Original Article

New Indian Journal of Surgery
Volume 13 Number 4/October - December 2022
DOI: https://dx.doi.org/10.21088/nijs.0976.4747.13422.1

A Clinical and Pathological Study of Fistula-in-ANO

Satish Deshpande[1], BB Prasad Kalagani[2], Dinesh Jagtap[3]

Author's Affiliation: [1]Senior Consultant and HOD, [2]Resident DNB Genernal Surgery, [3]Junior Consultant, Department of Colorectal Surgery, Kamalnayan Bajaj Hospital, Aurangabad 431010, Maharashtra, India.

How to cite this article:
Satish Deshpande, BB Prasad Kalagani, Dinesh Jagtap/A Clinical and Pathological Study of Fistula-in-ANO/New Indian J Surg. 2022;13(4): 147–155.

Abstract

Introduction: Fistula-in-ano is a very common ano-rectal condition with wide spectrum of aetiology with a prevalence 8.6 to 10/100,000 of the population per year. Establishing a cure is problematic due to location of the diseased part, that makes the patient refrain from early consultation and this delays in treatment. Fistula causes appreciable morbidity and inconvenience to the patient and there is scarcity of studies on its etiopathogenesis, clinical features, investigations and treatment. Hence, this study was undertaken to study the clinical and pathological presentations, efficacy of surgical modalities and treatment outcomes.

Material And Methods: An observational study was conducted during the study period (April 2017 to March 2018) on patients admitted at Kamalnayan Bajaj Hospital for the evaluation of Fistula in ano, 90 patients were enrolled in the study after fulfilling inclusion and exclusion criteria and taking written/verbal informed consent. The patients underwent either fistulectomy and fistulotomy according to the criteria decided.

Results: In our study, incidence was noticed more in the age group of 31-40 years 40%, and more in males. 70% of patients belonged to lower socio-economic status; incidence was more common in among drivers 30%. The commonest mode of presentation was discharging pus in 70% of cases. Majority of the patients 80% underwent fistulectomy. Among 72 patients who underwent fistulectomy, all the patients responded with complete healing after surgery.

Conclusion: It was concluded that history, clinical examination, per rectal and perineal examination helps to diagnose the condition. Proctoscopy, sigmoidoscopy and MRI examination helps in diagnosing complicated cases. It is curable disease by the treatment of surgery along with necessary antibiotics, analgesics and good post operative wound management.

Keywords: Fistulectomy; Fistulotomy; Fistula-in-ano; Fistulogram; Perianal abscess.

INTRODUCTION

An anal fistula, is a chronic abnormal communication, usually lined to some degree by granulation tissue, which runs outwards fromthe ano rectal lumen (the internal opening) to an external opening on the skin of the perineum or buttock.[1] It is essentially a painless condition, though dischargeceases temporarily and pus accumulates to form recurrent abscesses.[2] The most common cause is nearly always by a previousano rectal abscess.[3] while the majority offistulas are cryptoglandular in origin, trauma, Crohn's disease, malignancy, radiation, or unusual infections (tuberculosis, actinomycosis and chlamydial infections) may also produce

Corresponding Author: Dinesh Jagtap, Junior Consultant, Department of Colorectal Surgery, Kamalnayan Bajaj Hospital, Aurangabad 431010, Maharashtra, India.

E-mail: jagtapdinesh85@gmal.com

Received on: 01.09.2022 **Accepted on:** 05.10.2022

fistulas.[4]

The assessment of the anatomy is difficult, and previousfailed attempts at surgery for these anal fistulae result in increasing complexity.[5] Diagnostic tests such as pelvic MRI fistulogram or Endo-rectalultra-sound are helpful in assessing complex anal fistulae. Physical examination findings remain the main stay of diagnosis.[6] Anal fistulararely heals spontaneously and requires surgical therapy to achieve a cure.[7] Management includes control of infection, assessment of the fistulous track in relation to the anal sphincter muscle, and finally, definitive treatment of the fistula.

Surgical techniques like fistulotomy, fistulectomy, primary closure after excision of tract and staged operations have rendered the post-operative period uneventful, short and steep fall in recurrence rate. Fistulotomy was the most commonly usedmode of management, but concerns about post-fistulotomy in continence prompted the use of sphincter preserving techniques. There has been a lot of progress in the understanding of the anatomy of the anal canal and the mechanism of continence of rectum and anal canal. The lack of consistent results, long term follow-up, as well as the heterogeneity of fistula pathology has prevented a definitive treatmental gorithm.[4]

As Fistula in ano is a prevalent perianal disorder which causes appreciable morbidity and inconvenience to the patient and there is scarcity of studies on its etiopathogenesis, clinical features, investigations and treatment, especially in the sub urban part of Maharashtra. Hence this study was undertaken to study the clinical and pathological presentations, efficacy of surgical modalities and treatment outcomes of fistula in ano in our centre.

OBJECTIVES

1. To study the various types and the clinical and pathological presentations of the fistula-in-ano.
2. To study the efficacy of two modalities of surgical approach (Fistulectomy and Fistulotomy) with reference to post-operative hospital stay and any complications.
3. To study the surgical treatment outcomes in respect to operative failure, incontinence and persistence/recurrence of fistulae.

METHODS

After the Institutional Ethical Committee approval, the present observational study was conducted at the Department of General Surgery, Kamalnayan Bajaj Hospital Aurangabad, Maharashtra amongst 90 patients those who were admitted for the evaluation of Fistula in anoover a period of 12 months during April 2017 to March 2018. The following patients were included in the study, patient more than 21 years of age & patients less than 75 years of age, Patients who were admitted or came on outpatient basis to diagnosed to have Fistula in ano, duringthe study period after written and informed consent.

Exclusion Criteria

1. Patients below 21 years and above 75 years of age.
2. Patients unfit for surgery.
3. Patients not willing for surgery.
4. Patients with anal fistulas along with acute perianal abscess, knowncases of ulcerative colitis, crohn's disease, carcinoma of rectum, active abdominal tuberculosis, congenital fistulas, serology positive cases (HIV), and anal fistulae due to perianal injuries and radiation therapy areexcluded.

In the present study data was collected as follows, detailed history regarding the nature and duration of presenting complaints, previous treatments, family history and personal history.

General and Systemic physical examination was done along with Local examination – External opening, discharge, excoriation, swelling, fissure, prolapsed haemorrhoids, skin tags, granulation tissue etc. Digital rectal examination and proctoscopic evaluation which includes localization and palpation of internal opening along with any associated conditions like abscess, secondary piles, external haemorrhoids, fissure and skin tags. All essential Laboratory investigations were done. Pelvic MRI Fistulogram was also done. Operative findings and postoperative treatment progress of the patient was maintained. The patient was followed up in outpatient department basis for 6 months or longer period whenever necessary after discharge for evaluating outcomes and late complications.

Visual Analogue Score (VAS) was used to assess the post operative period painpost

operatively at 6 hours, 24 hours, at discharge.

Operative: All patients were operatedin left lateral position (Sims) under general anesthesia after adequate pre-operative evaluation. The patient was prepared with proctoclysis enema previous night and onthe morning of the day of surgery. At the time induction, injection Ceftriaxone + Tazobactum 1.125 gm I/V and injection Metronidazole 500 mg I/V were injected for prophylactic antibiotic coverage.

Patient with long palpable tract selected for fistulectomy Simple linear low fistula selected for fistulotomy. Simple linear low fistula and non-palpable tract selected for fistulotomy.

Fistulotomy

This classical technique uses the fistula probe for demonstration of the primary fistula track. Probing is used to define the course of the track and should also identify high blind tracks. The perianal skin and anal epitheliumare divided by use of diathermy. The internal sphincter, if involved, is identified and divided and the wounds are left open to heal by secondary intention.

Fistulectomy [8]

In this technique an elliptical incision is made around the external opening and depened, and tissue dissected in either side of the tract. The methylene blue dye which is injected through the external opening, acts as aguide that prevents the fistulous tract from accidental injury. If sphincter muscles come across during dissection, it is separated from the tract. Dissection is completed up to internal opening and finally mucosal defect closed with delayed absorbable suture materials if needed. Sometimes tract endsabruptly and without internal opening, in such cases dissection completed upto the level of methylene blue staining and tract excised.

Post Operative Care

1. Injection Ceftriaxone + Tazobactum 1.125 gm I.V stat 6 hours after the first dose.
2. Injection Metronidazole 500 mg IV stat 6 hours after the first dose.
3. Injection Tramadol 100 mg IV stat as needed.
4. The patient was allowed fully orally after 6 hours of surgery. P/Rdiclofenac suppository was kept to reduce the post operative pain.
5. Fistula tract or contents of tract are sent for histo pathological examination.

The patient was advised as follows, dietary advice of soft and fat free diet, Syrup Lactulose 15 ml at bedtime, plenty of fluids orally and initiate a routine of twice daily sitz bath.

The patients were discharged when there was no requirement for analgesia in the last 12 hours. The criteria of passage of first motion after surgery was not considered necessary for discharge. All the patients were discharged on the above mentioned advice and were encouraged to join work as soon as possible. They were called for followup after 1 month up to 6 months.

Statistical Methods

Statistical testing was conducted with the statistical package for thesocial science system version SPSS 17.0. Continuous variables are presented as mean, SD or median if the data is unevenly distributed. Categorical variables are expressed as absolute numbers and percentages. The comparison of normally distributed continuous variables between the groups was performed using Student's T-test. Nominal categorical data between the groups was compared using Chi-squared test or Fisher's exact test as appropriate. For all statistical tests, a p value less than 0.05 was Considered Statistically Significant.

RESULTS

A total of 90 patients with fistula in ano were selected and studied indetail the following results were obtained.

Table 1: Distribution of patients according to modes of presentation.

Modes of presentation		No. of patients	Percentage
Perianal discharge	Yes	63	70%
	No	27	30%
Pain	Yes	18	20%
	No	72	80%
Perianal swelling /itching	Yes	9	10%
	No	81	90%
Past h/o Perianal abscess	Yes	45	50%
	No	45	50%

Table 1: shows the distribution of patients according to the modes of presentation. It was observed that 63(70%) of patients presented with perianal discharge as the main symptom. 18(20%) of patients presented with pain, 9(10%) presented with itching and swelling around the anal region. Past history of perianal abscess which is drained surgically or burst out spontaneously was reported in 45(50%) of patients.

Table 2: Types of fistulae based on MRI Fistulography.

Types of fistulae	No. of patients	Percentage
Simple	45	50%
Inter sphincteric	31	35%
Trans sphincteric	9	10%
Supra sphincteric	5	5%
Extra sphincteric	0	0
Total	90	100%

Table 2 shows the distribution of patients according to the types of fistulae in ano. It is observed that 45(50%) patients presented with simple low anal fistulae, 31(35%) patients presented with Intersphincteric, 9(10%) patients presented with transsphincteric and 5(5%) patients with suprasphincteric fistulae.

Table 3: distribution of patients according to the types of surgical procedure performed.

Types of surgical treatment	No. of patients	Percentage
Fistulectomy	72	80%
Fistulotomy	18	20%
Total	90	100%

Table 3 shows the types of surgical procedures performed in our study. 72(80%) of patients underwent fistulectomy and the remaining 18(20%) of patients underwent fistulotomy based on merit of case and surgeon's choice.

Table.4: Distribution of patients according to the Post operative complications.

Complications		Fistulectomy		Fistulotomy		Total		Chi square	P value
		N	%	N	%	N	%		
Pain	Yes	49	74.2	17	25.8	66	73.3	5.128	0.024
	No	23	95.9	1	4.2	24	26.6		
Urinary retention	Yes	15	100	0	0	15	16.6	4.5	0.034
	No	57	76	18	24	75	83.3		
Bleeding	Yes	6	85.8	1	14.2	7	7.7	0.155	0.694
	No	66	79.5	17	20.5	83	92.2		
Incontinence (temporary)	Yes	2	100	0	0	2	2.2	0.511	0.475
	No	70	79.5	18	20.5	88	97.7		

Table 4 shows the comparison of post operative complications between fistulectomy and fistulotomy groups. It was observed that, most common post operative complication was pain, noticed in 49 (74.2%) patients of fistulectomy and 17 (25.8%) patients of fistulotomy. Urinary retention, bleeding and temporary fecal/flatus incontinence were other less common complications which were managed conservatively. There was no statistical difference found.

Table 5: Comparison of VAS score for pain at different time points.

Variable	Group	N	Mean	Std Dev	T Value	P Value
Pain score at 6 hrs	Fistulectomy	72	4.93	0.539	0.719	0.474
	Fistulotomy	18	4.83	0.383	0.88	0.385
Pain score at 24 hrs	Fistulectomy	72	3.68	-0.47	-0.799	0.426
	Fistulotomy	18	3.78	0.428	-0.845	0.405
Pain score at discharge	Fistulectomy	72	0.89	0.316	4.654	0
	Fistulotomy	18	0.44	0.511	3.523	0.002

Table 5 shows the Comparison of VAS at different time points between Fistulectomy group and Fistulectomy Group in our study. It was observed that at VAS score at 6 hours post operatively was 4.93 ± 0.53 for Fistulectomy group compared to 4.83 ± 0.38 for Fistulotomy group; VAS score at 24 hours post operatively was 3.68 ± 0.47 for Fistulectomy group compared to 3.78 ± 0.42 for Fistulotomy group; VAS score on discharge was 0.89 ± 0.31 for Fistulectomy group compared to 0.44 ± 0.51 for Fistulotomy group. Further it was observed that there was a no significant difference in mean VAS score for all the days between the two groups.

Table 6: Number of days required for hospital stay

Variable	Group	N	Mean	Std Dev	T Value	P Value
Duration of hospital stay	Fistulectomy	72	4.38	0.846	1.77	0.08
	Fistulotomy	18	4	0.594	2.181	0.036

The table 6 shows the comparison of mean Hospital stay between Fistulectomy group and Fistulotomy Group. It was observed that mean number of days required for hospital stay for Fistulectomy group was 4.38 ± 0.84 while for Fistulotomy Group was 4.0 ± 0.59. Further it was observed that there wasn't a significant difference in mean number of days required for hospital stay between the two groups.

Table 7: Follow up and results

Results	**Fistulectomy**		**Fistulotomy**		**Total**		**Chi square**	**P value**
	N	%	N	%	N	%		
Recurrence	0	0	1	100	1	1.1	4.045	0.044
Complete healing	72	80.9	17	19.1	89	98.8		

The table 7 shows the analysis of follow-up and results in our study. It is observed that out of 72(80.9%) patients who underwent fistulectomy were followed post operatively, all patients presented with complete healing, and 18 patients who underwent fistulotomy were followed post operatively 1 patient had come with recurrence of fistula in the 6th month of follow up.w

Fig. 1: Fistula in ano with large sentinel pile

Fig. 2: Operative photograph of fistulectomy

Fig. 3: Fistula in ano with large sentinel pile

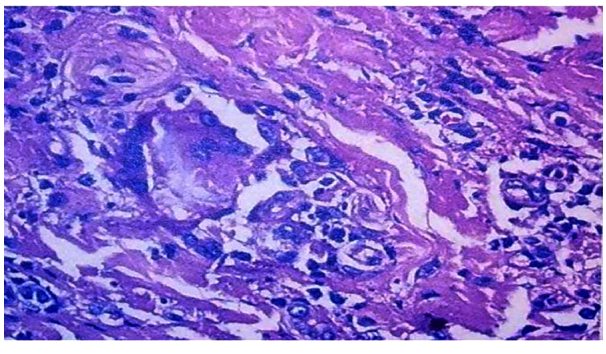

Fig. 4: Operative photograph of fistulectomy

DISCUSSION

We conducted a single centre observational study on total of 90 patients admitted at Kamalnayan Bajaj hospital for evaluation of Fistula inano. Patients underwent surgery based on surgeon's choice and merit of thecase.

In our study of 90 patients, 40% of patients were in the age group of 31– 40 years. Another 30% of patients were in the age group of 41 – 50 years. Mean age at presentation was 34.5 years. According to data from our study, itis quite evident that anal fistula is a disease of the young to middle aged population, which is comparable with other similar studies by Ramchandra et al and Yasmin Bhatti et al.[8,9]

In our study 90% of patients were male and 10% were females, the gender ratio is 9:1. There is a definite male preponderance to developing anal fistula with 90% of our patients being male, which is comparable with other similar studies Ramchandra et al and Yasmin Bhatti etal.[8,9]

In our study of 90 patients, 70% of patients were belonging to lower socio-economic status and 30% of patients were belonging to higher socioeconomic status as per the modified Kuppuswamy's classification.

In our study of 90 patients, 30% of patients were drivers, followed by 20% of the patients were vendors and 20% were agriculturists. Most of them were from poor social-economic class. We could find that the Fistula-in-ano is more common among drivers based on our data which can be probably associated with prolonged hours of sitting position.

According to our study of 12 months duration, we could find that the commonest mode of presentation is perianal discharge in 70% of cases which is comparable with other similar studies Ramchandra et al and R.N Mangual et al.[8-10] Pain and swelling was the associated symptoms in 20% of cases. Perianal irritation/itching were seen in 10% of cases. The predominant history of a previous/recurrent perianal abscess noticed in 50% of patients which had either ruptured spontaneously or had been surgically drained. None of the patients presented with acute abscess along with anal fistula.

A majority of our cases presented with simple low anal rather than complex fistula with no age relation to the simplicity or complexity of the fistula. MRI examination showed, according to the Park's classification 50% patients had simple low anal fistulae, 35% Inter sphincteric, 10% trans sphincteric and 5% supra sphincteric.Inter sphincteric type of fistulae is found to be more common among the complex fistulae as observed in this study.

In the present study most of the patients were admitted either in the morning of surgery or the night before surgery with pre-operative fitness taken prior. Based on the merit of the case, 80% of patients underwent fistulectomy and 20% of patients under went fistulotomy. Patient with long palpable tract selected for fistulectomy Simple linear low fistula selected for fistulotomy. Simple linear low fistula and non-palpable tract selected for fistulotomy.

Patients presented with post-operative pain out of which 49 patients were from the fistulectomy group and 17 patients from fistulotomy group. The visual analogue pain scores at 6 and 24 hours after surgery, and on the day of discharge were not significantly different in fistulectomy group compared to fistulotomy group.

In our study, all the patients were given post operatively daily sitz bath and appropriate intravenous antibiotics, analgesics and other supportive care. The other common post operative complications observed were bleeding, urinary retention and temporary incontinence, which are managed conservatively. Minimal tissue dissection and achievement of hemostasis during surgery are important for prevention of post-operative complications. Post-operative sitz bath helps to relieve pain and minimize local odema. Temporary incontinence to flatus and liquid stool was reported by 2 patients who underwent fistulectomy; which has been resolved on follow-up and no persistent incontinence reported. All the patients are called up for follow up to check for late post-operative complications like recurrence, abscess formation, infection and fecal or flatus incontinence.

The calculation of the hospital stay was made from day of surgery andnot from the day of admission thus excluding the duration in hospital forgetting pre-anaesthetic fitness. We observed that mean number of days required for hospital stay for fistulectomy group was 4.38 ± 0.84 while for fistulotomy group it was 4 ± 0.59. Based on the observations in our study, it can be inferred that

there wasn't any significant difference between both fistulotomy and fistulectomy groups with respect to post operative pain. Our initial results suggest that the fistulectomy has slightly more duration of hospitalization compared to Fistulotomy; it can be compensated by good results, complete healing and less recurrence.

While discharging each patient was educated about the disease, and the study. All the patients are requested to attend the outpatient department for follow up. Most of our patients were discharged between 4-6 days. All the patients were followed every monthly for a period of 6 months.

In our study 72 patients who underwent fistulectomy had responded with complete healing after surgery. Among the 18 patients who under went fistulotomy, 17 patients had responded with complete healing and 1 patient had come with recurrence in the 6th month of follow up. Perianal abscess, permanent fecal or flatus incontinence was not reported in any patient of both groups.

The results of our study were compared with the study done by Ganeshan et al.[11]

In the study done by Ganeshan R et al. total number of cases were 60 and in our study 90 cases of fistula in ano are included; In the study done by Ganeshan R et al.[11] there was h/o of perianal abscess in 61.7%, external opening on posterior side in 68.3% and anteriorly in 31.7% of cases whereas in our study there was h/o of perianal abscess in 50%, external opening on posterior side in 84% and anteriorly in 16% of cases.

In the study done by Ganeshan R et al.[11] the mean duration of hospital stay was 2 days and 1.8 days respectively in fistulectomy and fistulotomy, whereas in our study the mean duration of hospital stay was 4.3 days and 4 days in fistulectomy and fistulotomy. In the study done by Ganeshan R et al. recurrence rate was 1.7% and in our study recurrence rate was 1.1%.

SUMMARY

The present study has included patients of ages above 21 years and below 75 years of both gender diagnosed with Fistula in ano. The majority of the cases were in the third to fourth decade of life. Males are more commonly affected than females, ratio of Male: Female is 9:1. The majority of patients (70%) had perianal discharge as the main symptom, and 50% of them had previous history of perianal abscess which is either spontaneously burst openor surgically drained. Perianal pain, swelling, itching are the other common symptoms.

The visual analogue pain scores at 6 and 24 hours after surgery, and on the day of discharge were not significantly different in fistulectomy group compared to fistulotomy group (4.93 ± 0.53 vs 4.83 ± 0.38, 3.68 ± 0.47 vs3.78 ± 0.42, 0.89 ± 0.31 vs 0.44 ± 0.51, respectively, all P <0.5). The other common post-operative complications observed were bleeding, urinary retention and temporary incontinence, which are managed conservatively. We have counted the duration of hospital stay from date of surgery to date of discharge. There wasn't any significant difference with both the procedures. The mean duration of stay in the hospital for fistulectomy was 4.38 ± 0.84 days, while for fistulotomy group it was 4 ± 0.59 days.

89 patients out of 90 reported with complete healing after procedure. 1 patient who under went fistulotomy reported with recurrence at 6 months after operation. In our study, none of patients reported post operatively with perianal abscess, permanent incontinence to flatus and liquid/solid stool.

Based on the observations in our study, it can be inferred that there isn't any significant difference in post-operative pain between fistulo to my group compared to fistulectomy group. Our initial results suggest that the fistulectomy has slightly more duration of hospitalization compared to fistulotomy, it can be compensated by good results and less recurrence.

There are certain limitations in our study. Our findings cannot begeneralized to whole population because of the limited sample size and limited period of study. However, our findings add value to the research done previously. It is a single institutional observational study. However, a number of studies showing the comparable results suggest that fistulectomy is a better alternative than traditional lay open fistulotomy, in the management of anal fistulae.

CONCLUSION

From the present study it was concluded that fistula in ano is more commonly seen in middle aged, males and people with lower socio-economic status. History, clinical examination, per rectal

and perineal examination helps to diagnose the condition. While, Proctoscopy, sigmoidoscopy and MRI examination of the patient helps in diagnosing complicated cases and to map out the course of the fistulous tract pre-operatively to avoid difficulty during surgery. Surgery is the treatment of choice for management of a fistula in ano. It is curable disease by the treatment of surgery along with necessary antibiotics, analgesics and good post operative wound management. Histopathological examination of fistulous tract and its contents helps inidentifying the aetiology.

The ideal surgical treatment for anal fistula should eradicate sepsis and promote healing of the tract, whilst preserving the sphincters and the mechanism of continence. In all high anal fistulas, a sphincter sparing procedure should be carried out. Based on the results of our study, Fistulectomy appears to be better than fistulotomy, because of complete eradication of disease, good post operative results and no recurrence of disease. No significant difference in post operative pain scores and duration of hospital stay in both the groups.

REFERENCES

1. Luniss PJ. The anus and anal canal. In: P. Ronan O'Connell, Norman S. Williams, and Christoper JK. Bustrode, editors. Bailey and Love's short practice of surgery. 25th ed. London: Hodder Arnold; 2008. p. 1262-1263.
2. Goligher JC, Duthie HL and Nixon HH. Fistula-in-ano. In: Surgery of the anus, rectum and colon. 4th ed. London: Bailliere Tindall; 1980. p. 163-199.
3. Russel TR. Anorectum. In: Lawrence W, editor. Current surgical diagnosis and treatment. 10th ed. 1994.
4. David L. Dunn, Colon, rectum and anus. In: Brunicardi, F. C., Andersen, D. K., & Dunn, D. L, editors. Schwartz's principles of surgery. 10th ed. New York: McGraw-Hill Education: 2015. p. 1229- 1230.
5. David CC Bartolo, Surgery of anus and perineum. In: Moran, B., Hollingshead, J., & Farquharson. Farquharson's textbook of operative general surgery 9th ed. M. London: Hodder Arnold; 2005. p. 445-446.
6. Adams D and Kovalcik P. J. comparison of results of fistulae-in-ano. Surggynecol.Obstet. 1981; 153(5): 731-732.
7. Marvin M. Schuster, Roman E. Ratych. Ano rectal disease. In: Williams S. Hanbrich, Fenton Schaffner, editors. Bockus gastroenterology. 5th ed. Vol.2, Philadelphia: W.B. Saunders Company; 1995. p. 1773-1789.
8. Bhatti Y, Fatima S, Shaikh GS, Shaikh S. Fistulotomy versus fistulectomy in the treatment of low fistula in ano. Raw Medi J. 2011; 36:1-8.
9. R.N. Mangual, D.N. Tudu, S.P. Pattaik, K.P. Prusty. The sphincter preserving perianal fistulectomy: A better alternative. Ind J Surg 2004; 66:31-5.
10. Xu Y, Liang S, Tang W. Meta-analysis of randomized clinical trials comparing fistulectomy versus fistulotomy for low anal fistula. SpringerPlus. 2016 Dec; 5(1):1722.
11. Ganesan R, Karunakaran K, Anandan H. A comparative study between fistulotomy and fistulectomy in management of low anal fistulae. IntSurg J. 2017 Oct 27; 4(11):3665-9.