The Investigation on Frequency of Complications of Postoperative Perianal Fistulas Surgeries among Patients

Ameliyat Sonrası Perianal Fistül Ameliyatlarının Hastalarda Komplikasyon Sıklığının Araştırılması

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ABSTRACT

Introduction: Perianal abscess is the most conventional anorectal disease caused by infection of cryptoglandular glands in intersphincteric space. If it is left untreated, permanent fistula will be arisen. Nowadays, treatment of anal fistulas is one of the problems of general and colorectal surgeons due to its disabling complications. For this reason, because of the large number of reports of types of complications of fistula surgery, we investigated the frequency of postoperative complications of perianal fistula surgeries among patients.
Material and methods: In present retrospective cross-sectional study, demographic data including age, gender, educational level, diabetes status, Body Mass Index (BMI), type of surgery, and fistula length of patients were collected from hospital records. Patients were also evaluated at the specialized surgical clinic in the first week, first month, and six months after the surgery. Then, the information on recovery way and complications including fecal incontinence, flatus (gas) incontinence and recurrence were recorded by the surgeon and phone calls with all patients. Finally, the complications against demographic variables were evaluated.
Reults: In this study, 41.1% of patients had complications. All incontinence cases were minor. The highest frequencies were found to be as follows: in Fistulotomy for incontinence (flatus incontinence 23.5%, and fecal incontinence 23.5%), in Fistulectomy (recurrence 20%) and also in Seton embedment surgery (recurrence, 50%). Furthermore, in patients with short fistula and long fistula, recurrence and flatus incontinence had the highest frequency with a rate of 30.8% and 16.7%, respectively.
Conclusion: Regarding the type of surgery chosen by the surgeon, it is advisable to give the patient appropriate warnings about the most conventional complications in each type of surgery. Also, these warnings about the recurrence (with the highest frequency) should also be taken seriously.

Keywords: Perianal fistulas, Fistulectomy, Fistulotomy, seton

Received: 07.01.2020 **Accepted:** 05.27.2022

ÖZET

Giriş: Perianal apse, intersfinkterik boşluktaki kriptoglandüler bezlerin enfeksiyonunun neden olduğu en geleneksel anorektal hastalıktır. Tedavi edilmezse kalıcı fistül oluşacaktır. Günümüzde anal fistüllerin tedavisi, sakatlık yaratan komplikasyonları nedeniyle genel ve kolorektal cerrahların sorunlarından biridir. Bu nedenle fistül cerrahisinin komplikasyon tiplerine ilişkin çok sayıda rapor olması nedeniyle, hastalar arasında perianal fistül cerrahilerinin postoperatif komplikasyon sıklığını araştırdık.
Gereç ve yöntemler: Bu retrospektif kesitsel çalışmada, hastaların yaş, cinsiyet, eğitim düzeyi, diyabet durumu, Vücut Kitle İndeksi (VKİ), ameliyat türü ve fistül uzunluğu gibi demografik veriler hastane kayıtlarından toplandı. Hastalar ayrıca ameliyattan sonraki ilk hafta, birinci ay ve altı ayda uzman cerrahi kliniğinde değerlendirildi. Daha sonra tüm hastalar ile cerrah ve telefon görüşmeleri tarafından fekal inkontinans, gaz (gaz) inkontinansı ve rekürrens gibi komplikasyonlar ve iyileşme yolu bilgileri kaydedildi. Son olarak demografik değişkenlere karşı komplikasyonlar değerlendirildi.
Bulgular: Bu çalışmada hastaların %41.1'inde komplikasyon görüldü. Tüm inkontinans vakaları minör idi. En yüksek sıklıkların inkontinans için Fistülotomide (flatus inkontinans %23,5 ve fekal inkontinans %23,5), Fistülektomide (nüks %20) ve ayrıca Seton gömme cerrahisinde (nüks, %50) olduğu bulundu. Ayrıca kısa fistülü ve uzun fistülü olan hastalarda sırasıyla %30,8 ve %16,7 ile nüks ve gaz inkontinansı en yüksek sıklığa sahipti.
Sonuç: Cerrahın seçtiği ameliyat türü ile ilgili olarak, her ameliyat türünde en geleneksel komplikasyonlar hakkında hastaya uygun uyarıların verilmesi tavsiye edilir. Ayrıca tekrarlama (en yüksek sıklıkta) ile ilgili bu uyarılar da ciddiye alınmalıdır.

Anahtar Sözcükler: Perianal fistüller, Fistülektomi, Fistülotomi, seton

Geliş Tarihi: 01.07.2020 **Kabul Tarihi:** 27.05.2022

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doi:http://dx.doi.org/10.12996/gmj.2022.50

INTRODUCTION

Anal fistula is a duct between the skin around anus and anorectal canal and is one of the most common surgical problems usually arisen followed by the treatment of perianal abscesses(1). Today, treatment of anal fistulas is one of the problems of general and colorectal surgeons due to its disabling complications. This is particularly more sensitive in cases where the fistula and voluntary anal sphincter are involved, since any mistake in surgery causes serious consequences, such as permanent flatus and fecal incontinence(2). According to researches, anal infection causes an abscess that spreads along one of several perianal spaces, and its important specifications are as follows: constant secretion of pus, pain, itching and contamination of the underwear(3, 4). Anal fistulas affect 1 in 10,000 of the normal population annually, while approximately 80% of these cases are anal fistulas caused by infectious abscesses(2).

The distance between the external opening (Ext Os) and internal opening (Int Os) is the length of the fistula tract, which is divided into two general types of low and high, depending on the length of the fistula tract and its internal opening(5, 6). Surgery is the main way of treating fistulas, where maintaining the sphincters' mechanism and preventing recurrence are a very important issues(7). Methods used today to treat anal fistulas with external anal sphincter involvement include the use of a Seton, muscle cut or drainage, a Fistulotomy, a Fistulotomy and drainage combination, Fistulectomy, and primary repair of sphincter(2). Fecal incontinence after fistulotomy is negligible, however, minor flatus incontinence disorders are arisen by 52%, which can be embarrassing(8). Nowadays, treatment of anal fistulas is one of the problems of general and colorectal surgeons due to its disabling complications. This is particularly more sensitive in cases where the fistula and voluntary anal sphincter are involved, since any mistake in surgery causes serious consequences, such as permanent flatus and fecal incontinence(9). Total Fistulectomy is another option for managing complex fistulas. This type of surgery is based on the fact that removal of the chronic epithelial tissue results in the formation of healthy tissue, which is also accompanied with such complications as incontinence, pruritus, and fistula recurrence(10-12).

According to the above mentioned issues and numerous reports of the types of complications of surgeries undertaken on fistula, we aimed to investigate the frequency of postoperative complications of Perianal fistula surgery among patients.

MATERIAL and METHODS

In this retrospective cross-sectional study, patients with perianal fistulas referred to Poursina Guilan Hospital, Iran, who underwent surgery during 2015 onwards were studied. Inclusion criteria includes all patients with perianal fistula diagnosis Who had undergone a variety of perianal fistula surgeries, including fistulectomy, fistulotomy, and seton and at least 6 months had passed since their surgery. Exclusion criteria were also patients who did not respond to phone calls and had incomplete records. Also, in this study the name and all information of patients was kept confidential and ethically necessary.

Demographic data including age, sex, education, diabetes, BMI, type of surgery and fistula length were extracted from the hospital records. Then, information about the recovery and possible complications during the first week, the first month and six months after the operation was evaluated by the respected surgeon in the surgical clinic of Porsina Hospital in Rasht and telephone contact with all patients. Also, if there were any complications, the patient was asked to go to the hospital and the surgeon to confirm that the complication was present. During the phone call, gaz and fecal incontinence and recurrence after surgery was assessed. Also in this study, the BMI of subjects in different weight classes included severe weight loss (BMI less than 18.5), normal weight (BMI 18.5-24.9.9), weight gain (BMI 25- 25.9.9), grade 1 obesity. (30-34.9), grade 2 obesity (35-39.9) and grade 3 obesity (over 40) were evaluated.

Statistical analysis

The data collected in the study were coded and analyzed by SPSS version 22 software. Mean and standard deviation were used to describe the quantitative variables, and for qualitative variables, number and percentage were used.

RESULTS

In present study, a total number of 56 patients undergoing perianal fistula surgery were evaluated. Of the 56 patients studied, 26 of them (46.4%) had short fistulas and 30 of them (53.6%) had long fistulas. Patients underwent surgery in three forms: Fistulectomy, Fistulotomy and Seton embedment.

Based on the information in Table 1, the number and percentage of type of surgery in patients as well as the length of their fistula were taken into consideration, so that 35 subjects (62.5%) were those undergoing Fistulectomy, and 8 (22.9%) and 27 (77.1%) of them had short and long fistulas, respectively.

Table1. Frequency of surgery performed on patients based on fistula length

Perianal Fistula Surgery	Fistula Length		Total (N/%)
	Long (N/%)	Short (N/%)	
Fistulectomy	27 (77.1)	8 (22.9)	35(100)
Fistulotomy	0	17(100)	17(100)
Seton	3(75)	1(25)	4(100)
Total	30(53.6)	26(46.4)	56(100)

The mean age of the subjects in this study was 42.5±14.45 and the age range was 15-80. This mean age in each group of patients was as follows: 41±14.16 among patients undergoing Fistulectomy, 43.94±14.35 among those undergoing Fistulotomy, and 49.5±18.84 among the subjects undergoing Seton embedment. Of the 56 samples studied, 30 subjects (53.6%) were in ≤43 age group and 26 of them (46.4%) were in the above 43 age group.

Patients were also evaluated in terms of gender and Body Mass Index (BMI) in a variety of surgical procedures. According to Table 2, 45 subjects (80.35%) were male, i.e. a higher percentage of the participants. Table 2 also showed that most of the patients including 23 persons (41.07%) and 20 persons (35.7%) had a weight class of 25-29/29 and 18/5-24/9, respectively. In other words, the former had overweight and the latter had normal weight.

Table 2. Frequency of fistula surgery based on sex and BMI

Perianal Fistula Surgery	Sex		BMI						
	Male (N/%)	Female (N/%)	<18.5 (N/%)	18/5-24.9 (N/%)	25-29.9 (N/%)	30-34.9 (N/%)	35-39.9 (N/%)	>40 (N/%)	Total (N/%)
Fistulectomy	28(80)	7(20)	1(2.9)	14(40)	14(40)	5(14.3)	0	1(2.9)	35(100)
Fistulotomy	13(76.5)	4(23.5)	0	5(29.4)	8(47.1)	2(11.8)	1(5.9)	1(5.9)	17(100)
Seton	4(100)	0	0	1(25)	1(25)	1(25)	1(25)	0	4(100)
Total	45(80.35)	11(19.65)	1(1.8)	20(35.7)	23(41.07)	8(14.3)	2(3.6)	2(3.6)	56(100)

Following to evaluation of patients in terms of diabetes, 50 subjects (89.3%) had no diabetes. Of the 6 diabetic patients, 3 of them (8.6%) underwent Fistulectomy, 2 of them (11.8%) underwent Fistulotomy, and 1 subject (25%) experienced Seton embedment. More information is listed in Table 3. Also, information about educational level of the subjects show that in all three types of perianal surgery, most of the patients had high school certification (Table 3).

Table3. Frequency of surgery performed on patients based on diabet disease and education

Perianal Fistula Surgery	Diabet		Education							Total
	Yes (N/%)	No (N/%)	Illiterate (N/%)	Elementary (N/%)	Less diploma (N/%)	Diploma (N/%)	Associate (N/%)	Bachelor (N/%)	Master (N/%)	
Fistulectomy	3(8.6)	32(91.4)	0	6(17.1)	11(31.4)	13(37.1)	1(2.9)	3(8.6)	1(2.9)	35(100)
Fistulotomy	2(11.8)	15(88.2)	2(11.8)	2(11.8)	2(11.8)	7(41.2)	0	2(11.8)	2(11.8)	17(100)
Seton	1(25)	3(75)	1(25)	1(25)	0	2(50)	0	0	0	4(100)
Total	6(10.7)	50(89.3)	3(5.4)	9(16.1)	13(23.2)	22(39.3)	1(1.8)	5(8.9)	3(5.4)	56(100)

Possible postoperative complications, including fecal incontinence, flatus incontinence and recurrence, were evaluated among patients. Of 56 samples, 31 of them (55.35%) had no complication and 25 of them (44.65%) were suffering from complications in postoperative duration. Among patients with complications, 5 of them (10.7%) had fecal incontinence, 9 of them (16.1%) had flatus incontinence, and also 11 of them (21.4%) had recurrence. Were. Our results also showed that 2 (3.6%) patients had recurrence and gas incontinence. Besides, findings show that 2 subjects (3.6%) were suffering from flatus incontinence and recurrence simultaneously. Also, one subject (1.8%) was suffering from both fecal and flatus incontinences and one subject (1.8%) was suffering from all three types of complications. Table 4 lists information on fecal incontinence, flatus incontinence, and recurrence based on perianal fistula surgery.

Table 4. Frequency of complications of perianal fistula surgery

Perianal Fistula Surgery	Fecal incontinence		Gas incontinence		Recurrence		Total
	Yes (N/%)	No (N/%)	Yes (%/N)	No (N/%)	Yes (N/%)	No (N/%)	
Fistulectomy	1(2.9)	34(97.1)	6(17.1)	29(82.9)	6(17.15)	29(82.85)	35(100)
Fistulotomy	3(17.5)	14(82.5)	3(17.5)	14(82.5)	3(17.6)	14(82.4)	17(100)
Seton	1(25)	3(75)	0	4(100)	2(50)	2(50)	4(100)
Total	5(10.7)	51(89.3)	9(16.1)	47(82.1)	11(21.4)	45(78.6)	56(100)

Postoperative complications of perianal fistula surgery were evaluated among patients by gender, age group, fistula length, diabetes mellitus, educational level and BMI. The evaluated complications included fecal incontinence, flatus incontinence, and recurrence. Of the 25 patients with complications, the complications are listed in Table 5 in terms of diverse variables.

Table 5. Frequency of Complications in Patients

variable		Fecal incontinence			Gas incontinence				Recurrence	total
		Fistulectomy (N/%)	Fistulotomy (N)	Seton (N)	Fistulectomy (N)	Fistulotomy (N)	Seton (N)	Fistulectomy (N)	Fistulotomy (N)	Seton (N)	
Sex	M	1(4.34)	4(17.4)	1(4.34)	5(21.74)	3(13.05)	0	4(17.4)	3(13.05)	2(8.7)	23(92)
	F	0	0	0	1(50)	0	0	1(50)	0	0	2(8)
Age	≤43	0	2(16.66)	1(8.33)	2(16.66)	2(16.66)	0	3(25)	1(8.33)	1(8.33)	12(48)
	>43	1(7.7)	2(13.39)	0	4(30.77)	1(7.7)	0	2(13.39)	2(13.39)	1(7.7)	13(52)
Fistula Length	Short	1(6.25)	3(18.75)	0	1(6.25)	3(18.75)	0	4(25)	3(18.75)	1(6.25)	16(64)
	Long	0	0	1(11.12)	4(44.45)	0	0	3(33.34)	0	1(11.12)	9(36)
Diabet	Yes	0	1(16.68)	0	0	2(33.34)	0	1(16.68)	1(16.68)	1(16.68)	6 (24)
	No	1(5.27)	3(15.79)	1(5.27)	4(21.06)	2(10.53)	0	5(26.32)	2(10.53)	1(5.27)	19(76)
Education	Illiterate	0	0	0	0	1(50)	0	0	0	1(50)	2(8)
	elementary	0	0	0	1(50)	0	0	1(50)	0	0	2(8)
	Less diploma	1(25)	1(25)	0	0	0	0	2(50)	0	0	4(16)
	Diploma	0	3(21.43)	1(7.15)	4(28.58)	2(14.29)	0	2(14.29)	2(14.29)	0	14(56)
	Associate	0	0	0	0	0	0	0	0	0	0
	Bachelor	0	0	0	0	1(100)	0	0	0	0	1(4)
	Master	0	0	0	0	0	0	1(50)	1(50)	0	2(8)
BMI	<18.5	0	0	0	0	0	0	0	0	0	0
	18.5-24.9	1(12.5)	1(12.5)	0	2(25)	1(12.5)	0	2(25)	0	1(12.5)	8(32)
	25-29.9	0	2(16.67)	0	2(16.67)	3(25)	0	2(16.67)	3(25)	0	12(48)
	30-34.9	1(33.34)	0	0	0	1(33.34)	0	0	0	1(33.34)	3(12)
	35-39.9	0	0	1(100)	0	0	0	0	0	0	1(4)
	>40	0	0	0	0	0	0	1(100)	0	0	1(4)

DISCUSSION

Perianal abscess is the most conventional anorectal disease caused by infection of cryptoglandular glands in intersphincteric space(13). Infection of an anal gland causes an abscess that spreads along one of several perianal spaces, leading to the formation of severe tissue infection. In these cases, the first step is to drain the anorectal abscess, which is argued to treat about 50% of patients. However, in the remaining 50% not responded to perianal abscess drainage, a permanent fistula will be formed(13, 14). The patients untreated with perianal abscess drainage will undergo surgery. The fistula should be accompanied by a wide opening of the main muscle layer, leading to damages such as dysfunction of Perianal area muscles. Treatment of anal fistulas is one of the problems of general and colorectal surgeons due to its disabling complications. This is especially more sensitive in cases where the fistula and voluntary anal sphincter are involved since the mistake in surgical treatment leads to serious consequences, such as permanent fecal and flatus incontinences(9, 15).

In this study, the postoperative complications including fecal and flatus incontinences as well as recurrence were evaluated among patients with perianal fistula undergoing three types of surgeries including Fistulectomy, Fistulotomy, and Seton embedment. The prevalence of Fistulectomy surgery in this study, as in other studies, was higher than that of Fistulotomy and Seton embedment, because this procedure involves an open incision throughout the fistula to evaluate and eliminate the damage arisen to all parts. Also, in this procedure, skin and muscle of the existing tunnel will be opened, allowing to repair the fistula from inside to outside.

According to our results, of the 56 patients studied, 45 were men. In studies of Tobisch(12), Hamadani(16) as well as Shirah et al(17)., about 80% of patients suffering from perianal fistulas were males, suggesting that such a disorder is more likely to occur among men. Also, the results of the present study showed that of the 56 samples studied, 30 subjects were in the ≤43 age group and 26 of them were in the above 43 age group, indicating a higher prevalence of perianal fistulas among younger subjects in present study. This finding is in line with results of Hamadani et al(16)., who reported that the prevalence of perianal fistulas in patients younger than 40 years was higher than in patients over 40 years of age. Also, in this study, 26 subjects had short fistula and 30 of them had long fistula, indicating approximately equal prevalence of short and long fistula in this study.

On the other hand, this study investigated the frequency of fecal incontinence, flatus incontinence and recurrence of disease based on different variables. It should be noted that not all incontinence cases were minor and complete incontinence (causing patient's dissatisfaction with surgery) was not reported. In this study, patients who had incontinence after surgery were categorized in the group of incontinence complications. In the type of Fistulectomy surgery, 2.9% of fecal incontinence and 17.1% of flatus incontinence were reported to be lower than what was reported in study of Tobisch et al(12). (44%), which could be due to their main focus on complex fistulas.

In the type of Fistulotomy, 17.5% of both fecal and flatus incontinences were observed. Compared to the study by Göttgens et al., who reported a rate of 74.7%, this difference may be due to differences in sample size and accuracy in surgical technique. Also in this type of surgery, the recurrence rate was 17.6%, which was consistent with the Göttgens study who reported a rate of 16.4% (18).

With regard to Seton embedment surgery, a rate of 25% was reported for fecal incontinence, while no flatus was reported, which was less what reported in the study of Hamalainen (i.e. 63%) where some degrees of incontinence were logged. The recurrence rate in this type of surgery was also 50%, which is very high compared to the study's Hamalainen(19). This difference in the results can be due to the difference in sample size. Therefore, it is recommended to perform such an investigation in a larger sample of patients undergoing Seton embedment.

This information on fecal incontinence, flatus incontinence, and relapse was also evaluated in terms of gender among patients undergoing perianal fistula surgery. According to the results of the present study, no postoperative complication was found among women and these effects were only seen among men. But contrary to our study, Van Koperen(20) and Göttgens(18) report fecal and flatus incontinences also among women, which requires further investigation in more recent studies with more specimens.

Following to investigation of fecal incontinence and flatus incontinence, a rate of 25% was observed in the short fistula group. In the study of Göttgens et al(8)., incontinence is reported in the short fistula with a rate of 26%, which is similar to our study where complications of less than 30% was reported. In the long fistula group, a rate of 11.12% and 44.45% were reported for fecal incontinence and, flatus incontinences and recurrence, respectively. However, the reported postoperative complications were at a lower rate the study of Van Koperen(20).

Also, in respect of diabetes status, the information on fecal incontinence and flatus incontinence and recurrence of patients undergoing perianal fistula surgery was also evaluated. Since this issue is not addressed in similar studies. It can be considered as a strength of present work. Of the 56 samples, only 6 of them were suffering from diabetes, and it was found that the incidence of complications was higher among diabetic patients compared to non-diabetic patients.

Information on fecal incontinence, gas incontinence, and recurrence in patients undergoing perianal fistula surgery was also evaluated in terms of BMI levels and one case was reported in terms of 2nd and 3rd obesity grade. In normal weight group, recurrence had the highest frequency, while the highest frequencies were possessed by recurrence and flatus incontinence in the over-weight group. O Schwandner et al., report that patients with obesity had an increased risk of failure in anal fistula surgery(21). Ashish Manne et al., also report that obese patients undergoing Seton embedment surgery and Fistulotomy tend to have poor outcomes(22).

In general, depending on the type of surgeon's selected surgery, it is recommended that patients be warned about the complications that are most frequent in each type of surgery. These warnings about the most recurrence should also be taken seriously due to its highest frequency.

Finally, it is suggested to conduct future studies on a larger scale, with a larger sample size, with multiple follow-up years, on different populations, along with an in-person examination.

CONCLUSION

The results of this study showed that due to demographic variables, postoperative complications such as fecal incontinence, flatus incontinence and recurrence may be different in patients and it is necessary for the surgeon to take appropriate warnings and recommendations before surgery.

Conflict of interest

No conflict of interest was declared by the authors.

Acknowledgment

We appreciate the support of the Clinical Research Development Unit of Poursina Hospital, Guilan University of Medical Sciences, Rasht, Iran.

REFERENCES

1.Limura, E. and P. Giordano, Modern management of anal fistula. World Journal of Gastroenterology: WJG, 2015. 21(1): p. 12.

2.Tabry, H. and P.A. Farrands, Update on anal fistulae: surgical perspectives for the gastroenterologist. Canadian Journal of Gastroenterology and Hepatology, 2011. 25(12): p. 675-680.

3.Abcarian, H., Anorectal infection: abscess–fistula. Clinics in colon and rectal surgery, 2011. 24(01): p. 014-021.

4.Vasilevsky, C.-A. and P.H. Gordon, Benign anorectal: abscess and fistula. The ASCRS Textbook of Colon and Rectal Surgery. New York, NY: Springer, 2007: p. 192-214.

5.Athanasiadis, S., et al., The direct closure of the internal fistula opening without advancement flap for transsphincteric fistulas-in-ano. Diseases of the colon & rectum, 2004. 47(7): p. 1174-1180.

6.ARAÚJO, S.E.A., et al., Interesfincterial ligation of fistula tract (LIFT) for patients with anal fistulas: a Brazilian BI-Institutional experience. ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo), 2017. 3(4) p. 235-238.

7.Song, K.H., New techniques for treating an anal fistula. Journal of the Korean Society of Coloproctology, 2012. 28(1): p. 7.

8.Hammond, T., et al., The Snug Seton: short and medium term results of slow fistulotomy for idiopathic anal fistulae. Colorectal Disease, 2006. 8(4): p. 328-337.

9.Kunitake, H. and V. Poylin, Complications following anorectal surgery. Clinics in colon and rectal surgery, 2016. 29(01): p. 014-021.

10. Bubbers, E.J. and K.G. Cologne, Management of complex anal fistulas. Clinics in colon and rectal surgery, 2016. 29(01): p. 043-049.

11. Bleier, J.I. and H. Moloo, Current management of cryptoglandular fistula-in-ano. World Journal of Gastroenterology: WJG, 2011. 17(28): p. 3286.

12.Tobisch, A., et al., Total fistulectomy with simple closure of the internal opening in the management of complex cryptoglandular fistulas: long-term results and functional outcome. Diseases of the Colon & Rectum, 2012. 55(7): p. 750-755.

13. Whiteford, M.H., Perianal abscess/fistula disease. Clinics in colon and rectal surgery, 2007. 20(02): p. 102-109.

14. Emmanuel, B. and S.S. Bhimji, Abscess, Perianal, in StatPearls (Internet). 2018, StatPearls Publishing.

15. Akiba, R.T., F.G. Rodrigues, and G. da Silva, Management of complex perineal fistula disease. Clinics in colon and rectal surgery, 2016. 29(02): p. 092-100.

16. Hamadani, A., et al., Who is at risk for developing chronic anal fistula or recurrent anal sepsis after initial perianal abscess? Diseases of the colon & rectum, 2009 ;(2)52 .p. 217-221.

17.Shirah, B.H. and H.A. Shirah, The Impact of the Outcome of Treating a High Anal Fistula by Using a Cutting Seton and Staged Fistulotomy on Saudi Arabian Patients. Annals of coloproctology, 2018. 34(5): p. 234.

18.Göttgens, K., et al., Long-term outcome of low perianal fistulas treated by fistulotomy: a multicenter study. International journal of colorectal disease, 2015. 30(2): p. 213-219.

19.HÄmÄlÄinen, K.-P.J. and A.P. Sainio, Cutting seton for anal fistulas. Diseases of the colon & rectum, 1997. 40(12): p. 1443-1447.

20. Van Koperen, P.J., et al., Long-term functional outcome and risk factors for recurrence after surgical treatment for low and high perianal fistulas of cryptoglandular origin. Diseases of the colon & rectum, 2 ;(10)51 .008p. 1475-1481.

21.Schwandner, O., Obesity is a negative predictor of success after surgery for complex anal fistula. BMC gastroenterology, 2011. 11(1): p. 61.

22.Manne, A., A.S. Khan, and T.A. Malik, Obesity and Outcome of Crohn's Associated Perianal Fistula Surgery: A Case-Control Study. Gastroenterology research, 2015. 8(6): p. 291.