International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 2, February 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.2.2025.168

ORIGINAL RESEARCH

Outcomes we see after vesicovaginal fistula (VVF) after obstetric and gynaecologic surgery

[1]Dr. Sweta Gupta, [2]Dr. Ketan Zala, [3]Dr. Rupesh Gupta

[1]Assistant Professor, Department of Obstetrics and Gynaecology, GMERS Medical College, Vadnagar,Gujarat, India
[2]Assistant Professor, Department of Obstetrics and Gynaecology, GMERS Medical College, Vadnagar,Gujarat, India
[3]Associate Professor, Department of General Surgery, GMERS Medical College, Dharpur, Gujarat, India

Corresponding Author
Dr. Rupesh Gupta
Associate Professor, Department of General Surgery, GMERS Medical College, Dharpur,Gujarat, India
Email- drrupesgupta@gmail.com

Received: 17 December, 2024 Accepted: 10 January, 2025 Published: 26 February, 2025

Abstract
Aim : This studyaims to present the anatomical, clinical and lower urinary tract symptom outcomes of women with VVF.
Materials and methods: In this Study we include the patients with VVF. Data regarding pre-operative evaluation, surgical treatment, and post-operative follow-ups were collected. Surgical approach depended on the cause, type, number, size, location, and time of onset of the fistula. Post-operatively, foley catheter was maintained for at least 1 week with cystoscopy performed prior to removal. Follow-up evaluation included cystoscopy, bladder diaryand multi-channel urodynamic study.
Results: We evaluate total 20 patients, 1 had spontaneous closure, 10 were repaired vaginally and 9 abdominally. Patients repaired vaginally were significantly noted to have a mean age of 46.3 ± 7.1 years with VVFs located adjacent the supra-trigone area having a mean distance of 1.7 ± 0.5 cm from the ureteric orifice. Its operative time and hospital stay were significantly shorter. In contrast, abdominally repaired patients had mean age of 35.0 ± 8.2 years and VVFs with mean distance of 0.4 ± 0.4 cm from the ureteric orifice. Post-operatively, 2 cases (14.2%, 2/14) of VVF recurrence and de novo urodynamic stress incontinence (USI) (25%, 2/8) were noted after vaginal repair and 3 cases (50%, 3/6) of concurrent ureteric injury and overactive bladder after abdominal repair.
Conclusion: The vaginal route had higher incidence of recurrence and less invasiveness, faster recovery period, and no association with post-op overactive bladder made it more preferable than the abdominal approach.
Keywords: Dysmenorrhea, menstrual pain, lifest

Introduction

Vesicovaginal Fistula (VVF) consists a pathological entity representing an abnormal and unusual connection between urinary bladder and vagina wall. This distressing disorder may have profound physical, emotional, and social consequences for the affected individuals.[1] The anatomy of female pelvis depicts a fundamental role among the development and manifestation of vesicovaginal fistulas. The urinary bladder is located in close proximity to the vaginal wall, with the vesicovaginal septum separating them. Under normal circumstances, this septum maintains the integrity of the bladder and vaginal compartments. This structure prevents any communication between the two. However, when the vesicovaginal septum is compromised, either due to injury, surgery, or underlying medical conditions, it can lead to the formation of a fistula [2].Incidence of VVF varies globally, influenced by a multitude of factors. To be more accurate, in low-income nations and especially Africa, approximately 30.000 to 130.000 new cases are reported each year [1,2]. On the other hand, in advanced economies the incidence is relatively low. However, hysterectomy represents the main gynaecological operation leading to this complication with an incidence of 80%. Elucidating the incidence of VVF in each surgical approach of hysterectomy, laparoscopic method results in VVF in 2,2 in 1000 women, while laparotomy in 1 and transvaginal procedure in 0,2 in 1000 patients respectively [3]. In developing countries, where access to proper obstetric care may be limited, obstetric complications during childbirth account for a significant proportion of VVF cases. Prolonged and obstructed labor can exert excessive pressure on the bladder, causing ischemic injury and subsequent tissue necrosis, which can

DOI: 10.69605/ijlbpr_14.2.2025.168

result in the formation of a fistula. Additionally, pelvic surgery, including gynecological procedures and pelvic radiation therapy, can also contribute to the occurrence of VVF. [4]Trauma, such as pelvic fractures or severe pelvic infections, and certain underlying conditions like bladder cancer or endometriosis, can also be associated with VVF development. Pathophysiologic mechanism of vesicovaginal fistulas is complex and multifactorial. Common underlying pathway involves the disruption of the vesicovaginal septum, allowing urine flowing from the bladder into the vaginal canal. This disruption can occur due to tissue ischemia, infection, trauma, or surgical interventions. Factors that contribute to the development of VVF include tissue necrosis, poor wound healing, infection, inadequate blood supply, and compromised tissue repair mechanisms.[5] These factors can lead to the persistence of a fistula, hindering the natural healing process and perpetuating the abnormal communication between the bladder and the vagina . Proper understanding the intricate interaction between anatomy, incidence, and the mechanism of VVF is essential regarding the diagnosis, treatment, and prevention of this condition. Aim of this study represents the evaluation of effectiveness and safety of novel techniques regarding vesicovaginal fistula repair, improving surgical outcomes and patient quality of life .[6] Vesicovaginal fistula (VVF) is an abnormal epithelialised or fibrous connection between the bladder and vagina, which results in continuous and unremitting urinary incontinence (UI). VVFs are rare in developed countries and arise mainly from malignant disease, radiotherapy (RT), or surgical trauma. VVF is a debilitating condition for women not only in developing countries but for women in all parts of the world. Herodotus noted the continuous leakage of urine after difficult labour.[7]

The latest study in 2023 found that there was a significant correlation between health stigma and psychological distress among VVF patients. The findings highlighted the importance of health disclosure in the management of the stigma's effects on VVF patients' health and well-being Early detection and prompt treatment are essential for VVF management. Most patients complain of continuous urinary leakage about 7 to 10 days after gynecologic surgery. However, the onset of VVFs varies from immediately postoperatively to 6 weeks postoperatively. VVFs secondary to radiation therapy can take years to develop .[8]Surgical treatment can be performed with vaginal, abdominal, laparoscopic, robotic, and transurethral approaches.The patient's medical, obstetric, and surgical history as well as a carefully performed pelvic examination are important for the diagnosis of a VVF.[9] Confirmation of urine leakage is crucial to identify the site and size of a VVF and can be performed by a speculum examination. The physician can also evaluate the tissue quality prior to correction via a speculum examination. A biopsy is recommended in patients with a history of cancer.[10] The double-dye technique can be used to differentiate between a ureterovaginal fistula and a VVF. Cystoscopy and voiding cystourethrography are useful to determine the size, site, number, and location of VVFs. Imaging studies (computed tomography and magnetic resonance imaging) are advantageous for the diagnosis of ureterovaginal fistulas, 12% of which are concurrent with a VVF.[11]the literature on the aetiologies, predisposing factors and diagnosis; and describe treatments, including preoperative, intraoperative, and postoperative care. Intraoperative prevention and management is also discussed in some detail.

Vesicovaginal fistulas (VVFs) are devastating consequences resulting from obstetric labor and trauma for developing countries and from pelvic surgeries or radiotherapy for developed countries . Incidence for obstetric fistula from demographic health survey ranges 0.16%–4.7% in Sub-Sahara Africa and 0.08–2.7% in South Asia while gynecologic fistula approximates 1 in 1200 from gynecologic procedures .[12,13]

Currently, comparative assessment of fistulas within published literature is impossible since there is no accepted standardized method to classify them. Previous classifications were prone to subjective variations, which prompted Goh to make an objective classification utilizing the external urinary meatus as a reference point for measuring the distance of the distal edge of the fistula. Further sub-classifications were also included which covered the size of the fistula, extent of scarring, and vaginal length [14,15].

Associated functional abnormality of the lower urinary tract has been reported prior to repair of urogenital fistulas. In a study conducted by Browning and Menber persistence and development of stress urinary incontinence was significantly noted after surgical closure of fistula especially if the urethra was involved . Likewise Dolan et al. also demonstrates lower urinary tract symptoms after successful anatomical closure of urogenital fistula of surgical etiology with no significant difference in urodynamic abnormalities in different types of fistula . [16]Since the association of the type of surgical procedure and lower urinary tract symptoms has not been explored, it became the main interest of the present study. Thus, the study aimed to evaluate the anatomical, clinical and lower urinary tract symptom outcomes of women with VVF after obstetric and gynecologic surgery.[17]

Material and Methods

This was a retrospective case series study conducted in the Urogynecology department of GMERS Medical College, Vadnagar, Gujarat. The study was done from May 2024 to November 2024. A total of twenty patients diagnosed VVF were evaluated. Pre-operative work-ups such as detailing of medical history, physical exam, and pelvic exams assessing vaginal

DOI: 10.69605/ijlbpr_14.2.2025.168

caliber, length and mobility were done. Laboratory tests included urinalysis, urine culture, renal function and coagulation studies. Imaging studies performed were intravenous pyelogram and computed tomography to assess the actual extent of injury. Cystoscopy was done using a flexible cystoscope with instillation of methylene blue to assess the size, number, location and proximity of the fistula from ureteric orifices and bladder neck.

Surgical treatment commenced when the fistula site and adjacent tissues were pliable, non-inflamed, scarred, and free of granulation tissue and necrosis. Speculum exam was performed every 3–4 weeks to monitor tissue changes.

Post-operatively, Foley catheter was frequently checked for adequate drainage and maintained for at least 1 week. Prior to removal a cystoscopy was performed to ascertain tissue integrity. Follow-ups were done at 1 week, 2 weeks, 1 month, 3 months, 6 months and 10 month there after. Evaluation included pelvic exam, cystoscopy using a flexible cystoscope on an out-patient basis , 1-h pad test, bladder diary.

Statistical analysis

Descriptive statistics were used for demographics and perioperative data. Paired-samples t-test, chi-square or Fisher exact test were applied for comparison of pre- and post-operative continuous and categorical data, respectively. Values of $p < 0.05$ were considered statistically significant for all comparisons

Result

We evaluate total 20 patients , 1 had spontaneous closure, 10 were repaired vaginally and 9 abdominally. Patients repaired vaginally were significantly noted to have a mean age of 46.3 ± 7.1 years with VVFs located adjacent the supra-trigone area having a mean distance of 1.7 ± 0.5 cm from the ureteric orifice.Patients who developed fistula from pelvic procedures were aged 46-54 years old. Those from obstetric causes were aged 30–years old. All patients were parous. Ten of the patients had VVF due to hysterectomy and four patients due to cesarean section. One patient had spontaneous closure of the fistula following continuous bladder drainage with a VVF size of 0.2 cm located in the supra-trigone area. Nine patients underwent surgical repair, 8 through the vaginal route and 4 through the abdominal route. Retrograde placement of ureteric stent was placed for fistula close to the ureteral orifice in 3 patients for vaginal route. All VVF repair cases were primarily closed. Fistula remained for 20–200 days from diagnosis to commencement of anatomical closure. Three patients had their fistula in the trigone area and 10 patients in the supra-trigone area. VVF size ranged from 0.5 to 1.5 cm. Post-operatively, Foley catheter was maintained for 10 days to a maximum of 57 days. Follow-up period ranged from 6 to 120 months. Post-operative complications such as recurrent fistula, urodynamic stress incontinence (USI), urinary tract infection and overactive bladder were noted in 7 patients. Post-operative subjective assessment of lower urinary symptoms through UDI-6 and IIQ-7 questionnaires showed significant improvement of UDI-6 with the vaginal route as compared to abdominal route.

Comparative data between surgical procedures were detailed in 1. Patients repaired vaginally were significantly older with a mean age of 50.3 ± 7.1 years while those abdominally repaired aged 38.0 ± 8.2 years old. Eight patients had prior pelvic surgeries with no significant impact to surgical route of repair. Significant difference was noted between the etiology of VVF and route of repair. VVF resulting from hysterectomy were repaired vaginally ($p = 0.015$) while those from cesarean section were repaired abdominally. VVF remained for 124.5 ± 69.1 days before commencement of vaginal repair in contrast to 74.2 ± 82.1 days with abdominal repair with no significant difference. Mean size of VVF with vaginal repair was 8.8 ± 3.5 mm while abdominal repair was 11.2 ± 1.3 mm with no significant difference when compared ($p = 0.408$). The vaginal route had 2 cases of recurrence (14.2%, 2/14) while the abdominal route had none. Leakage of urine from the vagina occurred on the 10th and 12th day post surgery. It was then surgically managed through the abdominal route by an urologist. At present, these 2 patients remained continent. Concurrent ureteric injury was significantly noted in 3 patients (50%, 3/6) who underwent abdominal repair. VVFs that were located adjacent to the supra-trigone area were significantly repaired through the vaginal route ($p = 0.055$). Distance of VVF from the ureteric orifice significantly affects repair procedure ($p = <0.001$). The vaginal route was undertaken for mean distance of 1.7 ± 0.5 cm and the abdominal route for mean distance of 0.4 ± 0.4 cm from the ureteric orifice. Mean operative time was significantly longer ($p = 0.023$) with the abdominal route consuming 204.1 ± 87.8 min while vaginal repair took up 111.5 ± 44.7 min. Mean operative blood loss was also noted to be higher with abdominal repair loosing 213.3 ± 291.7 ml compared to 101.8 ± 98.0 ml with vaginal repair, however the difference was not significant. At the same time, patients who underwent abdominal repair stayed significantly longer in the hospital ($p = 0.004$) at a mean of 8.7 ± 1.8 days while vaginally repaired patients stayed 5.4 ± 1.6 days. Post-operatively, Foley catheter was maintained longer for abdominal repair at a mean of 26.0 ± 20.1 days in contrast to the 14.0 ± 4.1 days with vaginal repair with no significant difference ($p = 0.121$) noted. De novo urodynamic stress incontinence (USI) was observed in 2 patients (25%, 2/8) who underwent vaginal repair while abdominally repaired patients had none. Anti-incontinence surgery was not performed,.as symptoms were tolerable. Overactive bladder was significantly noted in 3 patients abdominally repaired (50%, 3/6; $p = 0.05$). Lastly, 2

DOI: 10.69605/ijlbpr_14.2.2025.168

patients also had urinary tract infection with each surgical route having one patient. Table 1. The patient's characteristics and VVF operation

Table -1 The patient's characteristics and VVF operation.

Empty Cell	VVF, n = 20	Vaginal, n = 10	Abdominal, n = 10	P value
Mean age (year)	44.7 ± 9.4 (39.5–49.8)	50.3 ± 7.1 (44.3–56.2)	38.0 ± 8.2 (29.3–46.7)	**0.011**[a]
Median parity	2 (1–4)	3 (1–4)	2 (1–3)	0.074[a]
Mean BMI (kg/m2)	24.3 ± 3.5 (22.3–26.2)	23.5 ± 2.1 (21.8–25.2)	26.0 ± 4.4 (21.4–30.7)	0.179[a]
Prior pelvic surgery (n %)	8 (53.3%)	4	3	0.608[b]
Cause of VVF (n %)				
Hysterctomy AH/LH	10 (7 + 3) (73.3%)	10 (5 + 5)	2 (2 + 0)	**0.015**[b]
C/S	4 (26.7%)	0	4	
VVF duration (days)	98.7 ± 74.4 (58.9–141.3)	124.5 ± 69.1 (66.7–182.3)	74.2 ± 82.1 (11.9–160.3)	0.237[a]
Mean size of VVF (mm)	8.8 ± 3.2 (7.0–10.6)	8.8 ± 3.5 (5.8–11.2)	11.2 ± 1.3 (4.0–6.8)	0.408[a]
Recurrent VVF (n %)	2 (13.3%)	2	0	0.473[b]
Concurrent Ureter injury (n %)	3 (13.4%)	0	3	0.055[b]
Supra-trigon VVF (n %)	12 (80.0%)	8	3	0.055[b]
Distance to ureter orifice (cm)	1.2 ± 0.8 (0.8–1.6)	1.7 ± 0.5 (1.3–2.1)	0.4 ± 0.4 (0.1–0.8)	<**0.001**[a]
Medical disease				
DM	1 (6.7%)	1	0	0.571[b]
HT	2 (13.4%)	1	1	0.473[b]
Post-menopause	3 (20.0%)	2	1	0.615[b]
Mean OP time (min)	151.2 ± 79.4 (105.4–197.1)	111.5 ± 44.7 (74.1–148.9)	204.1 ± 87.8 (112.1–296.3)	**0.023**[a]
Mean OP blood loss (ml)	149.6 ± 202.9 (32.5–466.8)	101.8 ± 98.0 (20.0–283.8)	213.3 ± 291.7 (52.7–519.4)	0.328[a]
Mean Hb difference (g/dl)	1.2 ± 1.0 (0.6–1.7)	0.8 ± 0.6 (0.3–1.4)	1.6 ± 1.2 (0.2–2.9)	0.184[a]
Foley maintained post-repair (days)	15.4 ± 4.9 (12.5–18.2)	14.0 ± 4.1 (10.6–17.4)	26.0 ± 20.1 (7.9–47.1)	**0.021**[a]
Mean hospital stay (days)	7.4 ± 2.8 (5.7–9.0)	5.4 ± 1.6 (4.0–6.8)	8.7 ± 1.8 (6.8–10.5)	**0.004**[a]
Median follow-up (months)	33.9 ± 32.7 (15.0–52.8)	42.8 ± 36.5 (12.2–73.3)	22.1 ± 25.2 (6.3–48.9)	0.260[a]
Complications,				
Ureter injury	0 (0%)	0	0	
USI	2 (13.3%)	2 (25.0%)	0	0.473[b]
OAB	3 (20.0%)	0	3 (50.0%)	0.055[b]
UTI	2 (13.3%)	1 (12.5%)	1 (16.7%)	0.692[b]
Failure	2 (13.3%)	2 (25.0%)	0	0.473[b]
Obj. cure (n, %)	15 (100%)	6 (75.0%)	6 (100.0%)	0.473[b]

Discussion

We have demonstrated that route of VVF repair depends on several factors, such as distance from ureteric orifice, patient's condition, accessibility from vagina and the type of fistula either simple or complex. Most obstetric causes of VVF tend to be low-lying located near the bladder base, trigone, and urethra, since it results from impacted head and/or instrumental delivery . They are complex, multiple in number, and closer to the ureteric orifice, thus were repaired abdominally. Whereas, gynecologic causes of VVF are high-lying resulting from hysterectomies and tend to be simple, single in number, located farther from the ureteric orifice easy access through the vagina.[18]

Controversy exists as to the timing of VVF repair. Conventional teaching dictates a waiting period of at least 3 months for the fistula tract to mature and tissue quality to improve. Yet, several studies have recommended early repair within 72 h or when tissues are deemed suitable to spare the patient of devastating physical, psychological and social stress. Following the recommendation, VVF remained on an average of 98.7 ± 74.4 days prior to surgical repair awaiting maturity of fistula with no significant correlation to surgical route of repair.

Most review articles have agreed that the bladder should be continuously drained after surgical repair of fistula, however, optimal duration of drainage remains unclear. Longer duration of bladder catheterization

DOI: 10.69605/ijlbpr_14.2.2025.168

increases the risk of urinary tract infections and other associated morbidities. In the current study, foley catheter is removed once cystoscopy shows good tissue integrity, which resulted to a minimum of 10 days and maximum of 57 days prior to removal.[18,19]

The present study preferred the vaginal route whenever possible for these reasons: shorter operating time, lesser blood loss and hospital stay, and shorter maintenance of Foley catheter. However, failure rate for vaginal repair is at 14% and 0% for abdominal route. Relatively, a large cohort prospective study done by Frazyngier et al. shows failure rate for vaginal repair at 18.8% and abdominal route at 10.5% . Re-operation of recurrent fistulas should be approached with care. Success rate for subsequent repair attempts decreases to 79% then to 53% with more than 2 attempts . In our study, subsequent repair of the recurrent fistula was done through the abdominal route with success.

Factors that contribute to failure includes small bladder with complete urethral destruction, urethral involvement, circumferential fistula, severe vaginal scarring and fibrosis in the vaginal epithelium . Most characteristic studies have included age as a factor affecting surgical outcomes. With majority of the vaginally repaired patients being post-menopausal, the hormonal changes that occurred lead to vaginal atrophy contributing to failure of repair. [20]

Influence of route of repair on fistula closureAlmost one-fifth (18.8%) of those repaired vaginally experienced repair failure, compared with 10.5% of those repaired abdominally. In bivariable analysis, a vaginal route of repair was associated with 1.42 (95% CI, 1.11–1.81) times the risk of failure to close the fistula relative to the abdominal route.[21]

Abdominal repair has been reserved for special cases due to increased morbidity from greater amount of blood loss, longer operating time, hospital stay and maintenance of Foley catheter. Failure rate approximates to zero as no recurrence was noted. Unlike the vaginal repair, post-operative overactive bladder syndrome was more prominent occurring in 50% of the study group. The opening of the bladder wall during the surgical procedure led to the loss of bladder tissue, nerve denervation, and a smaller bladder capacity. These alterations affect the neural regulatory circuit and detrusor muscle which lead to changes in sensory function yielding symptoms of overactive bladder [22]. Likewise, Zambon et al. [23] reports 16.6% of patients having urgency after abdominal repair and 12.5% after vaginal repair. Dolan et al. also reports 12.9% of patients with detrusor overactivity after fistula repair.Development of fistula could lead to conflicts between the patient, primary surgeon, and referral surgeon. The decision making process on fistula management not only relies on the anatomical defect but also on the capability and acceptance of the complication by the primary surgeon. Patients are usually referred to close colleagues of Urogynecologist. And urogynecologist would tend to favor the less invasive approach, which is the transvaginal route even though the criteria set for such procedure could not be met. The intention is to lessen the anxiety of the patient for another laparotomy procedure. However, the primary surgeon's highest duty is acceptance of direct personal responsibility of care for the patient whom he has operated on, from pre to post-operative period. A fistula surgeon must restrict his practice to which he is competent to deliver and not hesitate to refer patients needing higher level of care. He should never take advantage of a patient nor allow anyone to take advantage . He should safeguard themselves and the best interest of the patient .The strengths of the study include management perspective by the Urogynecologist and the standard institutional protocol that echoes a prospective evaluation. The retrospective study design, single center and small sample size limited the study. A good sample size was difficult to achieve even in a span of 13 years since VVF is not common in a country with good medical practice and facility.

Conclusion

The management of VVF is individualized and dependent on the surgeon's experience and expertise. Fundamental treatment principles involve adequate exposure, tension-free approximation of edges, non-overlapping suture lines, good hemostasis, watertight closure and adequate post-operative bladder drainage. Achievement of cure from abdominal and vaginal repair yields good outcomes. The downside of abdominal repair includes overactive bladder symptoms, longer operating time, hospital stay and maintenance of Foley catheter. Though vaginal repair has been associated with higher failure rate Faster recovery period and no association with post-op overactive bladder made this approach more preferable.

Reference

1. B.G. Hallner, K.L. Hebert, J.C. WintersTransvaginal repair of urogenital fistula(4th ed)L. Cardozo, D. Staskin (Eds.), Textbook of female urology and urogynecology, vol. 2 (107), CRC Press, Boca Raton, Fl (2017), pp. 1173-1180
2. C.C. Chen, M. KarramLower urinary tract fistulasM. Walters, M. Karram (Eds.), Urogynecology and reconstructive pelvic surgery (4th ed), 41, Elsevier Saunders, Philadelphia, PA (2015), pp. 603-621
3. P. Harki-Siren, J. Sjoberg, A. TitinenUrinary tract injuries after hysterectomyObstetGynecol, 92 (1998), p. 113
4. J.T.W. GohA new classification of female genital tract fistulaAust N Z J ObstetGynaecol, 44 (2004), pp. 502-504
5. A. Browning, B. MenberWomen with obstetric fistula in Ethiopia: a 6-month follow-up after surgical treatmentBJOG, 115 (2008), pp. 1564-1569
6. L.M. Dolan, W.E. Dixon, P. HiltonUrinary symptoms and quality of life in women following urogenital

DOI: 10.69605/ijlbpr_14.2.2025.168

fistula repair: a long-term follow-up studyBJOG, 115 (2008), pp. 1570-1574
7. T.S. Lo, S. Khanuengkitkong, Y.L. Tan, A.K. Dass, P. Y. Wu, A.M. Al-kharabshehLow incidence of bacteriuria with outpatient flexible cystoscopyAust N Z J ObstetGynaecol, 54 (4) (2014 Aug), pp. 366-370,
8. S.A. Shumaker, J. Wyman, J.S. Uebersax, D.K. McCli sh, J.A. FantlHealth-related quality of life measures for women with urinary incontinence: the incontinence impact questionnaire and urogenital distress inventory. Continence Program in Women (CPW) research groupQual Life Res, 3 (1994), pp. 291-306
9. M.D. Barber, M. Walters, R.C. BumpShort forms of two condition-specific quality of life questionnaires for women with pelvic floor disorders (PFDI-20 and PFIQ-7)Am J ObstetGynecol, 193 (2005), pp. 103-113
10. B.T. Haylen, D. deRidder, R.M. Freeman, S.E. Swift, B. Berghmans, J. Lee, *et al.*An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunctionIntUrogynecol J, 21 (1) (2010), pp. 5-26
11. Y. Xiong, Y. Tang, F. Huang, L. Liu, X. ZhangTranspe ritoneal laparoscopic repair of vesicovaginal fistula for patients with supratrigonalfistula:Comparison with open transperitoneal techniqueIntUrogynecol J, 27 (2016), pp. 1415-1422
12. B. Cohen, A.E. GousseCurrent techniques for vesicovaginal fistula repair: surgical pearls to optimize cure rateCurrUrol Rep, 8 (2007), pp. 413-418
13. V. Frajzyngier, J. Ruminjo, F. Asiimwe, T.H. Barry, A. Bello, D. Danladi, *et al.*Factors influencing choice of surgical route of repair of genitourinary fistula, and the influence of route of repair on surgical outcomes: findings from a prospective cohort studyBJOG, 119 (2012), pp. 1344-1353
14. A. BrowningManagement of obstetric urogenital fistula(4th ed.)L. Cardozo, D. Staskin (Eds.), Textbook of female urology and urogynecology, vol. 2 (109), CRC Press, Boca Raton, Fl (2017), pp. 1189-1200
15. R. Nardos, A. Browning, C.C.G. ChenRisk factors that predict failure after vaginal repair of obstetric vesicovaginal fistulaAm J ObstetGynecol, 200 (2009), pp. 578.e1-578.e4
16. M. Loposso, L. Hakim, J. Ndundu, S. Lufuma, A. Pun ga, D. De RidderPredictors of recurrence and successful treatment following obstetric fistula surgeryUrology, 97 (2016), pp. 80-85
17. V. Frajzyngier, J. Ruminjo, M.A. BaroneFactors influencing urinary fistula repair outcomes in developing countries: a systematic reviewAm J ObstetGynecol, 207 (4) (2012), pp. 248-258
18. J.P. Zambon, N.S. Batezini, E.R. Pinto, M. Skaff, M.E . Girotti, F.G. AlmeidDo we need new surgical techniques to repair vesico-vaginal fistula?IntUrogynecol J, 21 (3) (2010), pp. 337-342
19. B. Waddie, M. KamalRepair of vesicovaginal fistula: single-center experience and analysis of outcome predictorsArab J Urol, 9 (2) (2011), pp. 135-138
20. A. BrowningRisk factors for developing residual urinary incontinence after obstetric fistula repairBJOG, 113 (2006), pp. 482-485
21. M. DrakeTheoveractivebladder(4thed.)L. Cardozo, D. Staskin (Eds.), Textbook of female urology andurogynecology, vol. 2 (51), CRC Press, Boca Raton, Fl (2017), pp. 584-591
22. L.L. Wall, J. Wilkinson, S.D. Arrowsmith, O. Ojengbe de, H. MabeyaA Code of Ethics for the fistula surgeonInt J GynaecolObstet, 101 (2008), pp. 84-87
23. Mahliqa Maqsud B. Obstetric fistula prevention in South Asia an overview. 2007.