Long-term outcomes after anal fistula surgery: results from two university hospitals in Thailand

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Purpose: This study aimed to evaluate long-term outcomes after anal fistula surgery from university hospitals in Thailand.
Methods: A prospectively collected database of patients with cryptoglandular anal fistula undergoing surgery from 2011 to 2017 in 2 university hospitals was reviewed. Outcomes were treatment failure (persistent or recurrent fistula), fecal continence status, and chronic postsurgical pain.
Results: This study included 247 patients; 178 (72.1%) with new anal fistula and 69 (27.9%) with recurrent fistula. One hundred twenty-one patients (49.0%) had complex fistula; 53 semi-horseshoe (21.5%), 41 high transsphincteric (16.6%), 24 horseshoe (9.7%), and 3 suprasphincteric (1.2%). Ligation of intersphincteric fistula tract (LIFT) was the most common operation performed (n = 88, 35.6%) followed by fistulotomy (n = 79, 32.0%). With a median follow-up of 23 months (interquartile range, 12–45 months), there were 18 persistent fistulas (7.3%) and 33 recurrent fistulae (13.4%)—accounting for 20.6% overall failure. All recurrence occurred within 24 months postoperatively. Complex fistula was the only significant predictor for recurrent fistula with a hazard ratio of 4.81 (95% confidence interval, 1.82–12.71). There was no significant difference in healing rates of complex fistulas among seton staged fistulotomy (85.0%), endorectal advancement flap (72.7%), and LIFT (65.9%) (P = 0.239). Four patients (1.6%) experienced chronic postsurgical pain. Seventeen patients (6.9%) reported worse fecal continence.
Conclusion: Overall failure for anal fistula surgery was 20.6%. Complex fistula was the only predictor for recurrent fistula. At least 2-year period of follow-up is suggested for detecting recurrent diseases and assessing patient-reported outcomes such as chronic pain and continence status.

Keywords: *Rectal fistula; Chronic pain; Treatment failure; Outcomes; Surgery*

INTRODUCTION

An anal fistula is one of the most common benign anal diseases requiring surgical intervention [1, 2]. Its pathogenesis is closely related to chronic bacterial infection of anal glands which is known as cryptoglandular infection [3]. The disease represents a

wide spectrum of complexity due to various degrees of anal sphincter complex involvement and its unpredictable or multiple tracts thus leading to a high rate of recurrent fistula or persistent (unhealed) fistula after surgery [4]. Ultimately, the goals of anal fistula surgery are to achieve complete healing of the fistula tract by means of closure or removal of the tract and, more importantly, to preserve anal sphincter function. Although sphincter-preserving operations including ligation of intersphincteric fistula tract (LIFT) have gained popularity in the last decade [5], the best surgery for anal fistula remains inconclusive because no single procedure is entirely effective.

Since the results of anal fistula surgery require a long period of follow-up to determine both clinical outcomes (i.e., recurrent rate and pattern of recurrence) and patient-reported outcomes (i.e., fecal continence status and chronic postsurgical pain), there are a relatively limited number of large studies (more than 200 cases)

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examining these long-term outcomes [4, 6-8]. Moreover, to the best of our knowledge, no such large-scale studies reported these results in a comprehensive manner. The aim of this study was therefore to evaluate long-term clinical and patient-reported outcomes after anal fistula surgery from 2 large referral university hospitals in Thailand. Factors influencing recurrent fistula were also determined.

METHODS

Patients
This study has been approved by the Institutional Ethics Committee of Faculty of Medicine Siriraj Hospital (No. Si 752/2017) and Faculty of Medicine, Khon Kaen University (No. HE621468) with a waiver for informed consent. A prospectively collected database of patients with cryptoglandular anal fistula undergoing curative-intent surgery from January 2011 to November 2017 by 2 Thai board-certified colorectal surgeons in 2 large university hospitals (Faculty of Medicine Siriraj Hospital, Mahidol University in Bangkok and Srinagarind Hospital, Khon Kaen University in Khon Kaen) was reviewed. Patients with tuberculosis-associated anal fistula, Crohn-related fistula, and fistula with malignant transformation were excluded. Patients who had never attended the follow-up clinic and cannot be contacted by all means were also excluded.

Fistula classification and surgery
The type of anal fistulas was classified based on their relationship to the anal sphincter complex determined by intraoperative findings in conjunction with preoperative radiological imaging (if any) as intersphincteric, transsphincteric, suprasphincteric, extrasphincteric, and semi-horseshoe or horseshoe fistula. They were then divided into 2 groups based on the American Society of Colon and Rectal Surgeon practical parameters for the management of anal fistula as 'simple' fistula (consisting of intersphincteric fistula and low transsphincteric fistula) and 'complex' fistula (defined as transsphincteric fistulas involving more than 30% of the external sphincter, suprasphincteric, extrasphincteric, and semi-horseshoe or horseshoe fistulas) [9]. If the patients had more than 1 fistula tracts, the most complex type of fistula was used as a representative in such patients.

Patients were operated on by a board-certified colorectal surgeon—mostly with patients in a prone position. Preoperative intravenous antibiotics covering gram-negative bacilli and anaerobic bacteria were given only to patients with complex types of anal fistula. Depending on the planned operation and patient's preference, operations were performed under 1 of the following anesthetic techniques; perianal block (with or without total intravenous sedation), spinal anesthesia, or general anesthesia. Fistulotomy (with or without marsupialization) and fistulectomy were usually performed for 'simple' fistula whereas operations for 'complex' fistula including seton staged fistulotomy, LIFT, and en-

dorectal advancement flap (ERAF) was determined by the anatomy or complexity of anal fistula, continence status of the patient, type of previous surgery (if any), and agreement between patient and surgeon. Standard postoperative care was provided to every patient including opioid-sparing multimodal analgesia and laxatives [2]. Patients receiving perianal block may not require hospitalization whereas those subjected to the other anesthetic techniques were routinely admitted 1 or 2 days after surgery. If the patients underwent more than 1 operation at the same time, the main operation (especially for complex fistula) was used as a representative in such patients.

Primary outcome and data collection
Primary outcomes were the rate of treatment failure—which included persistent and recurrent fistula. The persistent fistula was defined as unhealed fistula after surgery. Recurrence was defined as a fistula that recurred after clinically complete healing or full epithelization of wound or external opening of the fistula [7]. Factors influencing recurrent fistula were also determined. Secondary outcomes included changes in fecal continence status after surgery and the rate of chronic postsurgical pain. Fecal continence status was evaluated using Wexner score [10]. Chronic postsurgical pain was defined as pain lasting more than 3 months after an operation without other etiology of pain such as acute or chronic abscess formation [11].

During an index operation, demographic data and operative details were noted. Patients' demographics included were age, sex, onset of the disease, previous treatment, and preoperative imaging (if any). Notably, preoperative radiological studies of anal fistula may or may not be performed at the discretion of surgeons. Operative details included fistula type, the number of primary fistula tract, operative time, and correspondence to the Goodsall's rule (as if the external opening of a fistula is located in the posterior half of the anus, its tract will follow a curved course to the posterior midline of the anal canal; whereas if the opening is located in the anterior half of the anus, its tract will follow a straight radial course to the dentate line) [12].

Follow-up protocol
Patients would visit a follow-up clinic every 4 to 8 weeks after an operation until the fistula clinically healed. Thereafter they were advised to visit the clinic every 6 to 12 months or when having any symptoms suggestive of recurrence. Patient-reported outcomes (fecal continence status and chronic postsurgical pain) were also assessed during the follow-up. For those missing the follow-up schedule, a telephone interview or telemedicine was utilized.

Statistical analysis
Stata ver. 13.1 (Stata Corp., College Station, TX, USA) was used for statistical analysis. Continuous data were reported as mean ± standard deviation or median (interquartile range, IQR). Categor-

ical data were described in number (percentage). Kaplan-Meier survival analysis was utilized to plot survival curve. The univariate relation between each variable and recurrent fistula was analyzed by binary logistic regression. Factors potentially associated with recurrent fistula (P < 0.2) in the univariate analysis were included in a multivariate model of logistic regression. Hazard ratio (HR) was presented as number (95% confidence interval [CI]). A P-value of < 0.05 was considered statistically significant.

RESULTS

Study population
During the period of study, 257 anal fistula surgeries were performed by the 2 colorectal surgeons in 2 university hospitals. According to our exclusion criteria, 10 patients were excluded: 3 with tuberculosis-associated anal fistula, 2 with adenocarcinoma arising in anal fistula, 1 with Crohn-related fistula, and 4 with no follow-up data. Finally, 247 patients with cryptoglandular anal fistula were included and their clinical characteristics are summarized in Table 1.

Characteristics of anal fistula
Sixty-nine patients (27.9%) underwent surgery for recurrent fistula following previous surgery elsewhere. The others (72.1%) had a new diagnosis of anal fistula and underwent surgery in our institutes. Preoperative radiological studies of anal fistula were performed in 180 patients (72.9%) including hydrogen peroxide-enhanced 3-dimensional endoanal ultrasonography (3D-EAUS) and magnetic resonance imaging (MRI) of anal fistula (Table 1).

Most patients (n = 204, 82.6%) had a single primary tract, but 30 (12.1%) had 2 primary fistula tracts and 13 (5.3%) had more than 2 tracts. Totally, 174 fistulas (70.4%) followed the Goodsall's rule. The most common type of anal fistulas was low transsphincteric

Table 1. Clinical characteristics of 247 studied patients

Characteristic	Data
Age (yr)	43 ± 13
Male sex	195 (78.9)
Body mass index (kg/m²)	25.8 ± 5.3
Patient with recurrent fistula	69 (27.9)
Duration of symptoms indicating fistula (mo)	8 (3–12)
Preoperative imaging of anal fistula	
None	92 (37.2)
3D-EAUS	116 (47.0)
MRI of anal fistula	15 (6.1)
Both 3D-EAUS and MRI	24 (9.7)

Values are presented as mean ± standard deviation, number (%), or median (interquartile range).
3D-EAUS, 3-dimensional endoanal ultrasonography; MRI, magnetic resonance imaging.

(n = 104, 42.1%), followed by semi-horseshoe (n = 53, 21.5%), high transsphincteric (n = 41, 16.6%), and horseshoe (n = 24, 9.7%). Intersphincteric fistula and suprasphincteric fistula were found in 22 patients (8.9%) and 3 patients (1.2%), respectively. Accordingly, 121 patients (49.0%) were subjected to the group of complex anal fistula (Fig. 1).
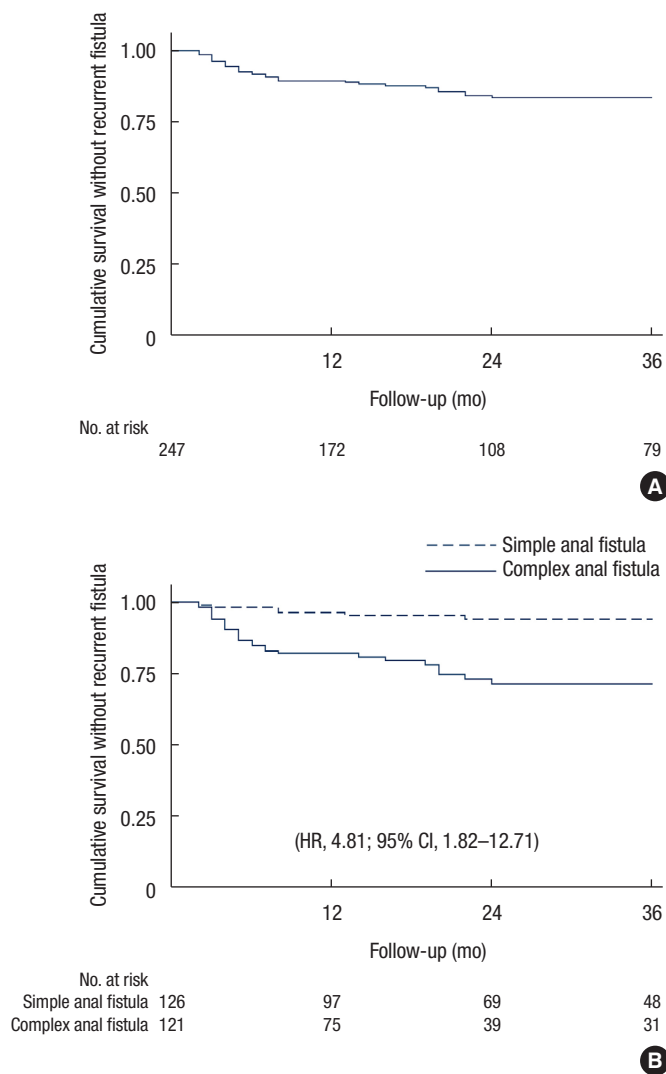
Details of operation
Operations were performed under spinal anesthesia in 155 cases (62.8%), followed by perianal block with or without total intravenous anesthesia in 83 cases (33.6%) and general anesthesia in 9 cases (3.6%). LIFT was the most common operation performed (n = 88, 35.6%) followed by fistulotomy (n = 79, 32.0%), fistulectomy (n = 39, 15.8%), seton staged fistulotomy (n = 20, 8.1%), and ERAF (n = 11, 4.5%). Collectively, sphincter-preserving operations were performed in 109 patients (44.1%). Median operative time was 40 minutes (IQR, 25–60 minutes). Median length of hospitalization was 1 day (IQR, 1–2 days). Notably, 16 patients (6.5%) had a day-case surgery.

Surgical outcomes
With a median follow-up time of 23 months (IQR, 12–45 months), there were 18 (7.3%) persistent unhealed fistula and 33 (13.4%) recurrent fistula—accounting for the overall failure rate of 20.6%. All recurrent fistulas clinically presented 24 months after an operation (Fig. 2A). The rates of treatment failure in each operation classified by the subtypes of an anal fistula are shown in Table 2. Notably, there was no significant difference in the rate of
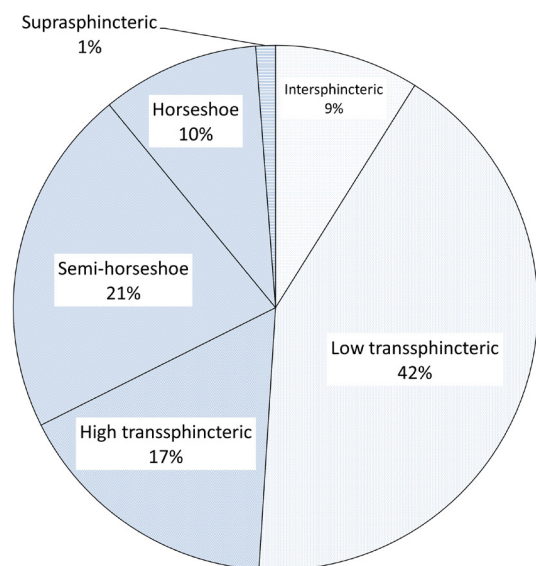
Fig. 1. Type of anal fistulas classified by their relationship to the anal sphincter complex. Intersphincteric fistula and low transsphincteric fistula were further grouped as 'simple' fistula (light blue background) whereas the others were grouped as 'complex' fistula (blue background).

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Fig. 2. Cumulative survivals without recurrent fistula. (A) All fistulas and (B) between the simple and complex type of anal fistula. HR, hazard ratio; CI, confidence interval.

Table 2. Failure rate of each operation classified by anal fistula subtype

Fistula type[a] & operation[b]	Case	Failure[c]	P-value
Intersphincteric	22	1 (4.5)	0.484
Fistulotomy	15	1 (6.7)	
Fistulectomy	7	0 (0)	
Low transsphincteric	104	7 (6.7)	0.317
Fistulotomy	59	3 (5.1)	
Fistulectomy	25	1 (4.0)	
LIFT	18	3 (16.7)	
Other	2	0 (0)	
High transsphincteric	41	12 (29.3)	0.43
Fistulotomy	1	0 (0)	
Fistulectomy	3	1 (33.3)	
Seton	9	1 (11.1)	
LIFT	19	7 (36.8)	
ERAF	8	2 (25.0)	
Other	1	1 (100)	
Semi-horseshoe	53	19 (35.8)	0.168
Fistulotomy	1	0 (0)	
Fistulectomy	2	2 (100)	
Seton	6	0 (0)	
LIFT	39	15 (38.5)	
ERAF	2	1 (50.0)	
Other	3	1 (33.3)	
Horseshoe	24	10 (41.7)	0.224
Fistulotomy	3	1 (33.3)	
Fistulectomy	2	0 (0)	
Seton	4	1 (25.0)	
LIFT	11	5 (45.5)	
ERAF	1	0 (0)	
Other	3	3 (100)	

Values are presented as number only or number (%).
LIFT, ligation of intersphincteric fistula tract; seton, seton staged fistulotomy; ERAF, endorectal advancement flap.
[a]Intersphincteric fistula and low transsphincteric were classified as 'simple' fistula, and the others were classified as 'complex' fistula. [b]Fistulotomy with marsupialization was grouped as fistulotomy. Other procedures included core-out distal fistulectomy, simple closure of the internal opening, and video-assisted anal fistula treatment. [c]Failure cases included persistent fistula and recurrent fistula.

treatment failure among various operations within the same fistula subtype. Collectively, treatment failure was found in 8 out of 126 simple fistula (6.3%) and 43 out of 121 complex fistula (35.5%) (odds ratio, 7.99; 95% CI, 3.44–20.60; P < 0.001). For complex fistula, the rates of complete healing without any recurrence were not significantly different among seton staged fistulotomy (85.0%, 17 out of 20 cases), ERAF (72.7%, 8 out of 11 cases), and LIFT (65.9%, 58 out of 88 cases) (P = 0.239). Preoperative imaging modality was not significantly associated with the rates of treatment failure (P = 0.134) (Table 3).

Regarding patient-reported outcomes, 17 patients (6.9%) experienced worse continence score after surgery (median Wexner's score change of 3; range, 1–8). Details of patients with worse postoperative incontinence score and their association with anal fistula type and operative methods are summarized in Table 4 and Table 5, respectively. Four patients (1.6%) reported chronic pain lasting up to 6 months after the operation but the severity of pain was quite mild (average numerical pain scale, 2 out of 10) and can be controlled by oral analgesia. Characteristics of these 4 patients were following; 1 with semi-horseshoe fistula undergoing ERAF,

Table 3. Comparison between preoperative imaging study and treatment failure

Variable	Case	Failure
No preoperative imaging	92	20 (21.7)
EAUS only	116	19 (16.4)
MRI anal fistula only	15	3 (20.0)
Both EAUS and MRI	24	9 (37.5)
Total	247	51 (20.6)

Values are presented as number only or number (%).
EAUS, endoanal ultrasonography; MRI, magnetic resonance imaging.
P = 0.134.

Table 4. Anal fistula type and postoperative fecal incontinence

Fistula type	Case	Incontinence case	Wexner's score change in affected cases
Intersphincteric	22	1 (4.5)	3.0 ± 0
Low transsphincteric	104	7 (6.7)	3.4 ± 2.2
High transsphincteric	41	2 (4.9)	3.0 ± 1.4
Semi-horseshoe	53	2 (3.8)	3.0 ± 1.0
Horseshoe	24	4 (16.7)	2.5 ± 1.0
Suprasphincteric	3	1 (33.3)	2.0 ± 0
Total	247	17 (6.7)	3.0 ± 1.6

Values are presented as number only, number (%), or mean ± standard deviation.
P = 0.584.

1 with semi-horseshoe fistula undergoing fistulectomy, and 2 with high transphincteric fistula undergoing seton staged fistulotomy.

Factors influencing recurrent fistula

In the univariate analysis, complex anal fistula, initial recurrence status, and operative time more than 45 minutes were 3 significant factors for recurrent disease. However, in the multivariate analysis, the complex anal fistula was the only independent factor for recurrent fistula (HR, 4.81; 95% CI, 1.82–12.71) (Table 6, Fig. 2B).

DISCUSSION

This study of 247 patients with cryptoglandular anal fistula (27.9% recurrent fistula and 49.0% complex type) demonstrated that sphincter-preserving operations including LIFT and ERAF were utilized in 44.1% of patients in this cohort. With a median follow-up of nearly 2 years, the overall rate of treatment failure was approximately 21%; mainly from recurrent diseases. Notably, all recurrent fistulas occurred within 24 months postoperatively. In this study, we divided treatment failure into the persistent fistula and recurrent fistula because they are different entities. The former is mainly related to incomplete removal or closure of the primary fistula tract or its internal opening whereas the latter can be

Table 5. Comparison between operation methods (n=247) and worse postoperative fecal incontinence (n=17)

Operation (n = 247)	Case	Patients with worse incontinence	P-value
In individual			0.309
Fistulotomy	79	4 (5.1)	
Fistulectomy	39	3 (7.7)	
Seton	20	3 (15.0)	
LIFT	88	4 (4.5)	
ERAF	11	1 (9.1)	
Others[a]	10	2 (20.0)	
In group			0.799
Sphincter-cutting operation	138	10 (7.2)	
Sphincter-preserving operation	109	7 (6.4)	

Values are presented as number only or number (%).
Seton, seton staged fistulotomy; LIFT, ligation of intersphincteric fistula tract; ERAF, endorectal advancement flap.
[a]Other procedures included core-out distal fistulectomy, simple closure of the internal opening, and video-assisted anal fistula treatment.

caused by several surgical and disease-related factors [13, 14]. In addition to more likelihoods of overall failure, complex anal fistula was the only significant predictor for recurrent fistula. Interestingly, seton staged fistulotomy, ERAF and LIFT had a comparable rate of healing in complex fistula surgery. Last but not least, functional disability after fistula surgery exists even in the hands of a proctologist with a 6.9% rate of worse continence score and 1.6% rate of chronic postsurgical pain.

This real-world data indicated that about half of cryptoglandular anal fistulas presented in daily practice were classified as complex fistula, which was an independent risk factor for recurrent disease. Our findings were consistent with 2 recent reviews of factors associated with recurrent anal fistula [13, 15], in which complex fistula including a high position of fistula tract (high transsphincteric and suprasphincteric fistula) and curved fistula (semi-horseshoe and horseshoe fistula) were strong predictors for recurrence. Some investigators also suggested that recurrent fistulas were more likely to unhealed or recurrent than newly-forming anal fistulas [13]. However, initial recurrent status was associated with disease recurrence in our univariate analysis but not multivariate analysis. Our results also indicated that the success rate of anal fistula surgery should be evaluated at least on postoperative year 2 because some recurrent fistula clinically presented at the late stage but not over 24 months after an operation in our study.

It is known that preoperative radiological imaging could help delineating and defining the course of anal fistula, especially recurrent or complex ones, which could lead to more appropriate surgical decisions and better outcomes. In our study, preoperative radiological imaging was performed in about 3-quarters of the studied patients. As shown in this study, hydrogen peroxide-en-

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Table 6. Factors influencing disease recurrence

Variable	Recurrence/total case (%)	Univariate analysis		Multivariate analysis	
		HR (95% CI)	P-value	HR (95% CI)	P-value
Age (yr)					
<50	22/171 (12.9)	Ref.			
≥50	11/76 (14.5)	1.03 (0.49–2.17)	0.930		
Sex					
Female	4/51 (7.8)	Ref.			
Male	29/196 (14.8)	2.24 (0.78–6.37)	0.120	1.76 (0.61–5.10)	0.290
Body mass index (kg/m^2)					
<25	12/120 (10.0)	Ref.			
≥25	21/127 (16.5)	1.65 (0.81–3.35)	0.160	1.60 (0.78–3.27)	0.190
Fistula onset (mo)					
<12	17/141 (12.1)	Ref.			
≥12	16/106 (15.1)	1.34 (0.67–2.65)	0.390		
Initial recurrence					
No	19/178 (10.7)	Ref.			
Yes	14/69 (20.3)	2.16 (1.08–4.32)	0.024*	1.32 (0.64–2.72)	0.450
Complex anal fistula					
No	6/126 (4.8)	Ref.			0.002*
Yes	27/121 (22.3)	6.10 (2.52–14.8)	<0.001*	4.81 (1.82–12.7)	
No. of primary tract					
1	27/205 (13.2)	Ref.			
>1	6/42 (14.2)	1.16 (0.48–2.8)	0.740		
Corresponding to Goodsall					
No	12/73 (16.4)	Ref.			
Yes	21/174 (12.1)	0.62 (0.31–1.26)	0.180	0.77 (0.38–1.60)	0.490
Operative time (min)					
<45	12/142 (8.5)	Ref.			
≥45	21/105 (20.0)	2.70 (1.33–5.48)	0.004*	1.09 (0.49–2.43)	0.820

HR, hazard ratio; CI, confidence interval.
*P<0.05.

hanced 3D-EAUS was used more frequently than MRI of anal fistula in Thailand because it is cheaper and more available as an office-based investigation. Also, it was evident that both modalities had comparable sensitivity (about 87%) to detect anal fistula although MRI had a higher specificity [16]. Notably, our analysis did not find an association between preoperative imaging modality and the failure rates of fistula surgery.

This study demonstrated that 17.4% of patients had 2 or more primary fistula tract but multiple tracts were not a risk factor for recurrence. It is worth noting that only 70.4% of the fistula tracts followed Goodsall's rule [12]. Recently, the predictive value of Goodsall's rule has been challenged because it was shown to be accurate only when applied to simple fistula (intersphincteric or low transsphincteric fistula) where its accuracy was less than 70% in complex fistulas [17, 18].

Complex anal fistula remains a challenging problem for colorectal surgeons as noted with a complete healing rate of 64.2% in this study. The healing rates of complex fistulas in our study were comparable among seton staged fistulotomy (85.0%), ERAF (72.7%), and LIFT (65.9%). Although there is no direct comparison of clinical effectiveness among these 3 procedures in the literature, seton staged fistulotomy appeared to have the highest rate of complex fistula healing followed by ERAF and LIFT [19-21], which was also demonstrated in this study. However, staged fistulotomy may have more adverse effects on anal sphincter function than the other 2 sphincter-preserving procedures (ERAF and

LIFT) [6, 20]. Since there is a lack of high-quality study determining the best or standard procedure for complex anal fistula [22], operative techniques will mainly depend on the anatomy of fistula and surgeon expertise—with may require a stepwise approach with preferential choices of sphincter-preserving operations [21] or perform multiple procedures at the same time [7].

Apart from clinical outcomes, patient-reported outcomes gain more interests in surgical practice because it affects patient's quality of life [23, 24]. In the case of anal fistula surgery, 2 main patient-reported outcomes were fecal continence status and chronic postsurgical pain. Unfortunately, both of these functional outcomes (especially chronic pain after anal surgery) have been hardly mentioned in a comprehensive manner in the literature [25]. In this study, 6.9% of studied patients experienced worse postoperative continence scores (median Wexner's score change of 3) and 1.6% had chronic postsurgical pain. The incidence of new-onset fecal incontinence after fistula surgery is various in the literature ranging from 8% to 52% depending on fistula characteristics, surgical technique, and measurement tool [25]. Patients with simple fistula and those having sphincter-preserving operations were reported to have a lower risk of fecal incontinence than their counterparts [14, 24]. However, our analysis did not find a significant difference in the incidences of fecal incontinence among various surgical procedures or among different subtypes of anal fistula.

Since chronic pain after fistula surgery is not well studied or described, its incidence is largely unknown but it can be disturbing for patients. In this study, 1.6% of studied patients reported chronic anal pain beyond 3 months after operation without identified etiology of pain. Their chronic postsurgical pain was mild and controllable with oral analgesia. It lasted up to 6 months postoperatively. The causes of chronic pain after fistula surgery could include occult infection, nonhealing fistula, trauma to the anal sphincter complex, and peripheral nerve injury. The possibility of chronic postsurgical pain highlights the importance of meticulous techniques and proper anatomical knowledge in anal fistula surgery.

Fundamentally, this large-scale study showed comprehensive clinical and patient-reported outcomes after anal fistula surgery with a sufficient period of follow-up. However, there are some limitations that should be acknowledged. First, this study was conducted in 2 referral tertiary university hospitals, and all operations were performed by colorectal surgeons. Hence, fistula characteristics may be different from those seen in primary and secondary hospitals so are the outcomes performed by non-proctologists. In fact, some investigators suggested that colorectal surgeons tended to perform sphincter-preserving operations and had fewer recurrences than general surgeons [26]. Second, this study included only cryptoglandular anal fistulas. Therefore, surgical techniques and their results (both clinical and patient-reported outcomes) may be different for fistula related to Crohn disease and tuberculosis. It is well known that patients with non-cryptoglandular fistulas are more difficult and complicated to treat due to more complexity of fistula characteristic and the possibility of rectal involvement or extensive perineal involvement [27]. Third, 37.2% of studied patients were classified without any preoperative imaging study which may mistake the classification of anal fistula and possibly lead to a bias. Last, we did not perform any incontinence tests (e.g., manometry) other than Wexner's clinical score.

In conclusion, this prospective audit showed a high proportion of complex fistula and sphincter-preserving operations seen in 2 university hospitals in Thailand. Despite satisfactory outcomes in the vast majority of studied patients, there were 20.6% treatment failure, 6.9% worse postoperative continence, and 1.6% chronic postoperative pain. The complex fistula was a strong predictor for recurrent fistula which eventually presented within 24 months after surgery. Hence, at least a 2-year period of follow-up is suggested for detecting any recurrence and measuring functional outcomes, which included fecal continence status and chronic postsurgical pain. The patient-reported outcomes should routinely be evaluated together with other clinical outcomes. These findings could also outline the information for counseling patients about potential outcomes and adverse effects before they anticipate surgery for anal fistula.

CONFLICT OF INTEREST

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