A new seton tightening method for anal fistula treatment: sailor's knot

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A new seton tightening method for anal fistula treatment: sailor's knot

AIM: *There are certain problems experienced while retightening the seton material during the patient follow-ups, such as pain and anaesthesia requirements in perianal fistula. The aim of the present study was to compare a sailor's knot with other seton tightening methods for the surgical treatment of perianal fistulas.*
MATERIAL AND METHODS: *The records of 105 patients who underwent surgeries for perianal fistulas using the seton method between 2016 and 2019 were analysed retrospectively. The demographic characteristics, complaints, fistula localizations, surgery types, hospital stay lengths, postoperative complications and imaging modalities of the patients included in the study were recorded. The patients were divided into two groups according to the surgical treatment method. Those patients who underwent seton procedures with a sailor's knot were included in Group 1. Group 2 included those patients who underwent other seton procedures, including silk and penrose drain procedures. Groups were compared with regard to success rates and postoperative recurrence.*
RESULTS: *There was no statistically significant difference between the groups in terms of the age, gender, fistula type and follow-up duration. Success rate in all patient was 88.6%, 91.2% in group 1 and 87.1% in group 2 (p=0.36). The number of patients with a kind of incontinence was 7 (7.1%), 3 (5.8%) in Group 1 and 4 (7.4%) in Group 2 (p = 0.297).*
CONCLUSION: *There were no statistically significant differences with regard to complications and recurrences between the sailor's knot and the other seton tightening methods used for the treatment of anal fistulas. The sailor's knot is recommended with regard to its easy application and seton retightening with satisfactory outcomes.*

KEY WORDS: Perianal fistula, Sailor's knot, Seton

Introduction

A fistula-in-ano is a commonly seen disorder in the general clinics. It is the chronic stage of an anorectal infection, and it is characterized by purulent drainage or abscess formation and the subsequent drainage of spontaneous abscesses. Perianal fistula occurs in approximately 33% of patients after perianal abscess [1]. Perianal fistulas can cause pain, perianal swelling, drainage and anal bleeding. The goals of treatment are sepsis control, fistula closure and continence protection. Unfortunately, the interventions used to maintain permanent healing lead to incontinence, while the methods used to protect continence increase the recurrence rate.
Seton (loose or cutting) fistulotomy and fistulectomy are the general surgical procedures used to treat perianal fistulas. However, the mode of treatment varies depending on the localization, as well as simple and complicated situations. In simple fistula cases, the treatment is easy, the recurrence rate and incontinence risk are low. The complication risk is higher in complex fistula cases. The seton procedure, which is one treatment method, plays an important role in the treatment of high and

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complex fistulas. It has been used to treat fistulas from the time of Hippocrates [2]. However, the seton type and method depend on personal preferences. Today, many different materials are used for seton procedures, including silk, wire, elastic bands, penrose drains, plastic pipes and nylon [3]. For all of these methods, either a loose or cutting seton is performed. The material that is used in a cutting seton is retightened using another material at certain time intervals.

The aim of the present study was to compares a sailor's knot and the other seton methods used in the surgical treatment of perianal fistula.

Methods

The records of 105 patients who underwent seton surgeries for the treatment of perianal fistulas between 2016 and 2019 were analysed retrospectively. The demographic characteristics, complaints, fistula localizations, surgery types, hospital stay lengths, postoperative complications and imaging modalities of the patients included in the study were recorded. The perianal fistula classification was based on the perioperative findings according to the Parks classification [4] (Table I). The patients were divided into two groups based on the surgical treatment method. Those patients who underwent seton procedures with a sailor's knot were included in Group 1. Group 2 included those patients who underwent other seton procedures, such as silk and penrose drain procedures. The patients in Group 1 and Group 2 were compared with regard to their postoperative complications, such as incontinence and recurrence.

The medical history and physical examination results were used during the diagnosis of the fistula, while magnetic resonance imaging (MRI) of the lower abdomen was used for the imaging process. Preoperative MRI scans were performed in 86 (82%) patients. All of the patients were hospitalized 12 hours before their operations. Two grams of a first generation cephalosporin were administered as prophylactic antibiotherapy and oral cephalosporin was administered during the discharge from the hospital. All patients underwent surgery in prone jack-knife or lithotomy position after the administration of spinal anaesthesia (saddle block). The inner orifice of the fistula was found with the help of a probe, and those that could not be found with a probe were found with the administration of normal saline or

Table I - *Parks classification in perianal fistulas*

– Intersphincteric: limited to the perianal area.
– Transsphincteric: holds a small portion of the external sphincter.
– Suprasphincteric: passes over the external sphincter and puborectal muscle to reach the ischiorectal distance.
– Extrasphincteric: fistulas starting from the rectum and extends to the ischiorectal distance and skin over the levator muscles.

Table II - *Demographic information of the patients and the operation methods implemented.*

	Group 1	Group 2	P
Age* (year)	41.7±11.8	40.1±12.7	0.30
Gender Male/Female	43/8	49/5	0.87
Seton type			
Loose	-	4	
Tight	-	16	
Cutting	51	34	
Seton material			
Penrose drain	–	23	
Propylene wire	51**	22***	
Silk wire	–	9***	
Type of fistula	51	54	0.79
Intersphincteric	25	24	
Transsphincteric	13	12	
Suprasphincteric	6	10	
Extrasphincteric	7	8	
Follw-up time(days)	365±248	411±244	0.39
Recurrence	5	7	0.35
Gas incontinence	3	4	0.29

*mean **with sailor's knot ***normal fixation

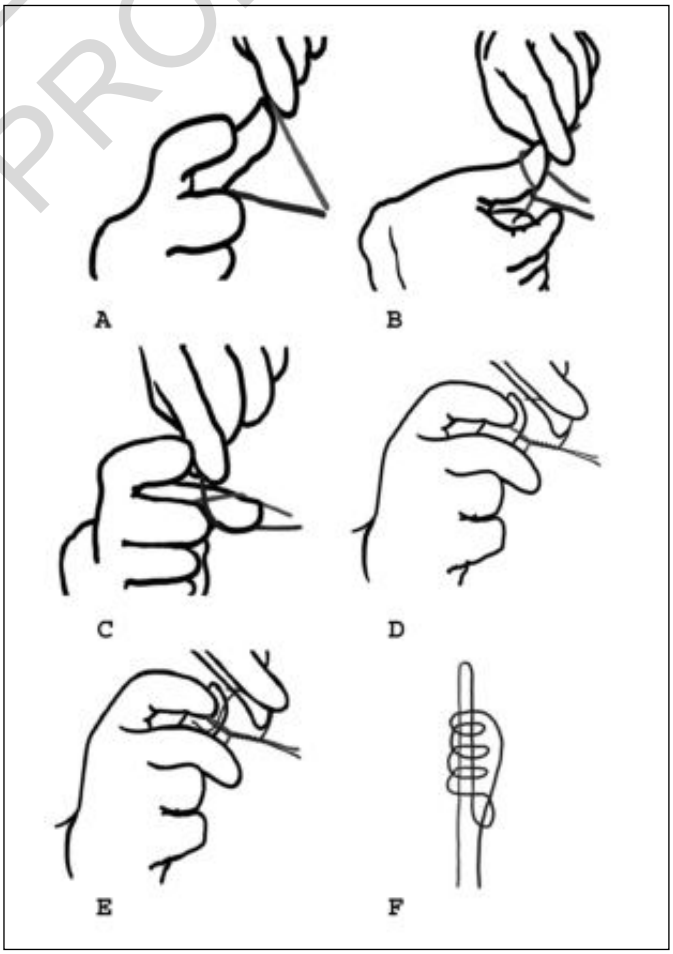

Fig. 1: Figure was drawn by Cüneyt Kayaalp.

methylene blue through the external orifice. The seton procedure was performed after partial fistulectomy. Two surgeons performed the seton procedure using a polypropylene thread with a sailor's knot, while three surgeons performed the seton procedure using silk and a penrose drain. The patients were discharged on the 1st postoperative day. The patients in Group 1 were recalled to the outpatient clinic 10 days later, and their sailor's knots were retightened. After this, the patients were recalled to the outpatient clinic every 2 weeks for 3 months, and their sailor's knots were retightened under outpatient clinical conditions.

Surgical Sailor's Knot Technique

The fistula was partially excised without any damage to the sphincters, after it was found with the help of a probe administered from the external orifice (Fig. A). Then, it was passed from the fistula with the help of a silk (No. 0) wire by probe. The silk thread was knotted intermittently, and the fistula tract was curetted. To apply the seton with a sailor's knot, a polypropylene thread (No. 1) was passed through the fistula tract under the guidance of the wire. Then, the polypropylene thread was applied diagonally (Fig. B), and the tract inside was pulled with the inner side of the thumb of the hand holding the thread (Fig. C). It was then transferred on top of the upper thread to form a ring (Figs. D, E). Next, the end of the lower thread was rotated approximately 5-6 turns around the ring that was formed (Figs. F, G). Then, the same end was passed through the ring formed by the thumb (Figs. H, I), and the knot was placed (Fig. J). The upper thread was left longer for the subsequent tightening process.

Statistical Analysis

The statistical analysis was performed using the Statistical Package for the Social Sciences (version 16.0; SPSS Inc., Chicago, IL, USA). All of the data were stated as the mean ± the standard deviation. The Kolmogorov-Smirnov test was used to analyse the distribution of the data. The independent-samples t-test was used to analyse the differences between the quantitative parameters of the data with a normal distribution, while the Mann-Whitney U test was used for the data without a normal distribution. The chi-squared test was used for the non-numerical data comparisons between the groups. P values of <0.05 were accepted as statistically significant.

Results

A total of 105 patients were included in this study, 92 (87.6%) were males and 13 (12.4%) were females. There were 51 patients in group 1 and 54 patients in group

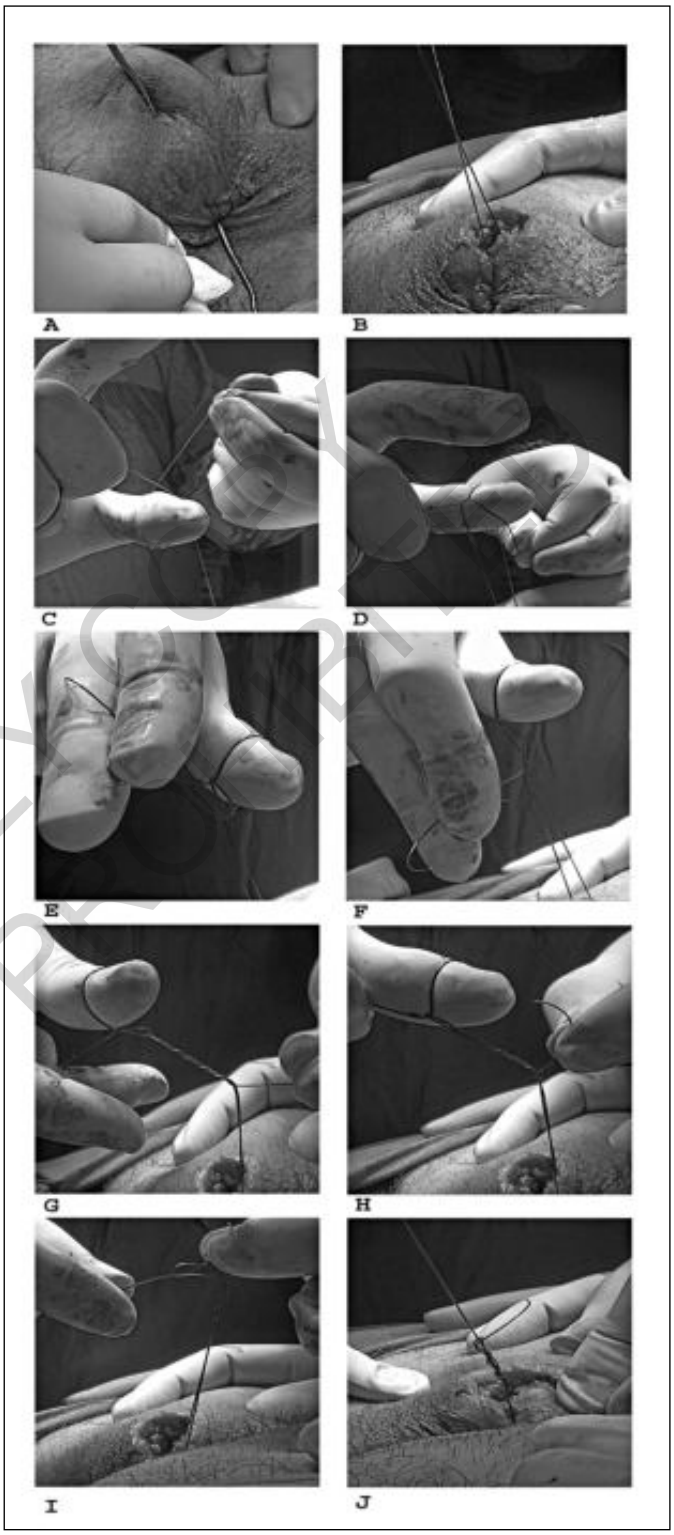

Fig. 2: A) The external orifice is found by probe; B) The polyprolene wire is made diagonally; C) The wire inside is pulled with the inner side of the thumb of the hand holding the wire, and it is transferred on top of the upper wire to form a ring; D-E) The end of the lower wire starting to be rotated around the ring formed; F-G) The lower wire is rotated approximately5–6 turns around the ring; H-I) The rotated end is passed through the ring formed by the thumb; J) The knot is placed after passing the end of the wire through the ring.

2.The mean age of Group 1 was 41.74 ± 11.8 years old, while the mean age of Group 2 was 40.1 ± 12.7 years old. The mean postoperative follow-up periods of the groups were 365±248 days and 411±244 days, respectively, for Group 1 and Group 2. There were no statistically significant differences between the groups in terms of the age, gender, fistula type and follow-up duration (Table II). Findings consistent with the physical examination were detected in 78 (90.7%) of the 86 patients who underwent MRI scans.

During the follow-up period, a total of 12 (11.4%) patients had recurrences. Of these patients, 5 (9.8%) were in Group 1 and 7 (12.9%) were in Group 2. The number of patients who had gas incontinence as a complication was 7 (7.14%). Of these patients, 3 (5.8%) were in Group 1 and 4 (7.4%) were in Group 2. There were no statistically significant differences between the groups in terms of recurrences and gas incontinence ($p = 0.357$ and $p = 0.297$, respectively) (Table II). Of the 12 patients with recurrences, 7 underwent a second surgery. In the second operation, all of the patients underwent seton procedures with a sailor's knot.

Permanent incontinence, a major complication of seton operations, did not develop in any of the patients.

Discussion

Perianal fistula is progress with chronic inflammation accompanied by drainage and pain. The treatment goals are the surgical obliteration of the fistula tract and the preservation of anal continence [5]. Seton procedures have been added to the treatment in several new methods, such as fistulectomies and fistulotomies, as well as the ligation of the intersphincteric fistula tract and video-assisted anal fistula treatment [6].

A seton procedure is a surgical method that preserves the function of the sphincter muscle, and it reduces incontinence when compared to the other methods [7]. A seton procedure has cutting and tight-fitting types, and we use both methods in our clinic. In addition, the cutting seton procedure with a sailor's knot has been performed in our clinic by 2 surgeons for the last 3 years. Raslan et al. achieved a success rate of 90.2% in the patients who underwent cutting seton procedures [2]. Moreover, Mentes et al. reported that they achieved a 45% recovery rate during the postoperative 1st month and a 100% recovery rate during the postoperative 3rdmonth [8]. The present study showed a recovery rate of 88.6%, and this rate was 90.2% in the patients who underwent the seton procedure with a sailor's knot.

The use of MRI in the diagnosis of perianal fistulas has increased in recent years. With MRI, the site of the sphincter can be identified [9]. Studies about the role of MRI in the diagnosis of fistulas were first published in 1989 [10]. In a study of 16 fistula patients by Lunniss et al., the MRI and physical examination findings were compared, and an accurate result was obtained in 14 (88%) patients [11]. In the present study, MRI scans were performed in 86 patients, and the MRI scans provided accurate results in 90.7% of the patients.

During the follow-up period, recurrences were seen in 12 patients (11.4%), while a total of 7 (7.14%) patients had transient gas incontinence. Permanent incontinence did not develop in any of the patients included in the study. In one previous study of 62 patients conducted by Zeren et al., the recurrence rate was 4.8% [12]. Lenter et al. reported a recurrence rate of 3.7% and an incontinence rate of 0.9% [13].

Fistula treatments with seton procedures have been used for a long time. The seton procedure works via several mechanisms: it helps to discharge the purulence and control sepsis prior to definitive treatment, it stimulates fibrosis, and a tight (cutting) seton allows the outer sphincter muscle to be cut slowly by minimally separating the cut ends [3,8]. Many materials and techniques have been described as seton methods. Today, many different materials, including silk, wire, elastic bands, Penrose drains and nylon, are being used in seton procedures [14]. For example, 'horsehair wrapped with mohair yarn' was used during the time of the Hippocrates [12].

To ensure that the seton adequately cuts the tissue it is encircling, there should be a constant tension. Thompson et al. described the use of leg strap and tourniquet to achieve constant tension in the seton [15]. Dziki and Bartos described a rubber-band seton technique which is tightened around the external sphincter by a thread tied around its ends [16]. The tension in the seton can be adjusted by applying further thread ties.

The most important problem of all anal fistula operations is the need for retightening the seton during the postoperative period. This is due to the loosening of the materials that were placed, depending on the tissue section. The material that is used in other cutting seton treatment methods is tightened with another material at certain time intervals [17-19]. For example, when the penrose drain has loosened, depending on the tissue section, it is withdrawn and tightened again by placing a wire. This can be a major problem for both the patient and the surgeon. The patient feels pain when the seton is tightened, and in most cases, the patient needs local anaesthesia during this procedure. More importantly, the discomfort experienced by the patient and the difficulty of the tightening process can prevent the surgeon from completing the necessary process. With the sailor's knot method that we recommend, the surgeon can hold both ends of the wire and gently tighten the loosening part. In this way, the patient does not feel excessive pain, and the method provides great comfort for the surgeon. With this method, we recall the patient every 2 weeks in order to check whether the seton has loosened. Because it can be performed under outpatient conditions, there is no need for additional medication. Moreover, a loosening seton can be tightened without the need for any other

material. These are among the advantages of the sailor's knot method that is recommended.

Conclusion

There were no statistically significant differences in terms of complications and recurrences between a seton procedure with a sailor's knot and the other techniques used in the treatment of anal fistulas. Certain problems, such as pain and anaesthesia requirements during seton retightening at the patient follow-ups are not experienced with the sailor's knot method recommended in this study. If a seton is to be used for the treatment of an anal fistula, the use of a sailor's knot should be kept in mind in terms of its easy application and follow-up.

Riassunto

Si sono riscontrati alcuni problemi al momento di incrementare la stretta del setone nel corso del follow-up del paziente con fistola perianale, in rapporto al dolore e l'anestesia. Lo scopo del presente studio è quello di confrontare il nodo marinaro con altri metodi di serraggio del setone per il trattamento chirurgico di queste fistole. Sono stati analizzati retrospettivamente i documenti clinici di 105 pazienti sottoposti a interventi chirurgici per fistole perianali utilizzando il metodo del setone tra il 2016 e il 2019. Sono state registrate le caratteristiche demografiche, le lamentele, le localizzazioni delle fistole, i tipi di interventi chirurgici, la durata delle degenze in ospedale, le complicanze postoperatorie e le modalità di imaging dei pazienti inclusi nello studio. I pazienti sono stati divisi in due gruppi secondo il metodo del trattamento chirurgico adottato. I pazienti sottoposti a procedure del setone con nodo marinaro sono stati inclusi nel I gruppo. Il II gruppo comprendeva i pazienti sottoposti ad altre procedure del setone, tra cui il drenaggio con seta o con penrose. I due gruppi sono stati posti a confronto per quanto riguarda il tasso di successo e le recidive postoperatorie.

Risultati: Non sono state rilevate differenze statisticamente significative tra i gruppi in termini di età, sesso, tipo di fistola e durata del follow-up. La percentuale di successo in tutti i pazienti è stata dell'88,6%, del 91,2% nel gruppo 1 e dell'87,1% nel gruppo 2 (p = 0,36). Il numero di pazienti con una sorta di incontinenza era 7 (7,1%), 3 (5,8%) nel gruppo 1 e 4 (7,4%) nel gruppo 2 (p = 0,297).

Conclusioni: Non ci sono state differenze statisticamente significative per quanto riguarda le complicanze e le recidive tra il nodo marinaro e gli altri metodi di serraggio del setone usati per il trattamento delle fistole anali. Il nodo del marinaio è raccomandato per quanto riguarda la sua facile applicazione e il suo riserraggio con esiti soddisfacenti.

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