Current Trends and Controversies on Female Genitourinary Fistula: A Review Article

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Abstract

Female genitourinary fistula (FGF) is an atypical connection between the female genitourinary system and the urinary tract. The abovementioned issue presents a dire public health concern and significantly affects the affected individuals' quality of life. The classification of fistulae arising from the genitourinary tract encompasses a range of types, including vesicovaginal (VVF), rectovaginal (RVF), uterovesical (UVF), and urinary fistula, with the particular manifestation dependent upon the site of perforation.

The development of consistent guidelines for FGF care poses a challenge due to the variability of clinical conditions. The selection of an appropriate treatment protocol is contingent upon the surgeon conducting the treatment and the resources at their disposal. In the medical field, it is advisable for surgeons to contemplate implementing conservative treatment methods, particularly in patients thoroughly assessed and deemed suitable for this approach.

Delayed repair of FGF results in superior outcomes compared to early repair. The transvaginal repair approach is favored due to its advantageous features. Anticholinergic pharmacotherapeutics may be employed during the postoperative phase to enhance the therapeutic course of the bladder.

Healthcare providers can refer their patients to a tertiary care facility with advanced resources and specialized expertise, provided the necessary facilities are available. Surgeons undergoing training and adapting to emerging trends are advised to enhance their proficiency in repairing vesicovaginal fistula (VVF).

Keywords: Anticholinergic therapy, Conservative management, Transvaginal repair, Vesicovaginal fistula

1. Introduction

Societal perception toward those who endure it (Härkki-Sirén, Sjöberg, & Tiitinen, 1998; Angioli et al., 2003; Alio et al., 2011). The majority of VVF research has been regionally specialized or has been on obstetric fistula. Researchers Ijaiya, Rahman, and colleagues (2010) only examined VVF in Female Genitourinary fistula (FGF) denotes pathological connectivity between the female genital and urinary tracts. The impact of this phenomenon on women is multifaceted, causing profound physical, psychological, emotional, and economic consequences. The first documented instance of FGF can be traced back to 2050 BC, as evidenced by historical records (Zacharin, 2012). A renowned expert in this field has been instrumental in shedding light on this early account. James Marion Sims accomplished the repair of the vesicovaginal fistula (VVF) through the utilization of silver wires. Since then, the management of female genitourinary fistula has undergone various modifications.

FGF impedes the comprehensive growth of women and gives rise to a detrimental general terms. After reviewing existing papers on VVF, it was discovered that case studies and individual accounts make up the majority of the literature. We carefully chose the literature for this review, which covers both industrialized and developing country reports on the causes of VVF. The author of this review analyzes the literature on the causes, risk factors, and diagnoses of VVF, calculates its prevalence, and describes the condition’s preoperative, intraoperative, and postoperative therapy. Additionally included are preventative measures and intraoperative care.
2. Methods
An extensive literature search was conducted until March 2023 to identify relevant publications about search items: Gento-urinary fistula, Vesicovaginal fistula, urinary tract fistula, lower urinary tract fistula, obstetric fistula, postpartum injury, sexual dysfunction, and stress urinary incontinence.

Electronic databases including PubMed, Scopus, and Google Scholar, which contain research publications written in English, were used for the search.

3. Epidemiology of Female Genito-Urinary Fistula (FGF)
Estimating the exact incidence of FGF poses a challenge because affected women endure their condition in silence owing to the prevailing social stigma. The etiology of FGF is characterized by variability, which leads to differences in the reported prevalence rates between low-to-middle-income countries and developed nations. The dominant causative factor for FGF in developed nations is pelvic surgery. The prevalence in the developing world, particularly in Sub-Saharan African countries, is primarily attributable to prolonged obstructed labor. More than 90% of such cases are directly attributed to this cause (Moore et al., 2007; Malik et al., 2018). As the literature supports, the incidence of obstetric fistula worldwide exhibits a variable range between 50,000 and 100,000 per year. (Härkki-Sirén, Sjöberg, & Tiitinen, 1998; Angioli et al., 2003). A small percentage of patients’ advanced pelvic tumors, including cervical, bladder, and rectal cancers, as well as their treatments, may contribute to the development of this illness. Another potential factor in the development of fistulas is radiation from uncommon sources. According to a 2007 study (Moore et al., 2007), a variety of interconnected factors affect how common VVF is in low- and middle-income countries. Numerous variables, such as low socioeconomic status, early marriage, malnutrition, a lack of education, and a deficient healthcare system, might be blamed for the higher frequency of VVF. In addition to these social determinants of health, medical factors such as radiation, TB, a foreign body, and pelvic trauma have also been identified as increasing the burden of VVF in disadvantaged areas. The present literature supports the relevance of the aforementioned drivers in the pathophysiology of VVF.

4. Classification of Female Genito-Urinary Fistula and Its Influence on the Management Decision
The Goh and Waaldijk category systems are both often used to arrange FGF associated with obstetrics. Based on these three criteria, the Waaldijk classification categorizes urethral abnormalities into three groups: (1) severity of the closure mechanism, (2) severity of the external urethral meatus, and (3) extent of the defect. The Goh Classification system takes into account the fistula tract’s size, the level of fibrosis present where the fistula is located, and the separation between the distal border of the fistula and the external urethral meatus. According to Capes et al. (2012), the Goh Classification method outperformed the Waaldijk Classification method in terms of predicting effective fistula healing.

In their 2017 study (Beardmore-Gray et al.), Beardmore-Gray et al. discovered that the Goh Classification system was not a reliable predictor of successful closure for non-obstetric fistulas. However, the aforementioned categorisation was significantly associated with better continence outcomes when patients did attain anatomical closure.

VVF is often categorized into a few different groups in the medical community according to standards set by reputable sources. Prior research (Capes et al., 2012; Beardmore-Gray et al., 2017) has shown that: The fistula’s location may be divided into three groups by cystoscopy: supratrigonal, trigonal, and infratrigonal (bladder neck). Congenital and acquired fistulas are separated in the second step. For acquired VVF, the following possibilities are conceivable: The classification of diseases includes benign, malignant, traumatic, inflammatory/infectious, and other conditions. The involvement of the urethra’s shutting mechanism in each kind determines how severe it is: Type 1 involves no involvement of the closure mechanism; Type 2 involves involvement of the closing mechanism but does not include the whole urethra; and Type 3 has varied involvement of the closing mechanism and may entail ureteric fistula. VVF sizes may be divided into four groups: small (2 cm), medium (3 cm), large (4 cm), and extensive (>6 cm). Based on the findings of a physical examination, there are five classifications: vesicocervical, juxtacervical, midvaginal, suburethral, and urethra-vaginal. There are three different kinds of urinary continent mechanisms, each of which is involved to variable degrees: The ureteric fistula is a component of Type 3, which also includes a few other processes. The use of a closing mechanism is not necessary for Type 1. A partial urethral involvement and a whole urethral involvement are the two subtypes of type 2. This method defines a small vesicovaginal fistula (VVF) as being less than 2 centimeters long, a medium VVF as being between 2 and 3 centimeters long, a large VVF as being between 4 and 5 centimeters long, and an extensive VVF as being more than 6 centimeters long. This system is supported and used by the academic community as a whole.
5. Management of Vesicovaginal Fistula

5.1 Newer Trends in Conservative Methods

A conservative approach has been employed in managing VVF for a considerable period. There are several methods that may be utilized to close a fistula. According to reports, there are varying degrees of effectiveness with the utilization of various techniques, including continuous bladder drainage (CBD), catheterization with fulguration of the fistula tract, adhesive injection, platelet-rich plasma (PRP) injection, and anticholinergic medication. To cope with challenging and recurrent VVF situations, several different tactics have been used. Urinary incontinence after surgery or due to an obstetrical issue is a medical emergency that need CBD treatment immediately.

Conservative therapy with an indwelling catheter CBD may be a possibility if the fistula has been present for little more than three weeks, the fistula tract is lengthy and narrow, and the fistula size is less than three millimeters. This approach may not be recommended if the fistula is greater than three centimeters, there is radiation damage to the urogenital tract, there is significant scarring around the fistula, and the growth of the fistula has taken longer than six weeks. CBD has a 3-22% success rate when administered alone, according to Breen and Ingber (2019) and others (Bazi, 2007). Notably, CBD may be efficacious for fistula sizes less than five millimeters and when the patient experiences dryness following catheter placement.

5.2 Fulguration of the Fistula Tract

The procedure of fulguration is carried out in cases where the fistula exhibits characteristics such as diminutive dimensions, fresh fistulas, elongated and contracted tract, and absence of fibrosis. The epithelial lining layer of the fistula tract is subjected to fulguration using electrocautery to promote fibrosis. (Akkoç and AYDIN 2020) have reported a success rate of 89% utilizing transvesicoscopy bipolar electrofulguration and three weeks of continuous bladder drainage (CBD) in a cohort of nine patients diagnosed with small fistulas (<1 cm in size).

5.3 Fibrin Glue Injection

Fibrin glue is employed as an ancillary measure in repairing VVF. Intraoperative administration of adhesive in the transvaginal route is facilitated under cystoscopic visualization after electrofulguration of the fistulous tract. CBD is typically administered for a duration ranging from one to four weeks, during which the application of fibrin glue enhances the fibrosis process (Safan et al., 2009; Rajaian & Kekre, 2012; Augustinet al., 2021) Furthermore, fibrin glue may be utilized as an interposition agent. The employment of fibrin glue has been observed to serve as a viable alternative to the comparatively intrusive method of local flap harvesting (Choudhury et al., 2022) Choudhury and colleagues (Choudhury et al., 2022) have reported a favorable success rate of 100% among a sample of 20 patients with vesicovaginal fistula treated with fibrin glue. Additionally, fibrin glue has demonstrated utility as an adjuvant in robotic vesicovaginal fistula repair procedures.

The administration of platelet-rich plasma (PRP) through injection.

Platelet-rich plasma (PRP) is administered in the vicinity of the fistula, generating a protuberance akin to that resulting from deflux injections in vesicoureteral reflux instances. This protuberance mechanically obstructs the fistula, while the growth factors derived from platelets promote collagen deposition and angiogenesis. In their prospective study, Streit-Cieckiewicz et al. (2019) evaluated a cohort of 16 patients who received Platelet Rich Plasma (PRP) injections as a conservative management approach. Through their findings, the authors established the significance of PRP as a supportive measure, particularly for patients with recurrent fistula before undergoing repeat surgery.

5.4 Bilateral Percutaneous Nephrostomies and Ureteric Occlusion

Percutaneous nephrostomy procedures are often employed as a palliative intervention in patients afflicted with malignant vesicovaginal fistula, having compromised performance status, and a reduced life expectancy due to the later stage of the ailment (Duan et al., 2022) The practitioner must carefully weigh the enduring characteristic of the percutaneous nephrostomy catheters and consider the patient’s inclination to remain reliant on the tubes. Lesser fistulas can potentially undergo reparative healing by administering percutaneous nephrostomy catheters (PCNs). For fistulae of considerable size, percutaneous nephrostomy catheter placement alone is inadequate in achieving continence in the patient. As such, a supplementary procedure of percutaneous ureteric occlusion becomes necessary, documented case studies.

Consequently, the selection of conservative methodologies is contingent upon the physician’s inclination, accompanied by a comprehensive elucidation that surgical measures would be imperative if the non-invasive treatment proves ineffectual (Safan et al., 2009; Rajaian & Kekre, 2012; Akkoç & AYDIN, 2020) The summary of
indications and contraindications of conservative methods has been presented succinctly in Table 1.

Table 1. Conservative management of female genitor-urinary fistula

<table>
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<th>Indications</th>
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<td>Fistula onset &lt; 4 weeks</td>
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<td>Progressively decreasing urine leakage with continuous urethra catheterization</td>
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<td>&lt;3 cm size fistula</td>
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<th>Contraindications</th>
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<tr>
<td>FGF following radiotherapy</td>
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<tr>
<td>Moderate to severe scarring around the fistula site</td>
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<tr>
<td>Fistula onset &gt;6 weeks</td>
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<td>&gt;3 cm size fistula</td>
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6. Urinary Diversion after Repair of Female Genito-Urinary Fistula

The diversion of urinary flow has been found to facilitate desiccation of the suture line and promote postoperative healing following surgical correction of FGF. The approach most frequently implemented involves the use of per-urethral catheterization. Concurrent suprapubic cystostomy (SPC) is posited as an additional safety measure in case of a malfunction in the urethral catheter, as posited by Dalela et al. (2016). However, only a handful of individuals have favored suprapubic diversion alone, as evidenced by existing literature (Shetty et al., 2022; Gedik et al., 2015).

The authors have reported a distinct technique for performing suprapubic cystostomy in patients with VVF (Alio et al., 2011) The conventional practice of maintaining a suprapubic catheter has been subject to scrutiny since it does not necessarily enhance the efficacy of the surgical intervention (Gedik et al., 2015; Shamout et al., 2021). However, the duration of catheterization may be extended in certain circumstances, such as in the presence of multiple or significant fistulas or in cases where the efficacy of surgical repair is not yet fully established.

7. The Principles of Female Genito-Urinary Fistula Repair

In order to attain favorable outcomes, surgeons are mandated to adhere to established fundamental principles of VVF repair. These principles have universal applicability, encompassing all types of repair performed via any approach (Alio et al., 2011).

A myriad of factors influences the timing for the repair of VVF. Most surgeons exhibit a predilection toward repairing the fistula when there is a lack of active inflammation, infection, or necrosis. Some proponents endorse medical intervention upon diagnosis of VVF and have reported comparable outcomes (Shetty et al., 2022). Typically, surgical repair is conducted after 12 weeks after fistula formation. The timing of fistula repair is subject to various influential factors, including (1) the type and severity of the initial injury that caused the fistula, (2) the patient’s current nutritional status, (3) any accompanying infection or presence of foreign objects, and (4) the patient’s immune system status (El-Azab, Abolella, & Farouk, 2019). It is worth noting that the initial attempt at repair offers the greatest likelihood of success when addressing vesicovaginal fistula concerns. Therefore, selecting an appropriate time for the repair process is of utmost significance in ensuring optimal outcomes. Women afflicted with VVF may experience anxiety and depression while they await surgical reparations. Therefore, providing emotional and psychological support from healthcare professionals and the immediate family unit is highly imperative.

According to the literature, the employment of a twelve-week timeline is deemed appropriate for the management of postsurgical VVF (Choudhury et al., 2022). This duration permits the subsidence of the inflammatory response and the demarcation of necrotic tissues. The principle above bears some exceptions, namely (1) a VVF that was diagnosed within a short time frame following the primary causative surgical procedure, (2) a concomitant injury to the ureters that necessitates intervention, and (3) the patient’s explicit request or compulsions to the surgeon. Surgeons should avoid surgical interventions in the initial stages of acute post-radiation tissue response progression. The process of radiation-induced reaction exhibits a temporal resolution that spans approximately one annum. Frequently, there is a tendency for the completion of repairs to occur after a one-year prolonged duration (Özkaya et al., 2021).
7.1 The Route of Repairs: Vaginal or Abdominal?

The selection of a surgical route hinges upon several critical factors, namely the surgeon’s proficiency in a given technique, the physical location of the fistula, the extent of space within the vaginal cavity, the requirement for allied procedures like ureteric reimplantation, and the feasibility of obtaining critical interposition flaps as needed. A meta-analysis conducted by Pattinama and Hardianto, involving 25 studies, yielded results consistent with a higher success rate in the abdominal approach than the vaginal approach for vault VVF (Pattinama & Hardianto, 2020). In a separate study by Kumar et al., a transvaginal route was preferred for the repair of simple fistulae. In contrast, the transabdominal route was found to be more successful in repairing complex fistulae. These findings reveal that specific surgical routes may be determined based on particular conditions or factors, as preferred by the operating surgeon.

The vaginal route presents several unique advantages (Kumar et al., 2019), including the avoidance of abdominal and bladder incisions, a reduction in blood loss, a profusion of choices for interposition flaps, shorter operative durations, and expedited recovery times leading to a shorter stay in the hospital. This method is commonly employed in cases where pre-existing surgical interventions cause abdominal wall scarring. The anatomical pathway through the vagina is to be avoided in cases that exhibit any of the following: (1) a narrow and scarred vaginal opening, (2) a fistula that has developed due to prior radiation therapy, and (3) the occurrence of a simultaneous rectovaginal fistula (Kumar et al., 2019).

The abdominal route represents the preferred option when the vaginal route constitutes a contraindication. This intervention is commonly suggested in cases that entail concurrent procedures, such as ureteric reimplantation and augmentation cystoplasty, pathological presence of vesical stones, or a highly positioned fistula in conjunction with a narrow vaginal opening (Rubin & Danforth, 2022).

7.2 Positioning during Repair

The size and site of the vesicovaginal fistula, the requisite degree of surgical intervention, and the surgical acumen of the practitioner would determine the optimal position for reparative measures. The Lawson and Jackknife positions have been optimal for managing proximal urethral and bladder neck fistulas. Incorporating the reverse Trendelenburg position has been shown to enhance the visualization of vesicovaginal fistula (VVF) and promote ease of repair, as noted in recent research. (Sayegh et al., 2022) It is important to note, however, that adopting either position may necessitate the use of general anesthesia to prevent patient discomfort in the prone position.

The dorsal high lithotomy position, coupled with steep Trendelenburg positioning, is deemed as an optimal approach for the management of a high vesicovaginal fistula (VVF), and it has also been utilized in laparoscopic and robotic VVF repair procedures, owing to its superior visual field. The conventional Sims position utilized for the repair of vesicovaginal fistula (VVF) is deemed obsolete in contemporary medical practice (Heusinkveld & Cardenas-Trowers, 2022).

7.3 Technical Modifications in Transabdominal Vesicovaginal Fistula Repair

The present review addresses technical modifications employed in the trans-abdominal repair of VVF, focusing on the comparison between vertical cystotomy, horizontal cystotomy, and transvesical repair. Historically, the standard approach for trans-abdominal repair of VVF has been the bivalve of the bladder, as described initially by O’Connor and Sokol. (O’Conor & Sokol, 1951) However, more recent and contemporary techniques have been shown to yield comparable results, thereby challenging the classical approach. Only a few surgical techniques have been reported to treat VVF, including intravesical repair, limited vertical cystotomy, and horizontal cystostomy (McKay et al., 2019, Mallikarjuna et al., 2015). The evidence for this is in Lueca et al. (2015). There are many methods for treating vesicovaginal fistulas surgically, each with its own set of possible benefits. These changes are intended to aid surgeons in achieving four main objectives: reducing operating time; enhancing laparoscopic suturing skills, which will improve luminal demarcation; decreasing the incidence of overactive bladder; and facilitating early anterior dissection, which will reduce suture line tension. It has been suggested that if the principles of VVF repair are followed and dissection is kept to a minimum, a better prognosis may be anticipated following surgery. However, it’s crucial to assess how these strategies will perform over time.

Interposition of tissue and its importance

Grafts and flaps have been inserted between the bladder and vagina to hasten healing and lower the risk of recurrence. (Margules&Rovner, 2019; Choudhrie et al., 2009; Svaerdborg et al., 2012). Some of the tissues that have been reported as being interposed in the literature include labial fibrofatty tissue (more specifically, the Martius flap technique), peritoneum, omentum, glutues muscle, rectus abdominis muscle, gracilis muscle, small intestinal submucosa, human dura grafts, sigmoid epiploicae, and urachus. (Rizwan, Zia et al. 2021; Wang, Gao et
The efficiency of interposition flaps was examined by Espinoza et al. (2019) in patients with benign etiologies. The majority of the 22 cases of vesicovaginal fistula (VVF) seen had a single orifice with an average diameter of 9.5 mm in a retrotrigonal position. In 77.27 percent of the patients, a peritoneal flap was used, in 13.63 percent a Martius flap, and in 4.54 percent the omentum and vaginal mucosa. According to the source, interposition flaps were effective in 90.91 percent of instances. Using interposition flaps to reconstruct radiation- and malignancy-induced fistulas has various benefits.

### 7.4 The Occurrence of a Vesicovaginal Fistula as a Result of Radiation Exposure

Pelvic radiation has been identified as the principal etiology for the delayed onset of VVF. (Chrisostomos et al., 2021) Most of these fistulae tend to develop approximately 1.5 to 2 years following the conclusion of radiotherapy. As established in the literature, it is imperative to conduct multiple focal biopsies to effectively rule out malignancy recurrence at the edges of the fistula (El-Azab et al., 2019). The post-radiation recurrence of vesicovaginal fistulas is associated with the most challenging and demanding course of treatment and exhibits the lowest success rates. The need to remove the scar until the new tissue boundary is fully formed arises from radiation-induced fibrosis. As a result of its significant magnitude, the primary closure of the defect may prove to be arduous. Radiation-induced fibrosis has been identified as a causative factor of tissue hypoxia, contributing to tissue’s hindered repair. This observation has been documented in the literature (Margules & Rovner, 2019; Fujiwara et al., 2000; Zhao et al., 2023).

### 7.5 Trauma-induced Vesicovaginal Fistula

VVF caused by trauma-induced pelvic fractures, Female genital cutting, and unsafe abortion is relatively uncommon, with limited anecdotal documentation in the literature (Espinoza et al., 2019). Common bladder neck injuries often coexist with urethral injury. The urethra is damaged in 6% of pelvic fracture victims who are female. (Zhao, Lu et al. 2023)

The two types of female urethral injuries are entire (also known as an avulsion) and partial (also known as longitudinal). It is advised that pelvic fractures be treated alongside urethral and vaginal injuries since single suprapubic drainage may result in undesirable outcomes including urethrovaginal fistula and oblitative stricture of the urethra. The lower urinary tract recovery of afflicted individuals may be slowed down by subsequent injuries that need treatment for hemodynamic instability. An alternative technique involves utilizing a catheter to realign the divergent urethral ends by primary endoscopic means. According to authors given in the reference, the damage will ultimately undergo a regeneration process; however, depending on the degree of the constriction and the amount of scarring present, a delayed reconstructive treatment employing vaginal or bladder wall flaps may be necessary. (Zhao et al., 2023)

For women who have been deemed medically inoperable,..

Despite the lack of available information, some patients with inoperable VVF are resorting to urine diversion as a last resort. Even when a fistula has been effectively healed, urine incontinence may still persist. Potential causes of this syndrome include diminished urethral function, a total absence of the urethra, and restricted bladder capacity as a result of tissue loss at the time of injury. Furthermore, a fistula (WDI) may be impossible to operate on because to the substantial tissue loss. Complete incontinence patients still endure prejudice and hostility from their communities.

The survey’s findings were produced by Kirschner and colleagues. They reported 118 instances of persistent VVF treated by urine diversion in a 2016 research, (Kirschner, Lengmang et al. 2016) nine ureterosigmoidostomies and a total of 109 modified Mainz II pouches were carried out. When severe urethral incompetence (33.9%), an inoperable vesicovaginal fistula (32.2%), the absence of the urethra (9.3%), a failed pubovesical sling (3.4%), or an unexplained etiology (21.2%) are present, urine must be diverted across the body. The outcomes showed that 106 persons (or 89.8%) attained complete bladder control.

The Mainz II pouch and ureterosigmoidostomy are feasible surgical procedures that can be conducted at VVF centers even with limited resources, as indicated by prior research. It is the surgeon’s responsibility to educate patients regarding the potential long-term risks associated with urinary diversion and devise a comprehensive protocol for promptly identifying and resolving complications. Essentially, such interventions’ safety, effectiveness, practicability, and ethical permissibility must be carefully evaluated. The medical practitioner ought to exercise prudence in proffering the Mainz II procedure and exert utmost diligence in comprehensively conveying this procedure’s restrictions and drawbacks to the patients (Gillies et al., 2003; Arrowsmith, 2007).
7.6 Management of Overactive Bladder in Vesicovaginal Fistula

Managing an overactive bladder, characterized by uncontrollable and acute pain originating from the bladder, is a crucial concern during the postoperative phase following VVF repair. Literature evidence must be more adequately supported in its management after surgical repair, highlighting the void in knowledge regarding managing bladder spasms (Gillies et al., 2003). Although postoperative pain may be absent, spasms may still occur and may necessitate the utilization of alternative medications. In their study, Ekwedigwe and colleagues (Ekwedigwe et al., 2017) investigated the occurrence of bladder spasms in a cohort of patients who underwent urogenital fistula repair through various surgical routes. They observed a notable prevalence of such spasms among individuals subjected to the abdominal approach, particularly those with a vault or ureterovesical fistula, respectively. A bladder-splitting procedure is required during abdominal repair, which may contribute to a heightened incidence of spasms; however, the degree of increase may not be statistically significant. The mitigation of postoperative bladder spasms may be achievable by reducing tension at the suture line, as noted in a study (Ghoniem & Warda, 2014). Additionally, ketorolac may benefit patients experiencing bladder spasms after ureteric reimplantation (Park et al., 2000).

Furthermore, continuous catheter drainage for a few weeks remains a nonmodifiable factor leading to bladder spasms in all patients who undergo VVF repair. Anticholinergics and adequate analgesics in the first postoperative week may reduce patient discomfort and avoid unnecessary tension at the suture line.

Is routine biopsy/excision of the fistulous tract necessary?

Tuberculosis, actinomycosis, schistosomiasis, and endometriosis (Lovatsis & Drutz, 2003; Dennis et al., 2009) have been detected in the biopsy specimens retrieved from the fistulous tract. Notwithstanding the anecdotal nature of these reports, performing routine biopsies is not advised, and a customized approach should be adopted to prevent unnecessary complications that may result from the biopsy process (Mawhinney et al., 2010) To obtain vital staging information for locally advanced genitourinary malignancies affecting the urinary bladder, and when there exists a history of such malignancies, a biopsy is recommended as the entire management plan hinges on the accuracy of the local staging (Kim, Jeong, & Cho, 2022). In cases where transvaginal repairs are conducted, removing the fistula tract may reduce the vaginal space. Additionally, the preservation of the fistula tract serves to prevent harm to the ureteric orifices, maintain fibrosis for suturing, and minimize both blood loss and the size of the fistula.

7.7 The Occurrence of Stress Urinary Incontinence (SUI) after Surgical Correction of Vesicovaginal Fistula

Following VVF repair surgery, stress urine incontinence may occur if the urethral supports become ischemic or iatrogenic, maybe as a consequence of the procedure itself or a triggering event. Previous studies have shown that stress urinary incontinence (SUI) is prevalent after the closure of a fistula at the neck of the bladder or proximal urethra. When it comes to the main therapy of VVF implantation, medical professionals are split on the question of whether a mid-urethral sling is necessary. Synthetic suburethral slings should be avoided in primary care settings because to the high rates of degradation and repair failure observed in previous studies (Capes, Ascher-Walsh et al., 2011) Breen and Ingber (2019) outline several surgical techniques for preventing stress urinary incontinence (SUI), such as the rectus fascial sling, the pubococcygeal sling, the plication of the pubocervical fascia, and caution when it comes to the tight closing of the vagina with skin grafts and Martius flaps.

The Impact of Vesicovaginal Fistula Repair on sexual outcomes

Recent research endeavors have explored the sexual ramifications arising from the surgical rectification of a VVF (Mohr et al., 2014; Miklos et al., 2015; Pope et al., 2018). Pope et al.’s study revealed that no discernible superiority of one surgical route over the other was observed. They examined the sexual function among a cohort comprising 115 patients during a 12-month follow-up period. The study findings indicated an average decline of 5 mm in vaginal length following surgical intervention. This study delineates that the presence of larger-diameter fistulas, exceeding the size of 3 cm, and diminished vaginal caliber were significantly and positively correlated with a greater probability of developing sexual dysfunction following surgical intervention, as supported by empirical data. Specific individuals may refrain from engaging in sexual activity or conceiving a child due to apprehension regarding recurrence.

In contrast, others may encounter extended periods of abstinence that strain their interpersonal relationships. Despite limited literature on the optimal timing for patients to resume sexual activity following VVF repair, it is customary to impose a prohibition period of three to six months on sexual intercourse for patients who have undergone this surgery. According to recent scholarly research, patients can engage in sexual activity six weeks post-surgery. Healthcare professionals commonly recommend that patients partake in sufficient foreplay,
refrain from engaging in rough sexual activity, and abstain during menstruation as a prescribed postoperative regimen (Miklos et al., 2015; Pope et al., 2018).

7.8 The Comparative Analysis of Open, Laparoscopic, and Robotic Repair

Traditionally, the treatment of VVF has involved surgical procedures utilizing either a transabdominal or transvaginal method. The inception of surgical robotics has brought about considerable ease in the performance of intricate surgical procedures. The expedited adoption of minimally invasive surgical techniques has substantially reduced postoperative recovery time and hospital stay duration. Two different methods have been identified for repairing VVF through robotics. These are the transperitoneal transvesical and transperitoneal extravesical techniques (Miklos et al., 2015)

Recent scholarly investigations have revealed that laparoscopic and robotic approaches for the repair of VVF present comparable results, coupled with low incidence rates of complications. The field of robotic repair presents a notable advantage compared to conventional laparoscopic methods due to its ability to utilize magnified three-dimensional vision, increased degrees of freedom of movement at 7°, streamlined suturing, precise dissection, and minimized blood loss (Miklos et al., 2015)

In recent years, robotic-assisted surgery has yielded notable advancements in minimally invasive surgical procedures. However, the feasibility of performing robotic VVF repair on a larger scale is currently debated. This discourse is particularly relevant in developing nations where the incidence of VVF is high among the poorest poor. (Fehintola et al., 2019).

An eminent hindrance encountered in adopting robotic VVF repair in underdeveloped countries is the financial burden. The application of robotic technology in surgical procedures appears encumbered by the relatively exorbitant expenses associated with the acquisition and maintenance of equipment and the costs of training medical professionals in its utilization, which may pose a barrier to its widespread use (Miklos et al., 2015; Fehintola et al., 2019). The principles and management strategies of FGF are summarized in Tables 2 and 3.

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<th>Table 2. Principles of female genitor-urinary fistula repair</th>
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<td>Adequate and complete exposure</td>
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<tr>
<td>Ensuring scrupulous hemostasis</td>
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<td>Adequate tissue dissection</td>
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<tr>
<td>Tension-free suturing with absorbable sutures</td>
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<tr>
<td>Water-tight closure is a must</td>
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<tr>
<td>Adequate blood supply at the repair site</td>
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<td>Continuous bladder drainage postoperatively</td>
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<td>Reducing postoperative bladder spasms</td>
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<thead>
<tr>
<th>Table 3. Management strategy for female genitor-urinary fistula</th>
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<tr>
<td>Often permanent percutaneous nephrostomies for urinary diversion in malignant FGF</td>
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<tr>
<td>Suprapubic cystostomy as adjunct urinary diversion following VVF repair is useful Bladder drainage for 2 weeks is sufficient for healing of VVF repair</td>
</tr>
<tr>
<td>Early repair of VVF is optional, Delayed repair is advocated: Repair at 12 weeks is ideal</td>
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<td>Transvaginal route of repair has greater versatility and more range of flap options than the transabdominal route</td>
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<td>Interposition flaps are valuable adjunct in malignant- and radiation-induced fistulae</td>
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<td>Anticholinergics and bladder relaxants help in postoperative recovery and comfort</td>
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<td>Biopsy of the fistula - not mandatory in nonmalignant VVF</td>
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<td>Vaginal intercourse initiation after repair to be done cautiously, safe after 3 months</td>
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</table>

8. Conclusion

On patients who have had rigorous evaluations to establish if they are good candidates, conservative approaches should be used. A careful clinical assessment that takes into account all pertinent factors should serve as the
foundation for prompt surgical intervention for VVF. According to recent research, postponing VVF repair may yield better results than having it done straight away. The transvaginal approach’s utilization is frequently recommended due to its low complication rate, high success rate, and low morbidity. If at all possible, all patients in need of medical care ought to be taken to a tertiary care facility, which has the most cutting-edge equipment and professionals who have undergone extensive training. Unfortunately, only a few third-world countries with weak economic and healthcare infrastructure may be affected by this realization.

Competing Interests Statement
The authors have no conflict of interest regarding this manuscript.

References


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