 5/0–4/0, monofilament and braided multifilament from 4/0 to 3/0 with 3/8 and 5/8 atraumatic needles are recommended, **Table 5**. This minimizes the amount of suture material in the wound and still provides adequate closure of wound edges [42].

#### 6.2.2.4 Position for repair of VVF

This depends on the preference of the surgeon.

##### 6.2.2.4.1 Prone position

Prone position is used in many fistula centers where skilled and experienced anesthetists will perform cuffed endotracheal intubation inhalation general anesthesia. The specifics of prone position are well illustrated in primary surgery volume one, edited by Maurice King et al. [37].

##### 6.2.2.4.2 Lithotomy position

Exaggerated lithotomy position with slight head down position, buttocks just beyond the edge of the table.

#### 6.2.2.5 Repairing technique of VVF

The principal steps are: dissecting out the fistula, mobilizing the vaginal skin from the bladder and precervical fascia, mobilization of precervical (pubovesical) fascia, if possible, attention to ureteric orifices, closure of bladder wall, doing a second layer with the precervical fascia over the first suture layer, placement of vascularized graft when indicated and closing the vaginal skin.

##### 6.2.2.5.1 Steps in vaginal approach

- i. After spinal anesthesia, antibiotic prophylaxis is given.
- ii. Exaggerated lithotomy position.
- iii. Skin preparation and draping.
- iv. Pass size 16, 2- way Foley catheter, inflate the balloon and connect to a urine bag.
- v. Infiltrate the layer between the vaginal wall and bladder wall with adrenaline in normal saline 1:100,000. If patient is hypertensive, use plain normal saline. This facilitates dissection and reduces bleeding when the adrenaline-saline solution is used.
- vi. The fistula is dilated, and size 14 or 12, or 10 or 8, 2- way Foley catheter depending on the size of fistula is inserted into the fistula tract and the balloon inflated with 5 mls of sterile water.
- vii. Commensurate traction is applied distally on the catheter in the fistula to enhance access, purchase and exposure.

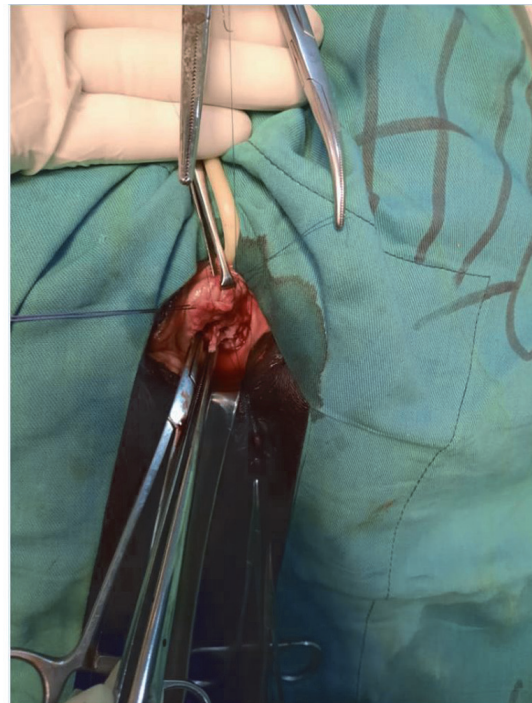
- viii. The vaginal skin is incised elliptically around the fistula. Using sharp dissection with knife and slender scissors, the vaginal skin is carefully dissected from the bladder wall for a distance of 0.5–1.5 cm, to allow for tension free closure eventually, **Figure 6A**. Some authors recommend 1 cm towards the cervix and 0.5 cm laterally [37].
- ix. Where possible separate the layer of tissue between the bladder and vagina (precervical fascia) from the bladder wall. This may be difficult in large and fibrotic fistulas. Use suture ligation with 5/0 polyglactin to control bleeding.
- x. The fistula collar, **Figure 6B**, may or may not be excised depending on the size of the fistula. In large fistulas with repeated repair attempts, conservation is prudent. In the past some workers insist on total excision of fistulous tracts and fibrous tissue [43].
- xi. Size 20, 2- way Foley catheter is placed suprapubically for drainage.
- xii. Extra mucosal closure of the bladder is done, starting at each end and coming towards the center, with 5/0 poliglecaprone (Monocryl) on a 5/8 atraumatic needle, at 3–5 mm interval. Through – and - through bladder mucosal closure can be done with good result especially in large fibrotic fistulas [37], where tissues are not very pliable or bleeding mucosal edge [32]. The ureters can be avoided by conserving fistular collar in large fistulas and doing careful extra mucosal closure. In high fistulas near the cervix the bladder is usually closed transversely and in low fistulas near the urethra the first layer is sutured longitudinally [2, 32, 37]. There are no hard and fast rules about this, the bladder should be closed in the line of least tension [32].
- xiii. The tightness of the repair is checked by instilling 200–300 mls of methylene blue normal saline solution into the bladder. More stitch is put at any leaking point, or the stitches removed, to start a fresh if the leakage is copious.
- xiv. The precervical fascia is closed if possible or the first layer is imbricated by suturing the bladder muscularis layer together with 4/0 or 3/0 polyglactin 910, **Figure 6C**. The stitches of this layer are staggered between those of the first layer so that no stitch lies on top of each other.
- xv. If the fistular is large or significant dead space exists, a graft is indicated. The bladder peritoneum can be mobilized or a Martius fat pad transpositional flap is raised and placed over the closed fistula [2, 3].
- xvi. The vaginal skin is closed perpendicular to the bladder closure line, if possible, otherwise close according to easy approximation of edges. **Figure 6D**.
- xvii. Repeat cystoscopy with intravenous indigo carmine to assess ureteric patency if available.

In Latzko technique, the fistulous tract is not excised. It is imbricated into the bladder with interrupted extra mucosal sutures on a small tapered needle [44]. The Latzko technique is versatile, simple and cost effective [45]. Many small and moderate sized vaults and high fistulas can be repaired with various versions of modified Latzko technique [46, 47].





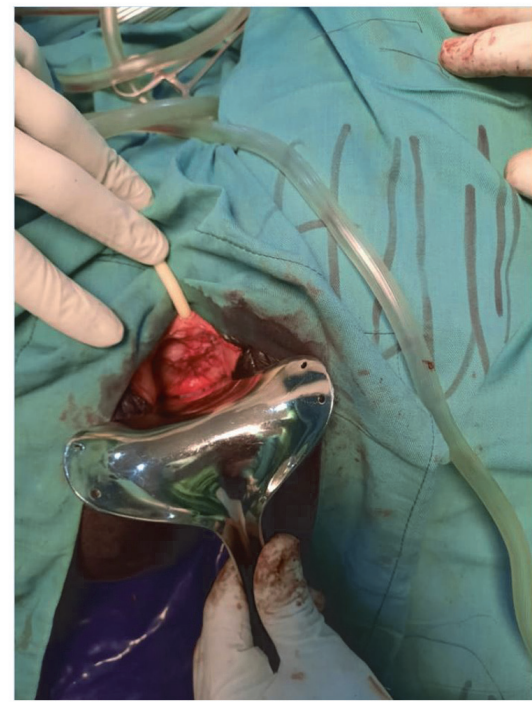
(a)



(b)



(c)



(d)

**Figure 6.**  
(a) Vaginal wall is dissected off the bladder wall. (b) Dissecting out fistula collar. (c) Closed precervical fascia. (d) Closed vaginal skin.

The vaginal flap technique made popular by Zimmern et al. and Eilber et al., results in four-layer closure when the flap is used [48, 49]. It is well illustrated by Ganabathi K, Siris L, Zimmern PE and Leach GC [50].

#### 6.2.2.6 Abdominal approach in VVF repair

Extra peritoneal and intraperitoneal techniques of VVF repairs have been well discussed by Gabanathi K, et al. and Wein AJ et al. [51, 52].



## 7. Post-operative management of VVF repair

- i. Presumptive intravenous antibiotics with 3rd generation cephalosporine in combination with metronidazole or tinidazole continued for 5 days is recommended, because of the peculiar setting of rural practice. Routine presumptive antibiotics regimen is not practiced in developed countries [32].
- ii. Efficient and effective bladder drainage. Urine bags should be emptied hourly and recorded in a chart [37]. Debate on method of catheter drainage is still on. Advocates of single urethral catheter as Collins CG et al., Trancer ML and Leng WW et al., found it effective [40, 52, 53]. Suprapubic catheter drainage alone is advocated by Blaivas JG et al. and, Carr and Webster [54, 55]. Both suprapubic and urethral catheters drainage were favored by Wein AJ et al., Eilber et al. and others [2, 32, 37, 49–51].
- iii. In transperitoneal technique, nil orally until bowel function returns.
- iv. Urethral catheter is removed when macroscopic hematuria has cleared, usually about the 3rd day in the case of double catheter drainage, and leave the suprapubic for three weeks.
- v. The catheter is spigoted at day 18 and bladder training is commenced: release urine hourly for 3 hours, then 2 hourly for 6 hours and thereafter 3–4 hourly from day 20. If all is well, catheter is removed on day 21.
- vi. Patient is observed for 2 days for normal micturition and dryness. If she leaks urine, examination in the left lateral position is done, to ascertain whether urine is coming from the fistula or urethra.
- vii. If she is leaking from the urethra, discharge and reassess at 6 weeks. If she is leaking from the fistula, recommence bladder drainage for 21 days. If she does not close, remove catheter and recommence salt (Sitz) bath.
- viii. Counsel and work her up for future repair.

### 7.1 Adjuncts

- Anticholinergics to control bladder spasms, oxybutinine 5 mg twice or three times daily; Tolterodine 2 mg twice daily, and solifenacin 5 mg daily are useful.
- Loose vaginal gauze as wick drains and changed daily. Some authors use vaginal packs after abdominal approach [2], while others do not [32].
- Estrogen may be given to enhance vaginal skin [2, 32, 50]. Estrogen is rarely used in rural practice.

#### 7.1.1 Postoperative counseling

- Sexual intercourse is forbidden for 3 months.
- Subsequent pregnancies shall be delivered by cesarean section.

## 7.2 Failure of VVF repair

Failure after repair may result from.

- a. host factors as presence of foreign body, tissue ischemia, infection, metabolic diseases as diabetes mellitus, peripheral vascular diseases and rarely malignancy.
- b. Surgical factors as undetected distal urinary obstruction, inadequate post-operative urinary drainage.
- c. Surgical technique as inexperience, inadequate excision of devitalized tissues and scar tissue, use of inappropriate suture materials and lack of adherence to detailed measures in the principles of surgical repair of vesicovaginal fistula.

## 8. Complex vesicovaginal fistula

These include:

- Multiple vesicovaginal fistulas involving the urethra and intestine, associated with trauma of fall from heights, anterior posterior- compression fractures from road traffic accidents, and gun shot injuries.
- Giant Vesicovaginal fistulas of more than 5 cm in diameter. Those associated with partial or complete loss of urethra, stress incontinence, narrow vagina and small bladder capacity.
- Those involving the cervix and lower uterine segments.
- Those complex fistulas are referred to fistula units in tertiary institutions and fistula centers. Elsewhere the author has emphasized the importance of sustaining the 2- way referral system in the practice of medicine [6]. It supports a good rural surgical practice.

## 9. Rectovaginal fistulas (RVF)

### 9.1 Etiology and clinical presentation

This is an abnormal connection between the rectum and vagina. The etiology, pathogenesis, clinical presentation and diagnosis of RVF have been discussed in the preceding sections and highlighted on **Tables 1** and **2**. RVF can be classified as low, mid and high vaginal fistula. Low is from the vaginal opening to the hymenal ring, mid from the hymenal ring to the external cervical os, and high from the external cervical opening to the vault of the vagina (area of the cul-de-sac) [32].

### 9.2 Management

Conservative management may be tried. Some resulting from penetrating and stab wounds responds to antibiotics, salt bath and fluid diet. Defunctioning colostomy has been performed for some cases. Obstetric RVF will require surgical correction after treating infection and resolution of inflammation.

**Time of repair:** A waiting period of 3–6 months is allowed, and salt bath continues before repair.

### 9.2.1 Surgical repair of RVF

A defunctioning sigmoid colostomy may be done.

Assessment under anesthesia as soon as possible to ascertain the location, size and state of the fistula, presence of sloughs, and edema. If the fistula is above 8 cm from the fourchette refer to higher center for repair from above. For mid and low fistulas, repairs can be undertaken from below. If there is associated VVF, it should be repaired first [37].

#### 9.2.1.1 Low fistula

Spinal anesthesia, prophylactic antibiotics, supine lithotomy position, aseptic technique, transperineal, transvaginal or transanal approach may be used [32, 37]. The tissue around the fistula is infiltrated with adrenalin-normal saline solution as in VVF. An incision along the anterior anal sphincter border or transverse along the posterior fourchette is deepened and dissected proximally separating the vaginal wall from the perineal body, anal sphincter, anal and rectal walls, developing a reasonable dissection of the rectovaginal space proximally, distally and laterally. The fistula is excised, homeostasis achieved, extraluminal closure of the rectum is done using interrupted 3/0 polyglactin and imbricated with seromuscular layer incorporating the internal anal sphincter using interrupted 2/0 polyglactin. Vaginal wall is closed with 3/0 polyglactin. The external anal sphincter if disrupted is repaired end-to-end with interrupted polyglactin O.

#### 9.2.1.2 Mid fistula

The transvaginal approach is preferred. The principles and techniques are the same. The fistula tract is dissected and excised, wide dissection of the rectovaginal space is done, layered closure of the rectum avoiding the lumen, and interrupted vaginal wall closure with 3/0 delayed absorbable suture.

#### 9.2.1.3 Postoperative care

- Presumptive antibiotics for 5 days, since the wound is contaminated.
- Pain is controlled with pentazocine injection 30 mg 4–6 hourly for about 72 hours.
- Liquid diet for about 5 days, then low residue diet.
- Stool softener as lactulose suspension, without inducing diarrhea.
- Urethral catheter is left for 7 days.

## 10. Ureterovaginal fistula (UVF)

### 10.1 Etiology and clinical presentation

This is a pathological communication between the ureter and the vagina. Etiology includes surgical injuries especially hysterectomy [2, 56]. More cases of UVF are

appearing in rural practice due to increasing rates of cesarean sections performed by unsupervised medical officers working alone. Other causes of UVF have been discussed by Payne CK and Raz S [56].

Vaginal urinary leakage after gynecologic or obstetric surgery is the commonest symptom. Urine may drain from incision wounds and wound drain. When urine collects in the abdomen or retroperitoneum, nonspecific symptoms of flank and abdominal pains, hiccups, fever, abdominal distension, ileus, localized fluctuance and tenderness may occur.

## **10.2 Diagnosis**

**Confirmation of the leakage as urine.** Oral phenazopyridine hydrochloride (pyridium) is given. Brown coloration of the leakage confirms it is urine. Intravenous indigo carmine can be used. Dye test as described under VVF can be done. Staining of the gauze at the vault confirms UVF. Intravenous urogram (IVU) and micturating cystourethrogram (MCUG) can also be used. The MCUG will diagnose a bladder fistula, confirm or rule out ureteric reflux; while IVU shows the excretion function of the kidneys, site of contrast extravasation, dilatation of upper tract and contrast in the vagina. A postvoid film is needed to assess for a distal fistula. Once the diagnosis is made or suspected, refer the patient to a urologist.

## **11. Vesicouterine fistula (VUF)**

### **11.1 Etiology and clinical presentation**

An abnormal communication between the uterus or cervix and the urinary bladder. It is uncommon. The commonest cause is lower segment cesarean section [2, 5, 57]. Other causes include myomectomy [17], vaginal operative delivery, induced abortion and, dilatation and curettage. Presentation is the classical “Youssef’s syndrome” of symptom complex: “menouria, cyclic hematuria associated with amenorrhea, secondary infertility and urinary continence” [58]. Diagnosis can be made by a combination of contrast cystogram with voiding cystogram and cystoscopy. Refer to a tertiary healthcare institution for multidisciplinary team management.

## **12. Urethrovaginal fistula (UrVF)**

### **12.1 Etiology and clinical presentation**

UrVF is an abnormal connection between the urethra and the vagina. The commonest cause in the developing world is obstructed labor followed by female genital mutilation as ‘GISHIRI CUT in Northern Nigeria [8, 15, 37]. In the developed world it occurs as a result of vaginal surgery for incontinence, anterior colporrhaphy, vaginal prolapse and urethral diverticulum [2]. It is often associated with VVF [37]. It presents as urinary leakage from the vagina. A small fistula may produce minimal discomfort, while a large one leaks copiously. Distal small fistulas may be asymptomatic.

### **12.2 Diagnosis**

The diagnosis is made clinically and confirmed by urethroscopy if available or by micturating cystourethrogram.

## 12.3 Treatment

Treatment is by surgical repair. However, some workers recommend that distal urethral fistulas can be observed or managed with an extended meatotomy [59].

### 12.3.1 Operative repair

Spinal anesthesia, lithotomy position, aseptic technique is used. Size 16 urethral catheter is passed. The tissue around the fistula is infiltrated with adrenalin normal saline solution 1:100, 000 or plain saline. The fistula tract is encircled with incision. The vaginal skin is dissected free from the urethra all-round the fistula to about 5 mm. An inverted 'U' shaped incision is marked out on the anterior wall of the vagina with the base at the proximal margin of the encircled fistula. The area within the incision is infiltrated with the adrenalin saline solution and dissected off the periurethral fascia as a vaginal wall flap, to a reasonable distance not less than 2 cm. The edges of the fistula are mobilized, reflected over the fistula but not excised. It is closed with interrupted 5/0 monocry (poliglecaprone) or vicryl in the line of least tension. The periurethral fascia is closed perpendicular to the first as a second layer when possible. A Martius flap is raised and tunneled to the repair as an additional layer. The anterior vaginal wall flap is advanced over the closure and sutured with 4/0 vicryl to the distal margin of the wound. This repair technique is well illustrated by Rovner ES, and Leach GE et al. [2, 60]. The repair of UrVF may be very difficult due to relative lack of connective tissues in the mid and distal urethra. Interposition tissue flap is often indicated. Multiple and complex urethrovaginal fistulas should be referred to higher centers for multidisciplinary team approach.

## 13. Vesicointestinal (vesicoenteric) fistula (VEF)

### 13.1 Etiology and clinical presentation

This is a rare connection between the lumen of small bowel and urinary bladder. The etiology in the rural areas include penetrating and gunshot injuries to the lower abdomen and pelvis; and iatrogenic trauma. In the developed world, it is caused by diverticulitis, malignancy, Grohn's disease, trauma, foreign body and infection [2, 61].

Presenting symptoms include pneumaturia, fecaluria, debritic urine, lower urinary tract symptoms (LUTs), fever, chills, abdominal pain, hematuria, epididymitis, orchitis, and urine from the rectum [2, 61].

Once suspected, the patient should be referred to a higher center for multidisciplinary team management.

## 14. Enterovaginal fistula (EVF)

### 14.1 Etiology and clinical presentation

A rare abnormal connection between the small bowel and vagina. A complication of hysterectomy in the author's experience, **Table 2**. Elsewhere cases arising from Crohn's disease have been reported [62].

### 14.2 Treatment

Refer promptly and accordingly once diagnosed or suspected in rural practice.



## 15. Rectourethral fistula (RUF)

### 15.1 Etiology and clinical presentation

This distressing acquired abnormal communication between the urethra and rectum is seen in males. The author has encountered only seven cases in 28 years; 4 from gunshot **Figure 7**, two from stab injury and 1 iatrogenic endoscopic injury during endourology procedure, **Table 2**. Other causes in the literature are iatrogenic trauma during prostatectomy, cryotherapy, anorectal surgery, pelvic irradiation, urethral instrumentation, infection and Crohn's disease [2, 63]. The symptoms may include fecaluria, hematuria, LUTs, fever, malaise, urinary tract infection (UTI), nausea and vomiting [64].

### 15.2 Diagnosis

Diagnosis is by history, physical examination, urine microscopy and culture; high index of suspicion; and confirmed by retrograde urethrogram (RUG) and MCUG. Urethrocystoscopy and sigmoidoscopy may visualize the fistula.

### 15.3 Treatment

#### 15.3.1 Conservative

Some will heal on conservative management [63, 64]. The author managed the RUF that resulted from iatrogenic trauma during a Direct Vision Internal Urethrotomy (DVIU) procedure with urethral catheterization continuous bladder drainage for 3 weeks, low residue diet and appropriate antibiotics cover.

#### 15.3.2 Surgical repair

Surgical repair of RUF is beyond the scope of rural practice. Single and staged repairs with or without urinary and fecal (defunctioning colostomy) diversions have been described involving transrectal, transanal and transperineal approaches [64–69].

The York-Mason procedure is a transrectal approach requiring jack-knife prone position and skilled anesthesia. It has been found to be effective with low morbidity [70].



**Figure 7.**  
*Perineal gunshot injuries resulting in rectourethral fistula.*

## 16. Vesicocutaneous fistula

### 16.1 Etiology and clinical presentation

An abnormal communication between the urinary bladder and the skin. The commonest variety is the type connecting the bladder and the skin of the lower abdomen or suprapubic region; **Figure 2**. This commonly follows prolonged or neglected suprapubic catheterization. Other sites encountered are perineum and upper thigh. Males are commonly affected. Other causes include gunshot and stab injuries, fall from heights and following pelvic surgery, **Table 2**.

It presents as urinary leakage through the skin.

### 16.2 Diagnosis

Diagnosis is clinical and confirmed by MCUG.

### 16.3 Treatment

#### 16.3.1 Conservative

Removal or bypass of distal urethral obstruction will heal some.

#### 16.3.2 Surgical treatment

Others will require surgical excision of fistulous tract, closure of urinary bladder in layers and wound closure may be primary or delayed depending on its state of cleanliness and contamination.

## 17. Urethrocutaneous fistula

### 17.1 Etiology and clinical presentation

This is an acquired connection between the urethra and skin. It commonly occurs on the penis, **Figure 8**.

In rural practice, it results commonly as circumcision mishap [71]. There are reported cases following surgery of urethral stricture and diverticulum; and hypospadias repair [72]. Others include paraurethral abscess, gunshot wounds and chronic inflammatory disease.

### 17.2 Diagnosis

Diagnosis is clinical.

### 17.3 Treatment

There is no standardized surgical repair technique for this condition. Each case should be individualized and treated according to its merit. Urethrocutaneous fistulas should be referred to the urologist.



**Figure 8.**  
*Urethrocutaneous fistula complicating male circumcision.*

## **18. Role of the rural practitioner and future research**

The roles of the rural practitioner have not been clearly defined in the treatment and management of the genitourinary fistula patient. The following roles are suggested from this study. They should:

- i. participate in the three preventive strategies mentioned in Section 5, and should participate in the treatment of the fistula from the beginning.
- ii. Resuscitate and refer complex and recurrent fistulas promptly to centers with good fistula repair record. Sophisticated ones as UVF, VUF, VEF, EVF, RUF, vesicocutaneous and urethrocutaneous fistulas are beyond the scope of rural practice, and should be referred appropriately once the diagnoses are suspected.
- iii. They may undertake the repair of simple fistulas after undergoing adequate training and exposure.

It will be worthwhile to determine the degree of involvement of rural practitioners in the treatment and management of genitourinary fistulas at present, and the impact on the burden of the disease when they are fully integrated.

## **19. Conclusion**

Genitourinary fistulas which occur often in rural practice embarrass the patient and practitioner. The dearth of skilled medical personnel and trained fistula

surgeons in the rural areas, made worse by brain drain, poor transport, education and health infrastructures complicate the burden of genitourinary disease. Thus, the patient will be most grateful to the rural practitioner who promptly guides and refers her to a good fistula surgeon who repairs her fistula successfully. The rural clinician should participate effectively in the preventive strategies, initiate treatment and care as soon as fistula occurs, refer complex and sophisticated ones, and may undertake repair of simple fistulas after adequate training and exposure. Good skill, dedication with passion, attention to the principles of fistula management and surgical treatment will achieve high repair success rate. More efforts in training the rural medical practitioner in fistula surgery, education of the girlchild and the public, deployment of more resources to improve social welfare infrastructures, the treatment and rehabilitation of victims, and regular frequent fistula treatment missions will reduce the prevalence of this condition. It is believed that the realization of these objectives will reduce the burden of genitourinary fistulas.

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