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Original Research Article

Prevalence and Characteristics of Transsphincteric Anal Fistulas Unclassifiable by the Sumikoshi Classification: A Single-center Retrospective Study

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Abstract

Objectives: The Sumikoshi classification for anal fistulas is widely used in Japan; however, it does not include a category for transsphincteric fistulas. Therefore, low transsphincteric fistulas were included in type IIL (low intersphincteric) for convenience; however, high transsphincteric fistulas have not been properly classified. We defined high transsphincteric fistulas as type IIT and investigated their prevalence and clinical characteristics.

Methods: Consecutive patients who underwent fistula surgery at our hospital were included. The operative and endoanal ultrasonography records were retrospectively reviewed, and the following cases were reclassified as type IIT: cases documented as transsphincteric fistulas or cases with written records and/or illustrations indicating that the fistula tract penetrated the upper two-thirds of the external anal sphincter.

Results: Of the 1,069 eligible patients, 895 (83.7%) had type II (intersphincteric) fistulas. Among the type II subtypes, type IIL was the most common with 771 (86.1%) patients, whereas type IIT accounted for 54 (6.0%) patients. The direction of the primary opening was more posterior (62.2%) in patients with type II fistulas other than type IIT, but it was more anterolateral (55.6%) in patients with type IIT fistulas. Patients with type IIT fistulas were more likely to undergo sphincter-sparing surgery than patients with other type II fistulas (37.0 vs. 3.7%, $p<0.001$).

Conclusions: Type IIT is not rare (6.0%) and should be treated as a complex fistula because of the greater involvement of the external anal sphincter. Surgeons may benefit by including type IIT as a new type II subclass in the Sumikoshi classification system.

Keywords

anal fistula, anal sphincter, classification, diagnostic imaging, sphincteroplasty, anal ultrasonography

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Introduction

An anal fistula is an epithelialized tract that connects the anorectal mucosa to the perianal skin and may present spontaneously or after an acute anorectal abscess[1]. The cryptoglandular infection theory, which states that inflammation of the anal glands forms an abscess, is the most common etiology of anal fistula/abscess[2]. Anal fistulas may develop secondary to Crohn's disease, anal fissures, and tuberculosis[2]. Anal fistulas rarely heal spontaneously and usually require surgical intervention for clinical cure[1]. The surgical approach to an anal fistula depends on its pathological

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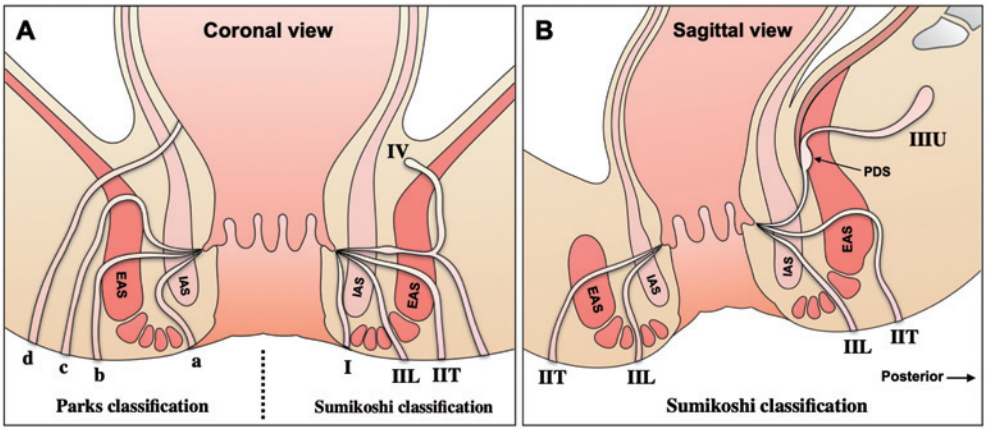

Figure 1. Schematic diagram of major fistula types in the Parks and Sumikoshi classifications.
A. The Parks classification includes intersphincteric (a), transsphincteric (b), suprasphincteric (c), and extrasphincteric (d) fistulas. The Sumikoshi classification includes subcutaneous/submucous (I), intersphincteric (II), infralevator (III), and supralevator (IV) fistulas. As the Sumikoshi classification cannot classify transsphincteric fistulas deeper than low intersphincteric fistulas (IIL), we defined them as type II-transsphincteric (IIT) fistulas.
B. In the posterior, the depth of the primary focus of type IIT fistulas is lesser than that of type III (PDS). Thus, type IIT fistulas can be differentiated from type III fistulas.
EAS, external anal sphincter; IAS, internal anal sphincter; PDS, posterior deep space

Table 1. Correspondence between the Sumikoshi and Parks Classifications.

Category	Sumikoshi classification [5]	Parks classification [1,6,16]
Subcutaneous/submucous	I	Submucosal
Intersphincteric	II	Intersphincteric
Low	IIL	Simple
High	IIH	High, blind track
Transsphincteric	–	Transsphincteric
Low	IIL (for convenience)	EAS involvement ≤30% or 1/3
High	IIT (added in this study)	EAS involvement >30% or 1/3
Linear, unbranched		Uncomplicated
Curved/horseshoe	–	With high ischiorectal extensions
Infralevator (ischiorectal)	III	With high ischiorectal extensions or suprasphincteric
Unilateral	IIIU	
Bilateral (horseshoe)	IIIB	
Extrasphincteric	–	Extrasphincteric
Supralevator	IV	–

EAS, external anal sphincter

anatomy and connection with the anal sphincters, and the goals of surgical treatment are complete eradication of the fistula and preservation of anal continence[3,4]. Therefore, most classifications of anal fistulas are based on the course of the fistula tract in relation to the anal sphincters[5,6]. These classifications have been used to select the optimal treatment and support the choice between lay-open fistulotomy and sphincter-sparing procedures[7].

In 1972, Sumikoshi et al.[5] classified anal fistulas into four major types (Figure 1, Table 1): type I, subcutaneous/submucous; type II, intersphincteric; type III, infralevator (ischiorectal); and, type IV, supralevator. Types I and II were further divided into high (H) and low (L) according to the dentate line. Type III was divided into unilateral (U) and bilateral (B) according to the extension of the fistula tracts. The Sumikoshi classification is specific to cryptoglandular fistulas with an internal opening at the dentate line and has been used in Japan for more than half a century without any modification[2,8].

In 1976, Parks et al.[6] classified anal fistulas into four

broad categories (Figure 1A, Table 1): intersphincteric, transsphincteric, suprasphincteric, and extrasphincteric. Intersphincteric fistulas are further divided into six subtypes according to the location of the opening and presence of a high tract[6]. The Parks classification covers not only cryptoglandular fistulas but also non-cryptoglandular fistulas, such as those with an internal opening in the rectum in patients with Crohn's disease, and it has been used worldwide with some modifications[1,7]. The modified Parks classification in the American Society of Colon and Rectal Surgeons (ASCRS) clinical practice guidelines[1] incorporated submucosal fistulas and revised the criteria for complex fistulas.

Anal fistulas may also be classified as simple and complex, which is practical for surgical selection[9,10]. The Sumikoshi classification defines linear, non-branching fistulas as simple, and other fistulas as complex[5]. According to the ASCRS clinical practice guidelines[1], simple fistulas include intersphincteric fistulas and low transsphincteric fistulas that involve less than 30% of the external anal sphincter (EAS). In contrast, complex fistulas include high transsphincteric fistulas that involve >30% of the EAS, suprasphincteric fistulas, extrasphincteric fistulas, horseshoe fistulas, recurrent fistulas, branching fistulas, and anterior fistulas in women[1]. Simple fistulas can be safely treated with fistulotomy, but complex fistulas often require sphincter-sparing procedures to prevent fecal incontinence[9,10].

Low intersphincteric fistulas, type IIL fistulas of the Sumikoshi classification, is the most common in Japan, affecting 57.2-64% men and 51.4-60% women[2,11]. In Western countries, two categories of the Parks classification are common: intersphincteric fistulas (31-54.7%) and transsphincteric fistulas (30-53%)[6,12,13]. This difference may be due to the lack of the transsphincteric type in the Sumikoshi classification. A type IIL fistula is defined as a fistula that descends between the internal and external sphincters; however, in many cases, the fistula tract penetrates the lower third of the EAS and opens into the perianal skin (Figure 1). In other words, in Japan, low transsphincteric fistulas have been categorized as type IIL fistulas for convenience[11,14]. On the other hand, high transsphincteric fistulas that penetrate the upper two-thirds of the EAS have been conventionally classified as type III fistulas (ischiorectal fistula)[8,11,14]. However, recent anatomical studies using magnetic resonance imaging (MRI) have revealed that most type III fistulas have a primary focus in the posterior deep space near the EAS muscle, where the fistula tracts may extend unilaterally or bilaterally into the ischiorectal fossa (Figure 1B)[14,15]. If the results of these studies are correct, high transsphincteric fistulas that do not develop posteriorly cannot be classified as type III fistulas. Even posteriorly, the depth of the primary foci in high transsphincteric fistulas is usually lesser than that in type III fistulas (Figure 1B)[14]. Therefore, high transsphincteric fistulas with an anterolateral internal opening or a primary focus shallower than that in type III fistulas cannot be properly classified using the Sumikoshi classification. In this regard, the Parks classification divides transsphincteric fistulas into two types: "uncomplicated (linear and unbranched)" and "with high ischiorectal extensions" (Table 1)[16].

In 2012, Tanaka et al.[17] reviewed preoperative endoanal ultrasound images of 721 patients diagnosed and operated on for type II fistulas and found that 7.1% of the cases were unclassifiable by the Sumikoshi classification. All of these unclassifiable fistulas penetrated the EAS at a deeper level than that of type IIL fistulas; and, they were linear rather than horseshoe-shaped; thus, they were considered to correspond to the uncomplicated transsphincteric fistula of the Parks classification[17]. These fistulas were noted in the operative records as "deep type II" and were more often treated with sphincter-sparing surgery than type IIL. Therefore, the authors propose that the uncomplicated transsphincteric type should be added as a new type II subclass[17].

We used the Sumikoshi classification, which has been helpful for the diagnosis and treatment of anal fistulas, for >30 years[18,19]. However, we occasionally encounter transsphincteric fistulas that do not fit into either type II or type III, and we have tentatively classified them as "deep type II" or "Parks' transsphincteric type." In this study, we defined transsphincteric fistulas as type II-transsphincteric (IIT; Figure 1) and added them under a new subtype of type II (Table 1). Further we reviewed and reclassified previous cases of fistulas to investigate the prevalence and clinical characteristics of type IIT fistulas.

Methods

This was a retrospective review of medical records approved by the institutional review board of our hospital (approval code: K24-006). This study included consecutive patients who underwent definitive surgery for cryptoglandular anal fistulas between January 2014 and December 2023. Written informed consent was obtained from all the patients. Exclusion criteria included coexisting anorectal pathologies such as tumors, strictures, abscesses, rectovaginal fistulas, and inflammatory bowel diseases. In cases of multiple fistulas, the deepest fistula was included in this study.

Preoperative examinations

Anorectal examinations before fistula surgery included digital rectal examination, proctoscopy, anorectal manometry, and endoanal ultrasonography (EAUS), all of which were performed with the patient in the left lateral position without bowel preparation. Endoanal ultrasonography was performed using an endocavity biplane probe (PVL-715RT or PVL-715RS; Canon Medical Systems, Tochigi, Japan)

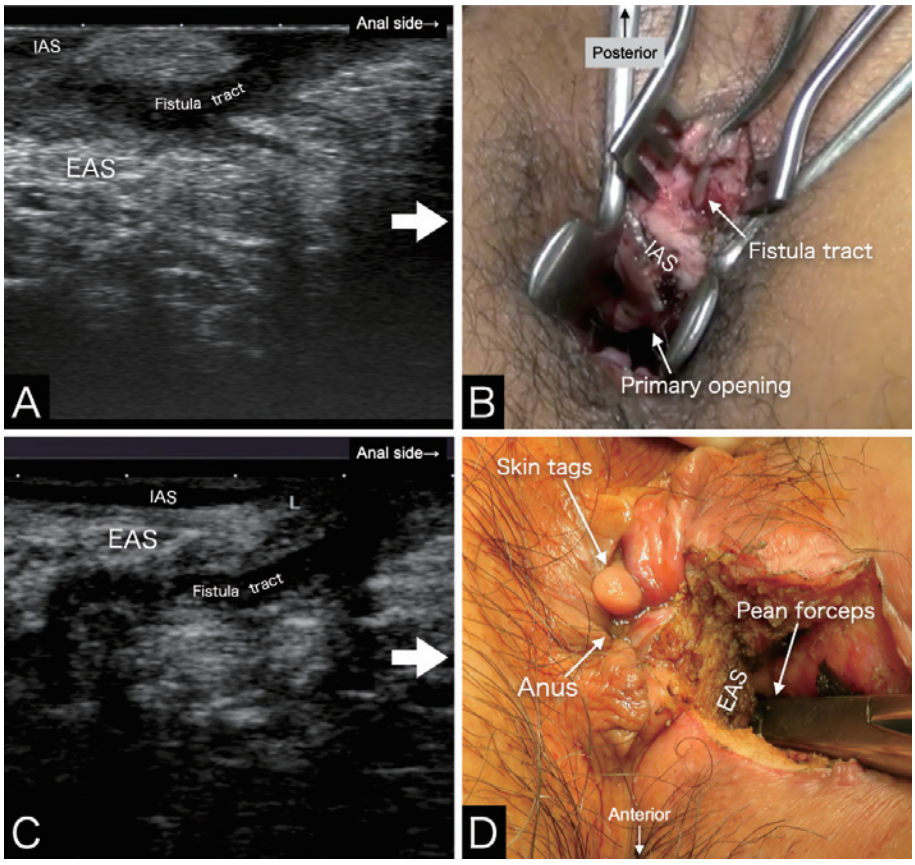

Figure 2. Examples of endoanal ultrasound images and intraoperative findings of types IIL and IIT. In type IIL, the fistula tract passes between the IAS and EAS (A, B), whereas in type IIT, the fistula tract runs outside the EAS (C, D).
IAS, internal anal sphincter; EAS, external anal sphincter

connected to an electronically scanned ultrasound system (Nemio MX SSA-590A or Xario100 TUS-X100; Canon Medical Systems, Tochigi, Japan). The biplane probe, which integrates a longitudinal linear transducer and transverse convex transducer, allows sagittal and transverse scanning from the lower rectum to the anal canal. For each case, the Sumikoshi classification was determined based on the positional relationship between the hypoechoic image of the fistula tract and adjacent structures (Figure 2).

Intraoperative diagnosis

Surgery was planned based on the Sumikoshi classification, as diagnosed during preoperative examinations. The main surgical options were lay-open fistulotomy for type I; open fistulectomy with sphincteroplasty (OFS)[19], type II; and, sphincter-sparing surgery, types III and IV. Surgery and intraoperative examinations were performed with the patient in the jackknife position under sacral epidural anesthesia. In type II, the fistula tract was first cored as deeply as possible from the external opening. By coring out to the primary focus, the precise course of the fistula tract was confirmed under direct vision before sphincter muscle division (Figure 2). Therefore, if the fistula tract penetrates deep into the EAS, a sphincter-sparing surgery may be performed instead of OFS. The Sumikoshi classification for each case was finalized based on intraoperative findings.

Outcome measures

The operative records of all the patients were reviewed, and the following cases were reclassified as type IIT: 1) cases recorded as a transsphincteric fistula of the Parks classification rather than as a type IIL fistula and 2) cases with written records and/or illustrations indicating that the fistula tract penetrated the upper two-thirds of the EAS and was different from a type III fistula. The direction of the primary opening for type II was divided into 45° sections each for the anterior, posterior, left, and right sides. Posterior type IIT fistulas were differentiated from type III based on the depth of the primary focus (type III fistulas are deeper) and the morphology of the fistula tract (linear or horseshoe-shaped) (Figure 1B). Type II cases were divided into IIT and non-IIT (type II fistulas other than IIT fistulas) groups, and their clinical characteristics were compared. Surgical procedures were categorized as sphincter-cutting procedures,

Table 2. Characteristics of the Study Population.

Variable	Men	Women	p-value
Number of patients	934 (87.4)	135 (12.6)	–
Age, years, mean (SD)	44.6 (15.3)	42.0 (16.5)	0.069
Previous fistula surgery	42 (4.5)	9 (6.7)	0.363
Multiple fistulas	73 (7.8)	7 (5.2)	0.362
Sumikoshi classification			
Type I	53 (5.7)	23 (17.0)	<0.001
Type II	796 (85.2)	99 (73.3)	<0.001
Type III	83 (8.9)	11 (8.1)	0.777
Type IV	2 (0.2)	2 (1.5)	0.134

Values in parentheses are percentages unless otherwise indicated.
SD, standard deviation

Table 3. Direction of Internal Opening of Type II Fistulas.

Direction	Men n = 796	Women n = 99	p-value
Posterior	491 (61.7)	56 (56.5)	0.325
Anterior	145 (18.2)	15 (15.2)	0.187
Left	98 (12.3)	13 (13.1)	0.815
Right	62 (7.8)	15 (15.2)	0.014

Values in parentheses are percentages.

including fistulotomy and OFS, and sphincter-sparing procedures, including open coring-out[20] and advancement flaps.

Endoanal ultrasonography records were reviewed for all cases except those with unclear findings/images and those with more than three months between the examination and surgery. The following two cases were reclassified as type IIT: 1) cases recorded as a transsphincteric fistula of the Parks classification rather than as a type IIL fistula and 2) cases recorded as deep type II with the fistula tract passing through the upper two-thirds of the EAS. The agreement between EAUS findings and intraoperative diagnosis in differentiating IIL and IIT was analyzed.

Statistical methods

All statistical analyses were performed using the EZR software (version 1.11; Saitama Medical Center, Jichi Medical University, Saitama, Japan). Categorical variables are reported as frequencies and percentages. Continuous variables are presented as means and standard deviations. Contingency tables were analyzed using chi-square tests. The distribution between groups was analyzed using the chi-square test or Fisher exact test, according to the sample size. The two-sided significance level was set at 5%. The Cohen kappa coefficient (κ) with a 95% confidence interval was used to measure the degree of agreement and was interpreted as follows: ≤0 as no agreement; 0.01-0.20, none to slight; 0.21-0.40, fair; 0.41-0.60, moderate; 0.61-0.80, substantial; and, 0.81-1.00, almost perfect agreement.

Table 4. Distribution of Subtypes of Type II Fistulas.

Subtypes	Men n = 796	Women n = 99	p-value
IIL	687 (86.3)	84 (84.8)	0.692
IIL+IIH	57 (7.2)	9 (9.1)	0.625
IIH	4 (0.5)	0	–
IIT	48 (6.0)	6 (6.1)	0.832

Values in parentheses are percentages.

Results

Between January 2014 and December 2023, 1,069 patients who underwent anal fistula surgery and met the eligibility criteria were included; their characteristics are summarized in Table 2. The mean age of the population was 44.3 years, and 87.4% were men. The Sumikoshi classification, based on intraoperative findings, showed that type II was the most common type in both men and women, whereas type I was significantly more common in women (Table 2). The most common direction of the primary opening was posterior in both men and women, followed by anterior (Table 3), and left-sided openings were more common than right-sided openings in men (12.3 vs. 7.8%, p = 0.003).

Type II cases were subclassified as IIL in 771 patients (86.1%); IIL+IIH, 66 (7.4%); IIH, 4 (0.4%); and, IIT, 54 (6.0%), with no sex differences in distribution (Table 4). A comparison of the clinical features of the IIT and non-IIT groups is shown in Table 5. No significant differences in age or sex were observed between the two groups. The direction of the primary opening was more commonly posterior (62.2%) in the non-IIT group, whereas it was more commonly anterolateral (55.6%) in the IIT group. The IIT group had a significantly higher proportion of patients with a primary opening on the right side than that in the non-IIT group (18.5 vs. 8.1%). A comparison of surgeries performed showed that more sphincter-sparing procedures were performed in the IIT group than those in the non-IIT group (37.0 vs. 3.7%). Sphincter-sparing procedures performed in the IIT group included open coring-out in 13 cases and advancement flaps in seven cases.

Table 6 shows a comparison of EAUS findings and intraoperative diagnoses for differentiating between types IIT and IIL. The results showed a moderate agreement between EAUS findings and intraoperative diagnosis, with a kappa value of 0.522 (95% CI: 0.367-0.676).

Discussion

In this retrospective review of 1,069 patients who had un-

Table 5. Comparison of Clinical Characteristics of Type IIT and Non-IIT Fistulas.

Variable	IIT n = 54	Non-IIT n = 841	p-value
Age, years, mean (SD)	44.5 (16.2)	43.1 (14.9)	0.502
Sex ratio, men/women	48/6	748/93	0.832
Direction of primary opening			
Posterior	24 (44.4)	523 (62.2)	0.010
Anterolateral	30 (55.6)	318 (37.8)	
Anterior	14 (25.9)	146 (17.4)	0.111
Left	6 (11.1)	104 (12.4)	0.953
Right	10 (18.5)	68 (8.1)	0.008
Treatment for anal fistulas			
Sphincter-cutting procedures	34 (63.0)	810 (96.3)	<0.001
Sphincter-sparing procedures	20 (37.0)	31 (3.7)	

Values in parentheses are percentages unless otherwise indicated.
SD, standard deviation

Table 6. Agreement between EAUS Findings and Intraoperative Diagnosis in Differentiating between Types IIT and IIL.

Intraoperative EAUS	Type IIT	Type IIL	Total
Type IIT	21	9	30
Type IIL	26	677	703
Total	47	686	733

EAUS, endoanal ultrasonography

dergone fistula surgery, 6.0% of type II cases were reclassified as type IIT, which corresponds to the uncomplicated transsphincteric fistulas of the Parks classification. The prevalence of type IIT fistulas was consistent with that reported in previous studies, and sphincter-sparing surgery was performed more frequently for fistulas reclassified as type IIT than for those not reclassified as type IIT.

The most important clinical difference between simple and complex fistulas is the depth at which the tract passes through the anal sphincters[1,9,10]. Anal fistulas have recently been classified as low and high fistulas[7,10,21]. Low fistulas usually include intersphincteric and low transsphincteric fistulas, whereas high fistulas include high transsphincteric and suprasphincteric fistulas[1,21]. The level of distinction between low and high fistulas has decreased over time as more emphasis has been placed on the prevention of fecal incontinence[9]. In the original Parks classification, a high transsphincteric fistula was defined as a fistula that passed through the EAS toward the high ischiorectal fossa[6]. Subsequently, a high transsphincteric fistula was defined as one that passes through the upper two-thirds of the EAS[21,22], and more recently, fistulas that involve >30% of the EAS have been treated as high transsphincteric fistulas[1,7].

The prevalence of high transsphincteric fistulas varies according to reports. Emile et al.[7] classified 710 surgically treated fistulas and found that transsphincteric fistulas were the most common (391, 55.1%); of these, 282 (39.7%) were high transsphincteric fistulas involving >30% of the EAS. Vo et al.[23] also classified 367 fistulas based on surgical findings; transsphincteric fistulas were the most common (263, 71.7%), of which 54 (14.7%) were categorized as high transsphincteric fistulas. Furthermore, Tantiphlachiva et al.[24] classified 339 surgically treated fistulas and found that transsphincteric fistulas were the most common (298, 87.9%), of which 204 (60.2%) were high transsphincteric fistulas. Thus, the prevalence of high transsphincteric fistulas ranged from 14.7-60.2%. However, half of the high transsphincteric fistulas classified by Tantiphlachiva et al.[24] were linear fistulas, and the other half were horseshoe fistulas. Therefore, these high transsphincteric fistulas may include ischiorectal fistulas of posterior deep space origin. In Japan, horseshoe fistulas are generally classified as type III; however, according to the Parks classification, they are categorized as transsphincteric with high ischiorectal extensions or suprasphincteric fistulas[25]. Van Onkelen et al.[21] examined the difference between high and low transsphincteric fistulas and reported that low transsphincteric fistulas are more common in women and younger patients and are predominantly located anteriorly.

Few studies have examined the prevalence of transsphincteric fistulas in Japan. Tanaka et al.[17] reviewed the endoanal ultrasound images of 886 patients who had undergone fistula surgery and reported that, of the 721 cases diagnosed as type II, 7.1% were reclassified as uncomplicated transsphincteric fistulas. The primary opening of the transsphincteric fistula was located posteriorly (55.6%) in more cases than anterolaterally (44.4%)[17]. Compared to the findings of Tanaka et al.[17], the prevalence of transsphincteric fistulas was similar, at 6.0% and 7.1% in our and Tanaka et al.'s studies, respectively. In contrast, our results showed that the direction of the primary opening was more anterolateral (55.6%) than posterior (44.4%). These results suggest that, unlike type III fistulas, which develop in the posterior deep space, type IIT may develop anterolaterally and posteriorly. Interestingly, more patients in the IIT group had the primary opening on the right side than those in the non-IIT group (18.5 vs. 8.1%, p = 0.008). On the contrary, more patients in the non-IIT group had the primary opening on the left side than those on the right side (12.4 vs. 8.1%, p = 0.004). Zhao et al.[13] categorized 115 anal fistulas based on MRI; the primary opening was more common on the left side (1-6 o'clock) than that on the right side (7-12 o'clock) (57.6% vs. 42.4%). Based on these results, it was inferred that low fistulas are more likely to develop on the left side because of the two main internal hemorrhoids on the right side. Conversely, primary infection on the right

side may tend to penetrate the EAS at a deeper level, since the deeper level is not affected by internal hemorrhoids. Asymmetry of the hemorrhoidal arteries branching from the superior rectal artery may also influence the left-right bias in fistula development. The mechanism of development of type IIT is unknown, but Seow-Choen et al.[26] reported that the majority of anal glands in healthy adults were located between the submucosa and the intersphincteric space, but 1% of anal glands penetrated the EAS.

Preoperative imaging is not always required for evaluating simple fistulas but is recommended for complex or recurrent fistulas[1]. Magnetic resonance imaging is considered the gold standard for the evaluation of anal fistulas because of its high soft tissue resolution and wide field of view[27]. Endoanal ultrasonography is also recommended by clinical guidelines as a useful tool for mapping the pathological anatomy of fistulas[1]. Endoanal ultrasonography is less expensive and more accessible than MRI, and is comparable to MRI in its ability to distinguish between simple and complex fistulas[27,28]. The agreement between EAUS findings and the intraoperative diagnosis ranges from 73% to 100%, with or without peroxide enhancement[1]. In this study, the agreement between EAUS findings and intraoperative diagnosis was lower than that reported in previous studies, with a kappa value of 0.522. One reason for this may be the lack of recognition of transsphincteric fistulas, as the Sumikoshi classification does not include them. Thus, the Parks classification may be more useful than the Sumikoshi classification in the diagnosis of transsphincteric fistulas. However, the Sumikoshi classification is more definitive and detailed in its classification of horseshoe fistulas. In other words, the Sumikoshi classification clearly categorizes ischiorectal fistulas arising from posterior deep space into types III, IIIU, and IIIB[5,14]. In contrast, the Parks classification simply includes “with high ischiorectal extensions” in the annotation for transsphincteric fistulas[16]. Since type III fistulas account for 10-20% of anal fistulas[5,11], the Sumikoshi classification, which includes type III as a major category, may be more useful in Japan.

The level of division of the EAS that can cause fecal incontinence is unclear, but it has been reported that EAS division >25% correlates with a higher fecal incontinence severity index score after fistulotomy[29]. Furthermore, fistulotomy for high transsphincteric fistulas significantly reduces the functional anal canal length and manometric squeeze pressure[30]. Therefore, clinical guidelines recommend sphincter-sparing procedures, such as advancement flaps or ligation of the intersphincteric fistula tract, for complex fistulas including high transsphincteric fistulas[1]. In a systematic review and meta-analysis of surgical interventions for high fistulas, the advancement flap was the most studied technique; however, the best surgical treatment could not be identified[31]. Healing rates after advancement flap range from 66% to 87%, and fecal incontinence has been reported in up to 35% of patients after advancement flaps, possibly because the flap may contain internal anal sphincter fibers to maintain blood flow[1]. Thus, we primary performed open coring-out as a sphincter-sparing surgery. This technique combined fistulotomy and coring-out to ensure eradication of the primary opening and primary focus while preserving the EAS[20]. In this study, 31 (57.4%) patients with type IIT underwent OFS, which combines fistulectomy and immediate sphincteroplasty. In recent systematic reviews and meta-analyses, the healing rate and worsening continence rate after fistulotomy/fistulectomy combined with immediate sphincteroplasty for complex or high fistulas ranged from 89-93.2% and 8-12.4%, respectively[32,33]. Unfortunately, the criteria for determining the level of acceptable EAS involvement for OFS and the extent to which sphincter-sparing procedures are necessary is unclear. Therefore, the optimal surgical technique based on fistula depth is an important issue to be explored in future comparative studies.

The limitations of this study include its retrospective, single-institution, observational design and the potential for selection bias. The strength of this study is that it classified anal fistulas in a larger number of cases than in previous studies. However, the number of type IIT cases was small, which may not fully elucidate the differences in characteristics between type IIT and non-IIT fistulas. Therefore, the pathogenesis of IIT must be confirmed by increasing the number of cases in future prospective studies.

In conclusion, type IIT is not rare, with a prevalence of 6-7%, and it should be treated as a complex fistula because of the large amount of EAS involvement. Although type IIT is unclassifiable according to the current Sumikoshi classification, it is clinically important, and its presence should be considered. The Sumikoshi classification has been used without any modification for more than half a century, but the addition of type IIT may be beneficial to surgeons for the accurate diagnosis and appropriate treatment of anal fistulas.

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Conflicts of Interest

There are no conflicts of interest.

Author Contributions

TA contributed to the concept and design and data acquisition and analysis and drafted and revised the manuscript; YT contributed to the concept and design and revised the manuscript; MK, YH, SO, KW, KO, YS, and MM contributed to data acquisition, revised the manuscript, and approved the final version.

Approval by Institutional Review Board (IRB)

This research was approved by the institutional review board of Kunimoto Hospital (approval code: K24-006).

Disclaimer

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References

1. Gaertner WB, Burgess PL, Davids JS, et al. The American Society of Colon and Rectal Surgeons clinical practice guidelines for the management of anorectal abscess, fistula-in-ano, and rectovaginal fistula. Dis Colon Rectum. 2022 Aug; 65(8): 964-85.
2. Yamana T. Japanese practice guidelines for anal disorders II. Anal fistula. J Anus Rectum Colon. 2018 Jul; 2(3): 103-9.
3. Bhat S, Xu W, Varghese C, et al. Efficacy of different surgical trea tments for management of anal fistula: a network meta-analysis. Tech Coloproctol. 2023 Oct; 27(10): 827-45.
4. An Y, Gao J, Xu J, et al. Efficacy and safety of 13 surgical techniques for the treatment of complex anal fistula, non-Crohn CAF: a systematic review and network meta-analysis. Int J Surg. 2024 Jan; 110(1): 441-52.
5. Sumikoshi Y, Kouzuki M, Noda Y, et al. The epidemiology and classification of anal fistula. J Jpn Soc Coloproctol. 1972 Mar; 25 (3): 177-84. Japanese.
6. Parks AG, Gordon PH, Hardcastle JD. A classification of fistula-in-ano. Br J Surg. 1976 Jan; 63(1): 1-12.
7. Emile SH, Elfeki H, El-Said M, et al. Modification of Parks classification of cryptoglandular anal fistula. Dis Colon Rectum. 2021 Apr; 64(4): 446-58.
8. Saito T, Takano M, Okada M, et al. Classification of fistulas. J Jpn Soc Coloproctol. 2013 Oct; 66(10): 991-8. Japanese.
9. Litta F, Parello A, Ferri L, et al. Simple fistula-in-ano: is it all simple? A systematic review. Tech Coloproctol. 2021 Apr; 25(4): 385-99.
10. Charalampopoulos A, Papakonstantinou D, Bagias G, et al. Surgery of simple and complex anal fistulae in adults: a review of the literature for optimal surgical outcomes. Cureus. 2023 Mar; 15(3): 0. e35888.
11. The Japan Society of Coloproctology. Clinical practice guidelines for anorectal disorder (hemorrhoids, anal fistulas, anal fissures) and rectal prolapses 2020. Tokyo: Nankodo; 2020. 32-6 p. Japanese.
12. Malouf AJ, Buchanan GN, Carapeti EA, et al. A prospective audit of fistula-in-ano at St. Mark's hospital. Colorectal Dis. 2002 Jan; 4 (1): 13-9.
13. Zhao WW, Yu J, Shu J, et al. Precise and comprehensive evaluation of perianal fistulas, classification and related complications using magnetic resonance imaging. Am J Transl Res. 2023 May; 15(5): 3674-85.
14. Kurihara H, Kanai T, Ishikawa T, et al. A new concept for the surgical anatomy of posterior deep complex fistulas: The posterior deep space and the septum of the ischiorectal fossa. Dis. Colon. Rectum. 2006 Oct; 49(10 Suppl): S37-44.
15. Araki Y, Kagawa R, Tomoi M, et al. Analysis of deep posterior anal fistulas by magnetic resonance imaging: site of primary abscess and extension patterns according to the primary abscess depth. J Anus Rectum Colon. 2018 Oct; 2(4): 130-8.
16. Parks AG, Stitz RW. The treatment of high fistula-in-ano. Dis Colon Rectum. 1976 Sep; 19(6): 487-99.
17. Tanaka Y, Kojima R, Ito I, et al. Examination of anal fistula types unclassifiable as low intersphincteric fistula-transsphincteric type-. Clin Proctol. 2012 Feb; 3(2): 70-7. Japanese.
18. Hachiro Y, Abe T, Kunimoto M, et al. Sphincter fixation after fistulectomy for low intersphincteric anal fistulas. J Jpn Soc Coloproctol. 2011 Aug; 64(8): 487-91. Japanese.
19. Abe T, Kunimoto M, Hachiro Y, et al. Open fistulectomy with sphincter fixation for anal fistula. Open J Gastroenterol. 2013 Jan; 3(4): 223-6.
20. Hongo Y, Kurokawa A, Nishi Y. Open coring-out (function-preserving) technique for low fistulas. Dis Colon Rectum. 1997 Oct; 40(10 Suppl): S104-6.
21. van Onkelen RS, Gosselink MP, van Rosmalen J, et al. Different characteristics of high and low transsphincteric fistulae. Colorectal Dis. 2014 Jun; 16(6): 471-5.
22. Garg P. Comparing existing classifications of fistula-in-Ano in 440 operated patients: is it time for a new classification? A retrospective cohort study. Int J Surg. 2017 Jun; 42: 34-40.
23. Vo D, Phan C, Nguyen L, et al. The role of magnetic resonance imaging in the preoperative evaluation of anal fistulas. Sci Rep. 2019 Nov; 9(1): 17947.
24. Tantiphlachiva K, Sahakitrungruang C, Pattanaarun J, et al. Effects of preoperative endoanal ultrasound on functional outcome after anal fistula surgery. BMJ Open Gastroenterol. 2019 Apr; 6(1): e000279.
25. Garg P. Assessing validity of existing fistula-in-ano classifications in a cohort of 848 operated and MRI-assessed anal fistula patients-Cohort study. Ann. Med. Surg. 2020 Sep; 59: 122-6.
26. Seow-Choen F, Ho JM. Histoanatomy of anal glands. Dis Colon Rectum. 1994 Dec; 37(12): 1215-8.
27. de Groof EJ, Cabral VN, Buskens CJ, et al. Systematic review of evidence and consensus on perianal fistula: an analysis of national and international guidelines. Colorectal Dis 2016 Apr; 18(4): O119-34.
28. Sahni VA, Ahmad R, Burling D. Which method is best for imaging of perianal fistula? Abdom Imaging. 2008 Jan-Feb; 33(1): 26-30.
29. Cavanaugh M, Hyman N, Osler T. Fecal incontinence severity index after fistulotomy: a predictor of quality of life. Dis Colon Rectum. 2002 Mar; 45(3): 349-53.
30. Toyonaga T, Matsushima M, Tanaka Y, et al. Non-sphincter splitting fistulectomy vs conventional fistulotomy for high transsphincteric fistula-in-ano: a prospective functional and manometric study. Int J Colorectal Dis. 2007 Sep; 22(9): 1097-102.
31. Göttgens KW, Smeets RR, Stassen LP, et al. Systematic review and meta-analysis of surgical interventions for high cryptoglandular perianal fistula. Int J Colorectal Dis. 2015 May; 30(5): 583-93.
32. Ratto C, Litta F, Donisi L, Parello A. Fistulotomy or fistulectomy and primary sphincteroplasty for anal fistula (FIPS): a systematic review. Tech Coloproctol. 2015 Jul; 19(7): 391-400.
33. Iqbal N, Dilke SM, Geldof J, et al. Is fistulotomy with immediate sphincter reconstruction (FISR) a sphincter preserving procedure for high anal fistula? A systematic review and meta-analysis. Colorectal Dis. 2021 Dec; 23(12): 3073-89.