The Scientific Journal of Medical Scholar

Volume 1, issue 1 , January 2022

Print ISSN: Applied

Online ISSN: Applied

The Scientific Journal of Medical Scholar

Available online at Journal Website

Subject (General Surgery)

Original Article

Comparative Study of Conventional versus Marsupilized Fistulotomy of Recurrent Perianal Fistula

Elmoatasem-Bellah MM Elsonbaty*, Mamdouh M. Elkasaby; Mohamed Ibrahim Narouz

Department of General Surgery, Damietta Faculty of Medicine, Al-Azhar University, Damietta, Egypt.

Article information

Submitted: September, 5th, 2021

Accepted: December, 10th, 2021

Published: January, 15th, 2022

DOI:

Citation: *Elsonbaty EMM, Elkasaby MM, Narouz MI. Comparative Study of Conventional versus Marsupilized Fistulotomy of Recurrent Perianal Fistula. SJMS 2022 January; 1 (1): 1-*

ABSTRACT

Introduction and Aim: There is a paucity of studies comparing marsupialization with the conventional fistulotomy technique in the management of recurrent perianal fistula. The current study aimed to compare between conventional and Marsupilized fistulotomy procedures in the management of recurrent perianal fistula regarding perioperative outcomes (pain, infection, healing time, incontinence, and recurrence).

Methodology: Twenty four patients with recurrent perianal fistula and underwent conventional surgery (Group A) or fistulotomy with marsupialization, were included. The preoperative assessment achieved by history taking, physical examination and laboratory investigations. The patients were discharged on the first postoperative day. The severity of postoperative pain was assessed by the visual analogue scale. Patients were informed about regular outpatient visits after one week, two weeks, one month, three months, six months and nine months to assess wound healing, recurrence, inflammation and incontinence. Both groups were compared for postoperative pain, infection, rate of healing, time for healing, recurrent and postoperative incontinence.

Results: Both groups were comparable regarding patient age, sex distribution (most included cases were males), preexisting medical comorbidities. Perianal discharge was present in all cases. Anal pain was reported by 33.33 and 25% of cases in the conventional and Marsupilized groups respectively. There was a significant increase in operative time in the Marsupilized than the conventional group (38.75 vs. 27.08 respectively, $p < 0.001$). The duration of wound discharge showed a significant reduction in the Marsupilized than conventional (2 weeks versus 3 weeks). Wound size was 2.11 and 3.31 cm^3 in the Marsupilized and conventional groups respectively ($p = 0.033$). Time needed for wound healing showed a significant shortening in the Marsupilized group ($p = 0.005$).

Conclusion: Marsupialization during surgical management of perianal fistula is associated with better post-operative outcome regarding wound size, discharge, and time for complete healing.

Keywords: Anal; Fistula; Fistulotomy; Marsupialization.

* Corresponding author

Email: m.sonbaty@domazhermedicine.edu.eg

INTRODUCTION

Anal fistula is a direct result of occlusion and infection of anal glands, which exist in the inter-sphincteric plane, resulting in a crypto-glandular abscess [1].

After drainage of a perirectal abscess – regardless of the drainage method- may results in a fistula (up to 40%); however, the rate of fistula formation is higher in spontaneously draining abscess (up to 66%) [2,3].

The overall incidence among general population is about 8.6 per 100000 inhabitants. The anal fistula is a distressing condition for patients, and affects patient's quality of life [4].

The anal fistulae are usually categorized on the basis of their anatomical sites, as first described in 1976 [5].

A multitude of causes cause fistulas, but the well-known mnemonic "FRIEND" here aids memory. "F" for foreign body, "R" radiation, "I" infection or Inflammatory Bowel Disease, "E" epithelialization, "N" neoplasm, and "D" for distal obstruction (as is the case in the cryptoglandular theory) [6].

In the western hemisphere, up to 25% of cases may be associated with Crohn disease [7].

It is two times more common in males than females and usually presents in the third to fifth decade of life. Some risk factors for peri-rectal fistula include obesity, diabetes, hyperlipidemia, history of anorectal surgery, and even excess salt intake [8].

Typical complaints include itching, drainage, discomfort, and possible pain with defecation on presentation. Patients that had an abscess that was inadequately drained may present with a fistula and recurrent perianal abscess [9].

An anorectal fistula is a clinical diagnosis, but imaging is beneficial in determining the course of a fistulous tract or determining its etiology. Imaging studies include endo-anal ultrasound, computed tomography (CT) of the pelvis, CT-fistulography, and magnetic resonance imaging (MRI) of the pelvis [4].

Surgery is the gold-standard treatment and is indicated in patients with symptomatic anorectal fistulas, with exception of cases with Crohn disease. The goal of surgery is to eradicate the fistula and at the same time preserving the fecal continence. The surgical approach depends upon accurate classification of the anorectal fistula [1, 2].

Fistulotomy includes laying open the fistula tract in its entire length. It is an effective intervention for simple anal fistulas that leads to healing in over 90% of patients [10].

When applied in the proper indications, fistulotomy is associated with a low incidence of recurrence of anal fistula and complete healing of the anal wound is usually achieved between four and six weeks according to a recent meta-analysis [11].

Attempts to accelerate wound healing and improve the outcome of fistulotomy have been made by some investigators. Alvandipour et al examined the efficacy of sucralfate ointment in a randomized placebo-controlled trial and concluded that topical sucralfate managed to reduce the postoperative pain and improve wound healing in patients undergoing anal fistulotomy [12].

Another technique that may hasten wound healing after anal fistulotomy is marsupialization of the wound edges, which was described to be associated with less postoperative bleeding, less need for analgesia and faster wound healing. The accelerated wound healing after marsupialization of the edges of the laid open fistula track was attributed to a smaller wound size, with to non-Marsupilized tracks [13].

To the best of our knowledge, there is a paucity of studies comparing marsupialization with the conventional fistulotomy technique in the management of recurrent perianal fistula. That is why we conducted the current study.

AIM OF THE WORK

The aim of the present study is to compare between conventional and Marsupilized fistulotomy procedures in the management of recurrent perianal fistula regarding perioperative outcomes (pain, infection, healing time, incontinence, and recurrence).

PATIENT AND METHODS

The study is a prospective study including twenty four (24) patients who presented with recurrent perianal fistula were underwent either conventional operation as fistula-tomy or fistulectomy or fistulotomy with marsupialization. Operations had been performed in at the Department of General Surgery, Al Azhar University Hospital (New Damietta).

Patient was included if he/she 18-65 years old and provided his/her informed consent. In addition he/she must be fit for surgery, with recurrent fistula, had low transsphincteric fistula involving less than the lower one third of the anal sphincter, and intersphincteric fistula and subcutaneous fistula with presence of both external and internal openings. Otherwise, patient was excluded if he was ASA (The American Society of Anaesthesiologists) class III or IV, age under 18 or above 65, with anal incontinence, had malignant fistula, had inflammatory bowel syndrome such as ulcerative colitis or Crohn's disease, with high perianal fistulae.

The recurrence was defined when there was a clinical reappearance of the fistula after complete healing of the wound, at any time within one year after the surgical intervention [14].

The preoperative assessment achieved by history taking and through physical examination. Additionally, laboratory investigations (complete blood picture, prothrombin time, liver function tests, kidney function tests, blood glucose) were routinely done for all patients. Prophylactic intravenous third generation was administered at the induction of anesthesia. For patient preparation, any coexisting medical disease was controlled and any suppuration was treated.

According to surgical intervention, patients were divided into two groups: *Group A* for conventional operation as fistulotomy or fistulectomy, and *Group B* for fistulotomy with marsupialization. All operation were performed under general anaesthesia. Under anaesthesia, anorectal examination and proctoscopy were carried out to confirm the clinical findings. A dye study of the tract was done by introduction of moist gauze in the anal canal and about two ml of methylene blue was injected through the external opening. Staining of the gauze piece indicated a patent tract of the fistula. A probe was then gently passed into the tract through the external opening.

In fistulectomy, elliptical incision was created over the fistulous tract and encircled the external opening. The incision was deeply extended through the subcutaneous tissue, and the tract was dissected from its surroundings. On the other side, in the fistulotomy (figure 1), the fistula tract was laid open over the probe placed in the tract. After the fistula tract had been laid open, the tract was curetted and examined for secondary extensions.

In the fistulotomy with marsupialization (figure 2), the fistula tract was laid open over the probe placed in the tract. After the fistula tract had been laid open, the tract was curetted and examined for secondary extensions. Wound edges were sutured with the edge of fistula tract by using interrupted 3-0 vicryl sutures.

Figure (1): Fistulotomy

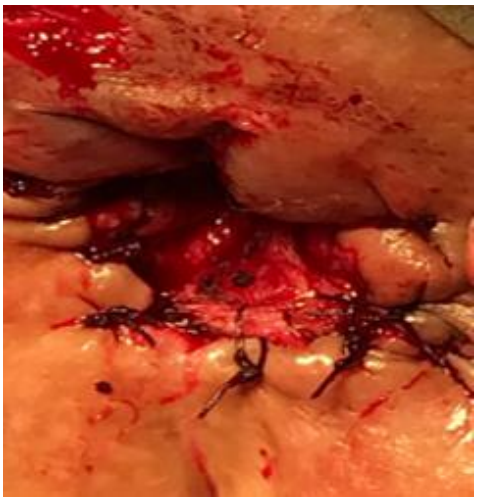

Figure (22): Fistulotomy with marsupialization

Postoperative care:

All patients were under perioperative antibiotics (ciprofloxacin and metronidazole) and an analgesic (Diclofenac sodium (50 mg twice a day)) for three days. The patients were usually discharged on the first post-operative day unless there were complications. They were advised regarding oral medication, to maintain a strict local hygiene, warm bath after defecation, dressings, and systematic follow-up. The initial postoperative assessment visit was handled at twenty four hours after surgery. The severity of postoperative pain was assessed by visual analogue scale (VAS) from 0 (no pain at all) to 10 (the worst pain). Patients were checked for any incontinence. Occurrence of any anal incontinence was assessed using the three-point Likert scale (0, never; 1, sometimes; 2, always) at one month and three months visits.

The routine follow up: patients were informed about regular outpatient visits after one week, two weeks, one month, three months, six months and nine months to assess wound healing, recurrence, inflammation and incontinence. Both groups were compared for postoperative pain, infection, rate of healing, time for healing, recurrent and postoperative incontinence.

Statistical Analysis:

The data were analysed by a software computer program known as Statistical Package for Social Sciences, version 23 for Windows® (IBM SPSS Inc, Chicago, IL, USA). Data were checked for normality by the Shapiro Walk test. Variables of category nature were expressed in their relative frequencies and percentages. Chi square test (χ^2) or Fisher exact was used to calculate association between variables as indicated. Variables of quantitative nature were expressed as mean ± SD (Standard deviation) (or median and interquartile range). Independent samples *t*-test was used to compare between two independent normally distributed means, while Mann Whitney U test was used for non-normally distributed means. All tests were two-tailed and the level of significance was set at or below 0.05.

RESULTS

The mean age of the included cases was 45.89 and 46.27 years in the conventional versus Marsupilized fistulotomy groups respectively. Most of the included cases were males. Generally, there was no significant difference between the two groups regarding the prevalence of the preexisting medical comorbidities. Diabetes was the most common comorbidity (41.67 and 50% of cases in the two groups respectively), followed by smoking (33.33% of cases in the two groups), and hypertension (25 and 16.67% of cases in the two groups respectively). Ischemic heart disease was present in only one case in the marsupialization group (8.33%). Perianal discharge was present in all cases, while pruritis affected half of the included cases in each group. In addition, anal pain was reported by 33.33 and 25% of cases in the two study groups respectively. No significant difference was detected between the two groups regarding their presentation. The mean duration of symptoms was 5.25 and 5.83 months in the

conventional and Marsupilized groups respectively, with no significant difference between the two groups (p = 0.375) (Table 1).

No significant difference was noted between the two groups regarding the type of recurrent fistula (p = 0.122). Intersphincteric fistula was detected in 50 and 58.33% of cases in the study groups respectively, while the low transsphincteric type was detected in 25% of cases in the two groups. The remaining cases in both groups were diagnosed with the subcutaneous type (Table 1).

There was a significant increase in operative time in the Marsupilized group compared to the conventional group (38.75 vs. 27.08 respectively, p < 0.001). The duration of wound discharge showed a significant decrease in the Marsupilized group (2 weeks versus 3 weeks in the conventional group, p = 0.019). Wound size showed a significant decrease in the marsupialization, is it had mean values of 2.11 and 3.31 cm^3 in the Marsupilized and conventional groups respectively (p = 0.033). Time needed for wound healing showed a significant decrease in the Marsupilized group (p = 0.005), as it had a median value of 5 weeks versus 6 weeks in the conventional group. No significant difference was noted between the two groups regarding post-operative pain scores (p = 0.268), which had a median value of 2 in the two study groups. There was no significant difference between the two groups regarding post-operative complications. Surgical site infection was encountered only in one case in the conventional group (8.33%), while bleeding was not encountered in the current study. In addition, urine retention was reported by 16.67 and 8.33% of cases in the conventional and marsupilized groups respectively, whereas minor incontinence was experienced in only one case (8.33%) in the in the conventional group (8.33%). During the follow up period estimated as one year after operation, recurrence was encountered in only one case (8.33%) in the conventional group. There was no significant difference between the two groups regarding that parameter (p = 0.142) (Table 2).

Table (1): Patient characteristics, comorbid disease and clinical manifestations among study groups

Variable		Group A (n=12)	Group B(n=12)	Test	P value
Age (years)		45.89 ± 3.88	46.27 ± 3.86	0.946	0.528
Sex (n,%)	Male	10(83.33%)	11(91.67%)	1.987	0.108
	Female	2(16.67%)	1(8.33%)		
Comorbidity (n,%)	Smoking	4(33.33%)	4 (33.33%)	0.001	1.00
	Diabetes	5 (41.67%)	6 (50%)	1.84	0.12
	Hypertension	3 (25%)	2 (16.67%)	1.79	0.13
	Ischemic HD	0 (0%)	1 (8.33%)	1.76	0.14
Symptoms (n,%)	Discharge	12 (100%)	12 (100%)	0.001	1.0
	Pruritis	6 (50%)	6 (50%)	0.001	1.0
	Anal pain	4 (33.33%)	3 (25.0%)	1.81	0.13
Symptoms duration (months)		5.35± 1.39	5.83± 1.67	1.11	0.375
Type of recurrent fistula (n, %)	Intersphincteric	6 (50%)	7 (58.33%)	1.84	0.122
	Low transsphincteric	3 (25%)	3 (25%)		
	Subcutaneous	3 (25%)	2 (16.67%)		

Table (2): Operative and postoperative data among study groups

		Group A (n = 12)	Group B (n = 12)	Test	P value
Operative time (minutes)		27.08 ± 1.40	38.75 ± 1.63	5.314	< 0.001*
Duration of wound discharge (weeks) (median (IQR))		3 (3 – 4)	2 (2 – 3)	4.126	0.019*
Wound size (cm^3)		3.31 + 0.54	2.11 + 0.37	3.789	0.033*
Wound healing time (weeks) (median (IQR))		6 (6 – 8)	5 (4 – 6)	5.008	0.005*
Postoperative VAS median (IQR))		2 (2 – 5)	2 (2 – 4)	1.964	0.268
Postoperative complications (n,%)	SSI (surgical site infection)	1 (8.33%)	0 (0%)	1.766	0.142
	Bleeding	0 (0%)	0 (0%)	0.001	1.00
	Urine retention	2 (16.67%)	1 (8.33%)	1.784	0.158
	Minor incontinence	1 (8.33%)	0 (0%)	1.766	0.142
One-year recurrence rates		1 (8.33%)	0 (0%)	1.766	0.142

DISCUSSION

Although there is multiple studies comparing these two approaches in the primary perianal fistula, there is a paucity of studies comparing the same two approaches in the management of recurrent disease. This represents a strength point of our study. In the current study, the mean age of the included cases was 45.89 and 46.27 years in the conventional versus Marsupilized fistulotomy groups respectively.

Raslan [15] reported that the mean age of the included cases was comparable between the two groups (37.55 and 36.3 years in the conventional and marsupialization groups respectively), which is younger than the current work. Other authors reported that the mean age of the included cases was 43.2 and 40.6 years in the conventional and marsupialization

groups respectively, with no significant difference between the two groups [16].

In our study, most of the included cases were males. It is agree with other author reported higher predominance of male gender in 50 cases with perianal fistula. The male to female ratio was 19:6 in the fistulotomy group versus 21:4 in the marsupialization group [15]. Other authors reported higher prevalence of the same gender, as male to female ratios were 20:5 and 21:4 in the two groups respectively [17].

Our findings showed comparable findings regarding the existence of medical comorbidities including diabetes, hypertension, smoking and ischemic heart disease) between the two study groups. Others reported no significant difference between the two groups regarding the prevalence of medical comorbidities including diabetes and hypertension [16].

Regarding clinical presentation in the current study, perianal discharge was present in all cases, while pruritis affected half of the included cases in each group. In addition, anal pain was reported by 33.33 and 25% of cases in the two study groups respectively.

Anan et al.[18] confirmed our findings regarding the clinical presentation, as discharge was the most common complaint (86.6 and 96.6% in the conventional and marsupialization groups respectively), followed by pruritis (46.6 and 53.3% of cases in the same groups respectively), and anal pain (30 and 26.6% of cases in the same groups respectively.

Other authors also reported that discharge was the most common presentation, followed by pruritis, and anal pain, with no significant difference between the two study groups ($p > 0.05$) [19].

Regarding the type of recurrent fistula encountered in our study, intersphincteric fistula was detected in 50 and 58.33% of cases in the study groups respectively, while the low transsphincteric type was detected in 25% of cases in the two groups. The remaining cases in both groups were diagnosed with the subcutaneous type. No significant difference was noted between the two groups regarding the type of fistula. Nour *et al*. also reported no significant difference between the two groups regarding the type of fistula ($p = 0.46$). Like our findings, intersphincteric fistula was more common (57.1 and 65.7% of cases in the conventional and marsupialization groups respectively), while the remaining cases in both groups had low transsphincteric fistula [19].

In the current study, the mean duration of symptoms was 5.25 and 5.83 months in the conventional and Marsupilized groups respectively, with no significant difference between the two groups. Another study reported no significant difference between the two study groups regarding duration of symptoms ($p = 0.29$). It had mean values of 4.7 and 5.8 months in the conventional and marsupialization groups respectively [18].

Other reported the same findings. Nevertheless, the duration of symptoms was longer than the duration reported by us. It had mean values of 8.02 and 9.97 months in the same groups respectively [13].

Generally, there was no significant difference between the two groups regarding most of preoperative criteria, and that should nullify any bias that might have skewed the results in favor of one group rather than the other one.

In the current study, there was a significant increase in operative time in the Marsupilized group compared to the conventional group (38.75 vs. 27.08 respectively – $p < 0.001$). This seems to be logic as adding more steps will need more time to be performed. In another study, researcher reported a significant increase in operative time in the marsupialization group compared to the conventional group (29 vs. 23.5 minutes respectively, $p < 0.006$) [15].

Another recent study conducted in 2020 reported that the mean operative time was 19 and 23.9 minutes in the conventional and marsupialization groups respectively, with significant difference between the two groups ($p < 0.05$) [19].

In a study of 103 fistula patients for whom a fistulotomy or a fistulotomy with adding marsupialization was done, a longer operating time was required for the marsupialization step [20].

Contrarily, Anan *et al*. reported no significant difference between the two approached regarding operative time ($p = 0.054$), which had mean values of 16.8 and 18.4 minutes in the conventional and marsupialization groups respectively [18].

In addition, another study reported no significant difference in operating time between the 2 groups (28.00 ± 6.35 minutes vs 28.20 ± 6.57 minutes, $p=0.92$) [17].

In our study, the duration of wound discharge showed a significant decrease in the Marsupilized group (2 weeks versus 3 weeks in the conventional group, $p = 0.019$). Other authors agreed with our findings regarding the duration of post-operative discharge ($p = 0.035$). The duration was significantly longer in the conventional group (4.1) compared to the marsupialization one (2.75) [17].

Our results showed that wound size significantly decreased in the marsupialization group, as it had mean values of 2.11 and 3.31 cm^3 in the Marsupilized and conventional groups respectively ($p = 0.033$). Pescatori *et al*. implied that marsupialization significantly halved the wound size at the end of the operation from a mean of 1749 mm^2 in fistulotomy only to 819 mm^2 in the marsupialization group [21].

The current study revealed that the time needed for wound healing showed a significant decrease in the Marsupilized group ($p = 0.005$), as it had a median value of 5 weeks versus 6 weeks in the conventional group. In line with our findings, another study reported that marsupialization was associated with faster wound healing, that had a mean duration of 4.8 weeks in that group, versus 6.9 weeks in the conventional procedure ($p = 0.001$) [15].

Ho *et al*. showed in their study that Marsupilized wounds heal faster than non-Marsupilized wounds. This was also

confirmed by Anan and his colleagues who reported that the mean time needed for complete healing had mean values of 6.7 and 5.1 weeks in the conventional and marsupialization groups respectively, with a significant faster wound healing in the second group ($p < 0.001$) [18]. In an addition, Nour *et al*. confirmed the previous findings [19]. Furthermore, other authors reported that the mean time of wound healing was 6.75 and 4.85 weeks in the conventional and marsupialization groups respectively ($p = 0.003$) [17], which confirms all of the previous findings.

When it comes to post-operative pain in the current study, no significant difference was noted between the two groups regarding post-operative pain scores ($p = 0.268$), which had a median value of 2 in the two study groups. In line with the previous findings, another author reported no significant difference between the two approaches regarding post-operative pain scores ($p = 0.77$), which had mean values of 3.4 and 3.3 in the conventional and marsupialization groups respectively [15].

Although Pescatori et al. found that the mean pain score postoperatively was higher in the Marsupilized group, it was statistically insignificant ($P > 0.05$) [21]. Despite the presence of multiple studies reporting comparable pain outcomes between the two approaches [13,16,17], one trial recorded the need to remove the marsupialization suture in one patient because of persistent anal pain [21].

We did not encounter any cases with post-operative bleeding in the current study. Anan and his coworkers reported no significant difference between the two approaches regarding the incidence of post-operative bleeding ($p = 0.29$), which was encountered in 6.6 and 0% of cases in the conventional and marsupialization groups respectively [18]. In another study, bleeding was encountered in 12% in the conventional fistulotomy cases, compared to no cases in the marsupialization group ($p = 0.0501$) [15].

Pescatori *et al.* testified a lower postoperative bleeding in the marsupialization group [21]. The rationale for the lower incidence of bleeding may be attributed to decreased wound size by marsupialization or to the direct hemostatic effect of the sutures used in marsupialization.

In our study, surgical site infection was detected in 8.33% and 0% of cases in the conventional and marsupialization groups respectively, with no significant difference between the two groups. In another study, although there was no significant difference between the two approaches regarding the incidence of surgical site infection ($p > 0.05$), the reported incidence was much higher than ours (14 and 23% of cases in the same groups respectively) [17]. This comes in line with our results.

The incidence of post-operative urine retention seemed comparable in our study ($p = 0.158$). It was reported by 16.67 and 8.33% of cases in the conventional and marsupialization groups respectively. Other authors reported no significant difference between the two groups regarding post-operative urine retention ($p = 1$), which was detected in 3.3 and 0% of cases in the conventional and marsupialization groups respectively [18]. Other authors reported that finding, as the same complication was detected in 2.86% and 0% of cases in the same groups respectively ($p = 0.56$) [19].

In the current study, there was no significant difference between the groups regarding post-operative incontinence that was encountered in 8.33 and 0% of cases in the conventional and marsupialization groups respectively. Other authors reported no significant difference between the two surgical approaches regarding post-operative incontinence. This complication was reported by 3.3 and 0% of cases in the conventional and marsupialization groups respectively [18].

Other reported that the same complication was detected in only one case in the marsupialization group (2.86%), compared to no cases in the conventional group ($p = 0.31$) [19].

Ho *et al*. showed a significant drop in the maximum anal squeeze pressure in the fistulotomy only group at three months postoperatively compared with the marsupialization group [20]. The authors concluded that marsupialization induced less deformity and scarring of the external anal sphincter.

During the follow up period in our study, we encountered only one case (8.33%) diagnosed with recurrence in the conventional group compared to no cases in the other group, with no significant difference between the two groups. Anan et al. also reported one case of recurrence in the conventional group (3.3%), compared to no cases in the marsupialization group, with no significant difference between the groups [18].

Of note, these authors followed these cases for about a year, which coincides with our data. Another study conducted in 2018 reported no recurrence among the included 50 cases who underwent either of the two evaluated procedures [15]. This could be due to difference in the follow up period between different studies. It was 3 months in the previous study.

The current study has some limitations; first of all. It is a single center study that included a relatively sample size. Also, we should have evaluated intermediate and long-term outcomes. These drawbacks need to be addressed in the upcoming studies.

Based on the results of our study, it could be concluded that, marsupialization during surgical management of perianal fistula is associated with better post-operative outcome regarding wound size, time of discharge, and time for complete healing. The increased operative time is the only reported drawback of marsupialization. However, this could be overcome by surgical training. The two surgical approaches are comparable regarding complication profile.

Conflict of interest: none

Financial disclosure: none to be disclosed

REFERENCES

1. Amato A, Bottini C, De Nardi P, Giamundo P, Lauretta A, Realis Luc A, Piloni V. Evaluation and management of perianal abscess and anal fistula: SICCR position statement. Tech Coloproctol. 2020 Feb; 24(2):127-143. DOI: 10.1007/s10151-019-02144-1.

2. Alkhawaga IA, Elkaseer MH, Abozeid AAH, Mohamed MS. Recent Trends in Management of Perianal Fistula. Egy J Hospital Med. 2019; 75 (2): 2298-2304. DOI: 10.21608/ejhm. 2019.30691

3. Włodarczyk M, Włodarczyk J, Sobolewska-Włodarczyk A, Trzciński R, Dziki Ł, Fichna J. Current concepts in the pathogenesis of cryptoglandular perianal fistula. J Int Med Res. 2021 Feb; 49 (2): 300060520986669. DOI: 10.1177/ 0300060520986669.

4. Sahnan K, Adegbola SO, Tozer PJ, Gupta A, Baldwin-Cleland R, Yassin N, et al. Improving the Understanding of Perianal Crohn Fistula Through 3D Modeling. Ann Surg. 2018 Jun; 267(6):e105-e107. DOI: 10.1097/SLA.0000000000002629.

5. Parks AG, Gordon PH, Hardcastle JD. A classification of fistula-in-ano. Br J Surg. 1976 Jan; 63 (1): 1-12. DOI: 10.1002/bjs. 1800630102.

6. Jimenez M, Mandava N. Anorectal Fistula. 2021 Feb 1. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan–. PMID: 32809492.

7. Zanotti C, Martinez-Puente C, Pascual I, Pascual M, Herreros D, García-Olmo D. An assessment of the incidence of fistula-in-ano in four countries of the European Union. Int J Colorectal Dis. 2007 Dec; 22(12):1459-62. DOI: 10.1007/s00384-007-0334-7.

8. Wang D, Yang G, Qiu J, Song Y, Wang L, Gao J, Wang C. Risk factors for anal fistula: a case-control study. Tech Coloproctol. 2014 Jul; 18(7):635-9. DOI: 10.1007/s10151-013-1111-y.

9. Dalal RL, Schwartz DA. The Gastroenterologist's Role in Management of Perianal Fistula. Gastrointest Endosc Clin N Am. 2016; 26(4):693-705. DOI: 10.1016/j.giec.2016.06.008.

10. Abramowitz L, Soudan D, Souffran M, Bouchard D, Castinel A, Suduca JM, *et al*. The outcome of fistulotomy for anal fistula at 1 year: a prospective multicentre French study. Colorectal Dis. 2016 Mar; 18 (3): 279-85. DOI: 10.1111/codi.13121.

11. Xu Y, Liang S, Tang W. Meta-analysis of randomized clinical trials comparing fistulectomy versus fistulotomy for low anal fistula. Springerplus. 2016 Oct 6; 5(1):1722. DOI: 10.1186/ s40064-016-3406-8.

12. Alvandipour M, Ala S, Tavakoli H, Yazdani Charati J, Shiva A. Efficacy of 10% sucralfate ointment after anal fistulotomy: A prospective, double-blind, randomized, placebo-controlled trial. Int J Surg. 2016 Dec; 36 (Pt A):13-17. DOI: 10.1016/ j.ijsu.2016.10.017.

13. Jain BK, Vaibhaw K, Garg PK, Gupta S, Mohanty D. Comparison of a fistulectomy and a fistulotomy with marsupialization in the management of a simple anal fistula: a randomized, controlled pilot trial. J Korean Soc Coloproctol. 2012 Apr; 28(2):78-82. DOI: 10.3393/jksc.2012.28.2.78.

14. Emile SH. Recurrent anal fistulas: When, why, and how to manage? World J Clin Cases. 2020 May 6; 8(9):1586-1591. DOI: 10.12998/wjcc.v8.i9.1586.

15. Raslan MM. Effect of marsupialization on the healing of fistulotomy wounds of simple anal fistula: a randomized control trial. Int Surg J 2018; 5(6): 2035-2038. DOI: 10.18203/ 2349-2902.isj20181839

16. Sahakitrungruang C, Pattana-Arun J, Khomvilai S, Tantiphlachiva K, Atittharnsakul P, Rojanasakul A. Marsupialization for simple fistula in ano: a randomized controlled trial. J Med Assoc Thai. 2011 Jun; 94 (6):699-703. PMID: 21696078.

17. Sandhya A, Rasool S, Parveen S. Marsupialization for Simple Fistula in Ano. J Surg Pakistan (Int) 2013; 18(1): 12-16.

18. Anan M, Emile SH, Elgendy H, Shalaby M, Elshobaky A, Abdel-Razik MA, Elbaz SA, Farid M. Fistulotomy with or without marsupialization of wound edges in treatment of simple anal fistula: a randomised controlled trial. Ann R Coll Surg Engl. 2019 Sep; 101(7):472-478. DOI: 10.1308/rcsann.2019.0057.

19. Nour H, Mohammad H. Fistulotomy with marsupialization versus fistulectomy with wound sutures in simple anal fistula, a comparative clinical trial. Cochrane Central Register of Controlled Trials 2020; Issue 06; https://doi.org/10.33887/ rjpbcs/ 2020.11.1.23

20. Ho YH, Tan M, Leong AF, Seow-Choen F. Marsupialization of fistulotomy wounds improves healing: a randomized controlled trial. Br J Surg. 1998 Jan; 85(1):105-7. DOI: 10. 1046/j.1365-2168.1998. 00529.x.

21. Pescatori M, Ayabaca SM, Cafaro D, Iannello A, Magrini S. Marsupialization of fistulotomy and fistulectomy wounds improves healing and decreases bleeding: a randomized controlled trial. Colorectal Dis. 2006 Jan; 8(1):11-4. DOI: 10.1111/j.1463-1318.2005.00835.x.

The Scientific Journal of Medical Scholar

Volume 1, issue 1 , January 2022

Print ISSN: Applied

Online ISSN: Applied