



Research Paper

Rectovaginal fistulas, outcomes of various surgical repair and predictive factors of healing success. A retrospective cohort study of 40 cases

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ABSTRACT

Background: Rectovaginal fistulas causing distressing and irritating symptoms as well as psychological suffering to the patients.

Objective: the main objective is to assess the outcomes of surgical repair of rectovaginal fistulas and factors that predict repair failure.

Methods: A retrospective cohort study in which 40 patients presented with rectovaginal fistulas were included. Their clinical presentations and the management outcomes of various surgical repair were studied and analyzed. The predictive factors for successful surgical repair were investigated and addressed.

Results: The overall success rate of both local and *trans*-abdominal was 82.5%. The success rate of local repairs was 87.5% while the success rate of *Tran's* abdominal repairs was 50%. Fecal diversion was done for 9 patients with complex high type fistulas. The results showed that 6 patients were healed and 3 patients with diverting colostomy were failed to heal after stoma reversal. Thus the role of diverting colostomy in recto-vaginal fistulas healing was not significant. ($P > 0.05$). The main negative predictor factors were prior repair and etiology of the fistulas.

Conclusions: For low simple rectovaginal fistulas, local repair is preferred option. Complex, high type and recurrent fistulas necessitate *trans*-abdominal approach. History of prior surgical repair and etiology are the main risk factor for repair failure. Diverting colostomy did not increase the overall healing rate.

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1. Introduction

A rectovaginal fistula (RVF) is an abnormal epithelial-lined communicating tract between the rectum and vagina. Rectovaginal fistulas represent a frustrating and distressing condition for patient and real challenge for surgeons owing to relatively high failure rate after repair [1]. These fistulas can develop from a different etiologies including congenital malformations and more commonly acquired conditions mainly difficult and prolonged labor with necrosis of rectovaginal septum and obstetrical injury with third and fourth-degree perineal tear or episiotomy and infection and breakdown of perineal repair [2]. Other acquired causes include iatrogenic and operative trauma like stapled haemorrhoidopexy and low stapled coloanal or colorectal anastomosis, pelvic malignancies due to local extension and following radiation therapy. Crohn's disease, diverticulitis, and infectious processes such as anorectal abscesses and Bartholin gland abscess and less

frequently tuberculosis and lymphogranuloma venereum are among other acquired diseases [3].

Patients with rectovaginal fistulas could be asymptomatic [3,4]. Symptoms depend on the location size and etiology of a rectovaginal fistula. Patients commonly present with passage of flatus or stool and foul smell vaginal discharge. Recurrent cystitis and vaginitis may also be presenting symptoms. Patients with rectovaginal fistulas secondary to obstetric injury may complain from fecal incontinence [5]. Other symptoms are related to the underlying etiology such as intestinal symptoms associated with inflammatory bowel disease and diverticulitis and symptoms related to pelvic malignancies such as bladder, rectal, and uterine or cervical cancers [6].

Rectovaginal fistulas are classified according to their location, size and etiology to either as simple or complex fistulas. On basis of location, rectovaginal fistulas are classified into low type, located between the lower half of the vagina and lower third of the rectum at dentate line or just above it and high type fistula situated between the upper half of vagina or posterior vaginal fornix and

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middle third of the rectum [7]. The location classification is vital because it determines the treatment plan since low type fistula can be corrected with a local or perineal procedures while trans-abdominal approach are commonly required for high type fistulas. Fistulas less than 2 cm in diameter are considered small while those larger than 2.5 cm are large fistulas [8].

Accordingly, low type, small size fistulas secondary to obstetric or operative trauma or secondary to infective process are deemed simple fistulas while complex type include large size, high type, fistulas caused by pelvic malignancies, post-radiation, inflammatory bowel diseases and recurrent rectovaginal fistulas [5,9].

Management of rectovaginal fistulas necessitates comprehensive and extensive evaluation. Clinical examination is paramount to determine the site and size of the fistula and to assess the state of surrounding tissues of rectum, vagina and rectovaginal septum using proctoscope and vaginal examination. Probing of fistula tract is painful and intolerable and thus is not recommended [8,10]. A vaginal tampon can be inserted followed by instillation of methylene blue in the rectum. The tampon can be removed after 15 min, if staining of tampon noticed, rectovaginal fistula is most likely. Assessment of anal sphincter tone and integrity is very important for planning of surgical repair. Imaging studies used to diagnose and assess rectovaginal fistulas include barium enema, CT scan, endorectal or transvaginal ultrasound and MRI can also be used for assessment of rectovaginal fistulas and sphincter integrity. Endoscopy and biopsy of fistula may be required especially for fistulas secondary to inflammatory bowel diseases, malignancy and radiation [11].

Treatment of rectovaginal fistulas depends on etiology, type, size, and location of the fistulas. Prior operations, anal sphincter integrity, quality of the surrounding tissues and patients comorbidities influence the choice of treatment. Surgical repair via either local or transabdominal approach is almost always required for majority of recto-vaginal fistulas [7,11,12].

In this research we discuss the management of 40 cases with acquired rectovaginal fistulas. The outcomes of surgical repair, both local and transabdominal and predictive factors for successful management were studied, discussed and analyzed.

2. Methods

This is a retrospective cohort conducted for the period between February 2015 and December 2019 in which 40 consecutive patients with rectovaginal fistulas of different etiologies had been enrolled. Age ranges between 23 and 65 years (mean 41.6 years). All the fistulas were at or above the dentate line. The exclusion criteria of this study were including anovaginal fistulas (fistulas below the dentate line). The causes of the fistulas were distributed as following: obstetric trauma and difficult birth: 33 patients, iatrogenic after anorectal fistulectomy and prolapsed piles: 4 patients, 2 fistulas due to advanced malignancy with radiation, one fistula was post-traumatic. Recurrent recto-vaginal fistulas after failed surgical attempt were 5. The rectovaginal fistulas were classified according to the etiology, size, location and whether primary or recurrent into 28 simple and 12 complex fistulas.

Clinical data from all patients were collected including patient demographic, characteristics of the fistula, and prior surgical repair. All patients were submitted to surgical repair. Those with simple low type fistulas underwent local repair while those with complex fistulas, a *trans*-abdominal approach was applied.

The surgical repairs were preceded by period of conservative treatment to drainage of any abscess and control infection by appropriate antibiotics for 6–12 weeks. Dietary modifications and fiber supplementation were also advised. Mechanical and chemical preparation was essential for both local and transabdominal

repairs. Prophylactic parenteral third generation cephalosporine and metronidazole were given preoperatively to all patients. The surgical procedures included *trans*-anal endorectal advancement flap (20 patients, 50%), *trans*-vaginal purse-string inversion repair (8 patients, 20%), *trans*-perineal approach (4 patients, 10%) and *trans*-abdominal repair (8 patients, 20%). Sphincteroplasty was done simultaneously with transanal endorectal advancement flap and *trans*-perineal repair for 11 patients presented with sphincter defect. Description the details of operative techniques are beyond the scope of this work. Fecal diversion by sigmoid colostomy was done for 9 patients including those patients with complex high type fistulas (6 patients) and fistulas with prior failed repair (3 out of 5 patients) to protect the repair and to identify the role of fecal diversion in healing of recto-vaginal fistulas. All surgical repairs were done by the same specialist surgeon.

The surgical repair whether local or *trans*-abdominal was considered successful and fistulas deemed closed when there is no passage of flatus and fecal discharge per vagina 6–12 weeks after operative repair and closure of diverting colostomy. The healing and closure of fistulas was confirmed by proctoscopy, endorectal or transvaginal ultrasound and by instillation of methylene blue retention enema for 30 min with a piece of gauze inside the vagina looking for any staining. Patients with clean non staining gauze were diagnosed as successfully healed. The data were statistical analyses using the SPSS software version 22. $P < 0.05$ was considered statistically significant. The work has been reported in line with the STROCSS criteria [13]. The study was registered at Researchregistry: <http://www.researchregistry.com>. Registration ID: researchregistry6681.

3. Results

A total of 40 patients who presented with rectovaginal fistulas of different etiologies submitted to either local (32 patients, 80%) or transabdominal (8 patients, 20%) surgical repairs. The choice of the procedure depends mainly on the type and location of fistula. The local repairs include transanal advancement flap (20 patients, 50%), *trans*-vaginal purse-string sutures repair (8 patients, 20%), *trans*-perineal approach (4 patients, 10%). Repairs through *trans*-abdominal approach were done for 8,20% patients for whom sigmoid colostomy for fecal diversion was done simultaneously for 4 patients (2 recurrent fistulas, and 2 fistulas secondary to malignancy and radiation). The duration of fistulas until surgical repair ranges 3–18 months (average 9 months).

The patient's ages range between 23 and 65 years (mean 41.6 years). Five patients had recurrent recto-vaginal fistulas after failed surgical attempt. The etiologies of the fistulas in this study distributed as following: Obstetric trauma and difficult child birth 33 patients (82.5%), iatrogenic after failed anorectal fistulectomy: 4 patients (10%), 2 fistulas (5%) due to advanced malignancy with radiation, one fistula (2.5%) was post-traumatic. Patient's characteristics and causes of rectovaginal fistulas are shown in Table 1.

The rectovaginal fistulas in this study were categorized according to their size, site, etiologies and whether primary or recurrent into 28 simple and 12 complex fistulas. The characteristics of fistulas and their classifications are shown in Table 2.

The majority of post-obstetric rectovaginal fistulas (Seventy percent (28 patients) were higher of simple type (at or just above the dentate line, less than 2 cm in size whereas the majority of iatrogenic fistulas (3 out of 4 fistulas) and all fistulas due to pelvic malignancy and irradiation (2 fistulas) were complex and higher type. All recurrent fistulas due to failed prior repair (5 patients) were of complex type and large in size.

The overall success rate of all surgical repairs was 82.5% (33 out of 40 patients). The success rate of local repairs was 87.5% (28 out of

Table 1
Patients demographics and fistulas characteristics.

Variables	Number	%
Patients number	40	100
Age (year)	23 - 65 (41.6)	
Body weight (BMI)	22.6 (18.5–35.3)	
Gravida		
Primigravida	9	
Multipara	31	
Etiology		
Obstetric trauma and difficult labor	33	82.5
Iatrogenic	4	10
Malignancy and post –irradiation	2	5
Traumatic	1	2.5
Prior surgical repair	5	12.5
Location of fistula		
Low type (at or just above dentate line)	28	70
High type (>2.5 cm above dentate line)	12	30
Size		
Small (≤2 cm)	28	70
Large (>2 cm)	12	30
Sphincter defect		
Present	11	27.5
Absent	29	72.5
Diverting colostomy		
Present	9	22.5
Absent	28	70
Co-morbidity		
Present	14	35
Absent	26	65

Table 2
Types of repair and success rate.

Type of Repair	Success (%)	Fail (%)
Trans-anal endorectal advancement Flap with sphincteroplasty	95	5
Trans-vaginal purse string inversion	75	25
Trans-perineal repair with Sphincteroplasty	75	25
Overall local repair	87.5	12.5
Trans-abdominal repair	50	50
Repair with fecal diversion	66.7	33.3
Overall repair	82.5	17.5

32 patients) while the success rate of trans abdominal repairs was 50% (4 out of 8 patients.) The results have been shown that *trans-anal advancement flap repair* was superior to other repair for simple low type and small size fistulas. The success rate of *trans-anal advancement flap repair* was 95% compared with the success rate of *trans-vaginal purse string inversion* and *trans-perineal repairs* which were 75% for each procedure (Table 3).

Regarding the transabdominal repairs which were done for 8 high type, complex and recurrent recto-vaginal fistulas, the results have been shown that history of prior failed repair and the etiology were the main predictive factor for failure of recto-vaginal repair. Three out of four fistulas (75%) that failed to heal by *trans-abdominal approach* were recurrent fistulas with prior repair. The *trans-abdominal repair* that applied in this study consists of fistula division after dissection of rectovaginal septum. The rectum and the vagina are closed with interrupted chromic catgut or vicryl sutures without bowel resection. The suture lines are separated by healthy well vascularized omentum.

Fecal diversion by sigmoid colostomy was done for 9 patients including those patients with complex high type fistulas (6 patients) and fistulas with prior failed repair (3 out of 5 patients) to protect the repair and to identify the role of fecal diversion in healing of recto-vaginal fistulas. The results showed that 6 patients were healed and 3 patients with diverting colostomy were failed to heal after stoma reversal. Thus the role of diverting colostomy in recto-vaginal

Table 3
Relationships of patient's characteristics and success of repair.

Type of Repair	Success	Fail
Etiology of fistula		
Post-obstetric	75	25
Iatrogenic	50	50
Malignancy and post-irradiation	0	100
Post-traumatic	100	0
Size of fistula		
≤2 cm	89.3	10.7
≥2 cm	33.3	66.7
Location		
Low type	82.1	17.9
High type	92.9	7.1
Co- morbidity		
Present	78.6	21.4
Absent	84.6	15.4
History of previous repair		
Yes	60	40
No.	85.7	14.3

fistulas healing was not significant. (p.>0.05). The results further showed that all patients with prior failed attempt for whom diverting colostomy was done were healed compared with two unhealed fistulas without colostomy. Patients who healed with colostomy underwent stoma closure operation within 3–6 months later.

Our results also showed that there was no statistical significance between healing of high and low fistulas (p > 0.05). The average follow-up period for all patients in this study was 24 months (12–36 months). No mortality was recorded. Several parameters were studied and analyzed to assess the predictive factors of successful fistula closure including etiology, location, size, prior failed repair surgical procedure, and co morbidities. A history of previous repair, high type and fistulas secondary to pelvis malignancy, radiation and infectious process were associated with a lower success rate (Table 3).

4. Discussion

Although rare, rectovaginal fistula is agonizing and frustrating condition to the patient and the. Although surgical repair is almost always required for management, still there is no consensus on the ideal and most effective treatment options failure rate is not uncommon in all types of surgical repair [5,12,14].

The repair of rectovaginal fistulas can be conducted either via local or transabdominal approach. Factors such etiology of the fistula, its size and location, the state of the surrounding tissue, comorbidities, and prior attempts at repair determine the type of surgical approach [14]. For benign, low type non recurrent rectovaginal fistulas; local repairs is preferable and usually applied. Local repairs include *trans-anal mucosal advancement flap repair*, *trans-vaginal purse-string inversion repair* and *trans-perineal repair* (perineoproctectomy with layered closure) with or without sphincteroplasty depending on integrity of anal sphincters [15]. Transabdominal repair with or without diverting colostomy are particularly used for high, recurrent and complex rectovaginal fistulas including those secondary to inflammatory bowel disease, pelvic malignancy and radiation [16,17].

The surgical repairs applied for the fistulas in this study included local repairs (32 patients, 80%) and Tran's abdominal repairs (8 patients, 20%). The local repair procedures included *trans-anal advancement flap* (20 fistulas, 50%), *trans-vaginal purse-string suturing inversion repair* (8 patients, 20%), *trans-perineal repair* (4 patients, 10%). Repair through *trans-abdominal approach* (8 patients, 20%) were done for patients with high, complex and recurrent recto-vaginal fistulas.

The overall success rate of both local and *trans*-abdominal repair was 82.5% (33 out of 40 patients). The success rate of local repairs was 87.5% (28 out of 32 patients) while the success rate of *trans* abdominal repairs was 50% (4 out of 8 patients.) The results have been shown that *trans*-anal endorectal advancement flap repair was superior to other local repair for simple low type and small size fistulas. The success rate of *trans*-anal advancement flap repair was 95% compared with that of *trans*-vaginal purse string inversion and *trans*-perineal repairs which were 75% for each procedure (Table 3). The overall success rate in our study was in consistent with other previous similar studies [[11,18,19]].

A transanal repair was first described by Hoexter et al. [20] in which the fistula tract is excised, the rectal musculature approximated, and flap of the rectal mucosa submucosa advanced to protect the repair. The vagina mucosa is left open to heal by secondary intention. They reported no recurrence in 35 patients with benign rectovaginal fistulas after 1–6 years. Repair of the defect from the high-pressure side of the rectum, perhaps increasing the success rate of repair. Furthermore, sphincteroplasty can be performed concomitantly if indicated. The success rate of *trans*-anal advancement flap done for fistulas due to birth trauma in our study was 95%, which are very satisfied results. Our results are consistent with Kemal et al. [21] who reported in their retrospective study that all simple recto-vaginal fistulas due to birth trauma healed after *trans*-anal advancement flap repair. The success rates of this approach vary from 29 to 100%. This wide range could be explained by differences in patient's selection and the technique. Complications of this approach are uncommon and minor such as, including local infection fever, urinary tract infection, and spinal headaches [22]. Jones et al. [23] and Ozone et al. [24] concluded in their similar studies that *trans*-anal rectal advancement flap repair is effective and safe approach for managing rectovaginal fistulas including selected cases of Crohn's disease whereas Toyooki et al. [25] found in their retrospective review of 105 patients that the success rate of endorectal advancement flap may not be as optimistic as reported in other published studies. They concluded that patient selection is crucial. Further, they found that prior surgical repair and Crohn's disease are main predictive of surgical failure. A *trans*-anal advancement flap, is frequently practiced by the colorectal surgeon, whereas other local approaches such as the *trans*-vaginal or *trans*-perineal approach is the preferable choice of the gynecologist [26]. When the rectovaginal fistula associated with an anterior sphincter defect, repair of this sphincter defect should be strongly considered. The sphincteroplasty can be done with either a *trans*-anal rectal advancement flap or *trans*-perineal repair.

Other local repair approach is transvaginal purse string inversion repair. This approach is considered by some surgeons to be the preferable method due to the fact that the repair occurs in the vagina vault where the tissue is relatively healthy, soft and pliable and there is minimal manipulation in the potentially diseased and inflamed bowel [26,27]. Transvaginal repairs include two main techniques depending on site, size of the fistulas and surgeon preference. If the fistula is small size and low, the fistula inversion by circular incision made around the vaginal introitus with purse-string sutures are placed to invert the fistula into the rectum. Vaginal mucosal flap is mobilized, and then the vaginal mucosa is reapproximated with the mobilized flap. This technique was done for 8 patients in our study. The success rate was 75% (6 out of 8 patients). The other technique of transvaginal repair which less commonly used entails dissection of a mucosal flap which extended laterally to the ischial tuberosities and then cephalad, with the vaginal defect closed with interrupted suture [28].

Most gynecologists prefer transvaginal approach for correction rectovaginal fistula. Bauer et al. [28] reported successful *trans*-vaginal repair in 12 out of 13 patients with low or middle

rectovaginal fistulas complicating Crohn's disease during an average follow-up period of 50 months. Diverting colostomy for fecal diversion was also done for repair protection and to eliminate the pressure gradient. Rahman et al. [29] in their similar study of fifty-two women with a rectovaginal fistulas caused by obstetric injury were managed over a period of 15 years, reported that the fistulas in five patients healed spontaneously within 12 weeks of the injury. Thirty-nine patients underwent transvaginal purse-string repair by standard technique and eight patients had perineoproctotomy and sphincteroplasty for large fistulae associated with anal incontinence. Surgical repair was successful in all the 47 patients including two patients who had previous failed repair. They found that transvaginal purse-string repair for small, low rectovaginal fistulae proved highly satisfactory with 100% cure rate.

Episiotomy by transperineal approaches was applied for 4 patients in our study. The success rate was 75% (3 out of 4 patients). This type of repair is preferable for women with preexisting incontinence due to sphincter defect, or those with history of prior failed transanal or transvaginal repair. Our success rate was similar to that reported in literatures which are between 64.5 and 100% [14,21,27,29]. This repair is often technically demanding with high complications rate and thus is not a preferable choice. *Trans*-perineal repair entails approaching the fistula tract through the perineum, making an incision at the perineal body with dissection in the rectovaginal septum above the level of the fistula. The tract is then excised, and closure is performed in multiple layers on both the sides. This approach has a benefit of doing sphincteroplasty simultaneously for those patients that have sphincter defects. El-Gazzaz et al. [30] reported their results of *trans*-perineal repair for 8 patients with rectovaginal fistulas with a success rate of 71.4%. Athanasiadis et al. [31] in their comparative study of 88 patients between endorectal advancement flap and transperineal closure in surgical repair of recto-vaginal fistulas both procedures with sphincteroplasty found that endorectal advancement flap is an effective procedure for repair of rectovaginal fistulas with better primary healing rate of 85% and allows preservation of the sphincter compared with *trans*-perineal repair with success rate of 65%. They reported that *trans*-perineal repair is indicated for selected patients, who simultaneous sphincter need repair, fistulas secondary to Crohn's disease and fistulas associated with intra or suprarenal stenosis.

Repair of high, complex and recurrent rectovaginal fistulas usually requires a *trans*-abdominal operation. These include iatrogenic fistulas mainly after hysterectomy, pelvic cancer surgery, post-radiation, pelvic inflammatory and infectious process such as diverticulitis and Crohn's disease and some iatrogenic fistulas. These fistulas are difficult to be accessed via a local approach and therefore, *trans*-abdominal approach is advised. Repair through *trans*-abdominal approach were done for 8 patients, (20%) with high, complex and recurrent recto-vaginal fistulas. The success rate of *trans*'s abdominal repairs was 50% (4 out of 8 patients.). Three out of four fistulas (75%) that failed to heal by *trans*-abdominal approach were recurrent fistulas with prior repair. The etiology of these fistulas is further compromise the outcomes of *trans*-abdominal repair. These fistulas were secondary to hysterectomy for cervical cancer, low anterior resection of rectum and post-radiation. Therefore, prior failed attempt and the etiology of fistula were the main factors that predict failure of repair.

We found that the history of prior failed repair and the etiology of the fistulas were associated with a lower success rate. Fistulas secondary to malignant invasion, post-irradiation, infectious process and iatrogenic were predicted low success rate. Our findings are consistent with previous similar studies [18,19,32]. Recurrent recto-vaginal fistula is a big surgical dilemma and difficult task owing to scar and unhealthy tissues around the fistula.

The etiology of the fistula must be considered when trans-abdominal repair is applied for a high fistula. If the fistula is secondary to pelvic inflammatory and infectious process or iatrogenic the fistula can be successfully closed by dissection of the rectovaginal septum and closing the rectal and vaginal defects with interposition of well-vascularized healthy omental patch which is usually required in cases of fistulas secondary to advanced malignancy or radiation injury. Although resection of diseased bowel and coloanal anastomosis is an option in treatment of high and complex rectovaginal fistulas, these procedures, carry very bad prognosis due to presence of diseased unhealthy tissue secondary to extensive adhesions and fibrosis, radiation and malignant infiltration. Bowel resection was not applied for any patient in our study. El-Gazzaz et al. [30] recorded a 57.1% healing rate of *trans*-abdominal approach in 7 patients with high recto-vaginal fistula secondary to inflammatory bowel disease. Cooke et al. [33] and Nowacki et al. [34] reported success rate of 93% and 78.3 respectively in patients undergoing *trans*-abdominal repair for radiation-induced recto-vaginal fistulas. The success of *trans*-abdominal repair depends mainly on etiology, the quality of surrounding tissues as well as history of previous failed attempt.

The decision to perform a diverting colostomy is difficult decision both the patient and surgeon. Although the clinical effectiveness of diverting colostomy is still controversial and up to date there is no consensus on the treatment of rectovaginal fistulas with diverting colostomy, patients with complex, high fistulas and recurrent fistulas are usually advised to have a diverting colostomy to divert feces away from site of repair. Diverting colostomy in this study was suggested for 9 patients 6 patients with complex high type and 3 patients with failed prior attempt recto-vaginal fistulas. Although diverting colostomy was advised for all those with history of previous repair, only three of them were operated on with a colostomy whereas the 2 other refused fecal diversion. All three patients with diverting colostomy healed, whereas none of the two patients who declined colostomy healed. Thus, it was noted that a diverting colostomy is crucial and necessary in patients in whom the first repair attempt was failed. Our results are consistent with that reported by Jihong et al. [18]. Corte et al [35] suggested that temporary diverting colostomy can significantly improve the healing rate of fistulas whereas Lambertz's et al. [36] suggested in their retrospective cohort study that diversion colostomy does not influence the outcome of patients with rectovaginal fistula with special regard to rates of fistula recurrence, their use is limited to complex cases of sick patients and larger fistula sizes. It worth noting that fecal diversion for certain reluctant rectovaginal fistulas such as secondary to malignancy or radiation and complicated recurrent fistulas could be a feasible and valid option.

The main limitations of this work is that of any retrospective study, small number of patients involved and the follow-up periods were considered insufficiently long to evaluate the management outcomes of various surgical repairs. Large sample-size and high-quality prospective studies are required for better evaluation the outcomes of surgical treatment of rectovaginal fistulas.

5. Conclusion

The management of rectovaginal fistula is difficult and challenging task. Up to now, there is no consensus on the ideal management and each case should be individualized. For simple low type benign fistula, transanal endo-rectal advancement flap or transperineal repairs with or without sphincteroplasty are a feasible options. Patients with anal stenosis or previous failed attempt by endorectal advancement flap, a *trans*-vaginal purse-string inversion repair could be a valid alternative. High type, complicated and recurrent fistulas, a *trans*-abdominal approach with excision of

fistula, closure of vaginal and rectal defect with interposition of well vascularized omentum is necessary. The role of diverting colostomy is not well-established and controversial. It did not increase the overall closure rate, but it seemed to be necessary in some complicated and recurrent fistulas to control infection and protect the repair. A history of prior surgical repair is a risk factor for failure of low simple fistula repair while the etiology, location and prior failed attempt are the main failure predictive factors of high and complex fistulas. It is crucial that the patient should be aware of possible treatment failure and second intervention may be required.

Ethical Approval

The study was approved by ethical committee of college of medicine, university of Basrah.

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Author contribution

This is a single author study.

Conflict of interest statement

No conflicts of interest.

Guarantor

The study is under the author responsibility.

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Appendix A. Supplementary data

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