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ORIGINAL CONTRIBUTIONS

# Anal Fistula Surgery

## Factors Associated with Recurrence and Incontinence

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**PURPOSE:** This study was undertaken to assess results of surgery for fistula-in-ano and identify risk factors for fistula recurrence and impaired continence. **METHODS:** We reviewed the records of 624 patients who underwent surgery for fistula-in-ano between 1988 and 1992. Follow-up was by mailed questionnaire, with 375 patients (60 percent) responding. Mean follow-up was 29 months. Fistulas were intersphincteric in 180 patients, transsphincteric in 108, suprasphincteric in 6, extrasphincteric in 6, and unclassified in 75. Procedures included fistulotomy and marsupialization (n = 300), seton placement (n = 63), endorectal advancement flap (n = 3), and other (n = 9). Factors associated with recurrence and incontinence were analyzed by univariate and multivariate regression analysis. **RESULTS:** The fistula recurred in 31 patients (8 percent), and 45 percent complained of some degree of postoperative incontinence. Factors associated with recurrence included complex type of fistula, horseshoe extension, lack of identification or lateral location of the internal fistulous opening, previous fistula surgery, and the surgeon performing the procedure. Incontinence was associated with female sex, high anal fistula, type of surgery, and previous fistula surgery. **CONCLUSIONS:** Surgical treatment of fistula-in-ano is associated with a significant risk of recurrence and a high risk of impaired continence. Degree of risk varies with identifiable factors. [Key words: Fistulo-in-ano; Fistulotomy; Anal fistula; Functional results; Recurrence; Incontinence; Seton]

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The goal of surgical treatment of fistula-in-ano is the permanent eradication of the suppurative process without compromising anal continence. There are few controlled studies on the surgical management of fistula-in-ano; therefore, factors associated with recurrence and incontinence have not been critically assessed. Furthermore, results from most retrospective studies are usually limited by short follow-up. To identify factors associated with recurrence and incontinence, we have reviewed our recent experience on surgical management of fistula-in-ano.

### PATIENTS AND METHODS

We searched our billing computer file for patients submitted to surgical treatment for fistula-in-ano at the University of Minnesota and affiliated hospitals from January 1988 to December 1992. Data related to anatomy of the fistula and its surgical treatment were obtained retrospectively by reviewing charts and operative reports. We selected only patients with chronic fistula of cryptoglandular origin. All had a history of previous perianal suppuration drained either surgically or spontaneously. Patients with superficial fistula associated with fissure, inflammatory bowel disease, hematologic malignancy, and preoperative incontinence and those who underwent primary fistulotomy at time of draining the abscess were not included.

A total of 624 patients met the criteria for inclusion in the study. Information regarding fistula recurrence

and postoperative incontinence was investigated by a mailed questionnaire. Questionnaire was sent a second time to those who did not respond within two months of initial mailing. Any noticeable difficulty in controlling flatus, soiling of underwear, or accidental bowel movements that persisted for more than one month after the operation were considered to represent incontinence.

Three hundred seventy-five patients (60 percent) returned their questionnaire and represent the basis of this study. Average age of patients was 48 years, and 71 percent of patients were males. Average follow-up was 29 (range, 2-70) months.

All patients were examined under local, regional, or general anesthesia in the prone jack-knife position. Fistulas were classified at time of surgery according to the criteria of Parks *et al.*<sup>1</sup> Fistulas were intersphincteric in 180 patients (48 percent), transsphincteric in 108 (29 percent), and suprasphincteric and extrasphincteric in 6 (2 percent) patients each. In 75 operative reports (20 percent), type of fistula was not specified by the operating surgeon. We included these unclassified fistulas in a separate group for statistical analysis because we thought that lack of classification may have some influence on recurrence rate or incidence of postoperative incontinence.

Three hundred patients (80 percent) were treated by fistulotomy and marsupialization as previously described.<sup>2</sup> Seton placement with subsequent muscle division was used in 51 patients (14 percent), whereas a cutting seton was used in 12 (3 percent).<sup>3</sup> Twelve patients each were treated by anorectal advancement flap, core out of the fistulous track, or other techniques.<sup>4,5</sup> Statistical analysis was performed by chi-squared test and multivariate regression analysis.

## RESULTS

### Recurrence

The fistula recurred in 31 patients (8 percent; Table 1). Rate of recurrence increased with complexity of the fistula. It was 4 percent for intersphincteric fistula, 7 percent for transsphincteric fistula, and 33 percent for suprasphincteric and extrasphincteric fistulas. Fistulas not classified by the surgeon at time of procedure had a recurrence rate that was significantly higher than recurrence rate of the entire group (Table 1). These differences were statistically significant ( $P < 0.01$ ; Table 2).

In most patients, the internal fistula opening was easily identified by inspection and palpation of the

**Table 1.**  
Recurrence After Fistula Surgery

	No.	Recurrence (%)
Type of fistula		
Intersphincteric	8/180	4
Transsphincteric	7/108	7
Suprasphincteric	2/6	33
Extrasphincteric	2/6	33
Unclassified	12/75	16
Internal opening		
Identified	22/328	7
Unidentified	9/16	56
Location of internal opening		
Lateral	8/61	13
Midline anterior	9/146	6
Midline posterior	9/146	6
Horseshoe extension		
Yes	7/37	19
No	23/306	7
Treatment		
Fistulotomy and marsupialization	21/299	7
Seton and fistulotomy	5/51	10
Cutting seton	1/12	8
Other	4/12	33
Previous operations		
Yes	5/31	16
No	26/334	8
Surgeon		
1	5/37	14
2	0/27	0
3	1/31	3
4	2/41	5
5	1/5	20
6	3/56	5
7	3/17	18
8	2/18	11
9	6/28	21
10	0/21	0
11	4/56	7
12	1/6	17
13	3/23	13
Entire group	31/375	8

anal canal and probing of the track. However, in some cases, the internal opening could not be found even after introducing hydrogen peroxide or other marking agents through the external orifice or by opening of track and following the granulation tissue. Risk of fistula recurrence was greater than 50 percent when the internal fistula opening could not be identified (Table 1). The difference in fistula recurrence between patients with identified and unidentified internal openings was statistically significant ( $P < 0.01$ ; Table 2).

Fistulas with lateral location of the internal opening

**Table 2.**  
Factors Associated with Recurrence After Surgical Treatment of Fistula-In-Ano

Univariate analysis	
Internal opening identification	$P < 0.01$
Fistula type	$P < 0.01$
Horseshoe extension	$P = 0.04$
Location of internal opening	$P = 0.05$
Treatment	NS
Previous fistula surgery	NS
Surgeon	NS
Multivariate analysis*	
Horseshoe extension	0.56
Fistula type	0.49
Surgeon	0.45
Location of the internal opening	0.37
Previous fistula surgery	0.33

NS = not significant.

\* Correlation coefficient regression values greater than 0.3 were considered very strong.

were associated with a recurrence rate (13 percent) that was more than twice the recurrence rate of fistulas with an internal opening located in the midline, either anteriorly (6 percent) or posteriorly (6 percent; Table 1). These differences were statistically significant ( $P = 0.05$ ; Table 2). Fistulas with horseshoe extension were more likely to recur than fistulas without (19 *vs.* 7 percent; Table 1). This difference was also statistically significant ( $P = 0.04$ ; Table 2).

Type of surgical treatment had a minor influence on fistula recurrence (Table 1). Recurrence rates were almost identical after fistulotomy and marsupialization (7 percent), seton placement with subsequent muscle division (10 percent), and cutting seton fistulotomy (8 percent). Differences among these groups were not statistically significant by univariate analysis (Table 2). Comparisons among other types of treatment (anorectal advancement flap, Parks fistulotomy, core-out of the fistula track) were impossible given the small number of patients in each group. The fistula was more likely to recur among the 31 patients who had previously undergone surgery for fistula-in-ano (16 *vs.* 8 percent), but the difference was not statistically significant by univariate analysis (Table 2).

Procedures were performed by 13 colorectal surgeons at different stages in their careers. We found a wide variation in the rate of fistula recurrence among surgeons who were performing the procedures (Table 1). However, these differences were not statistically significant by univariate analysis (Table 2).

In Table 2, we list factors associated with recurrence in multivariate analysis using correlation coef-

ficient regression. Factors with values greater than 0.3 were considered very strongly associated with recurrence. Horseshoe extension, complex type of fistula, and lateral location of internal opening, all of which were associated with recurrence in univariate analysis, remained associated with recurrence in multivariate analysis. The surgeon performing the procedure and previous fistula surgery, not significantly associated with recurrence in univariate analysis, became important factors in multivariate analysis. Surprisingly, lack of identification of internal opening, strongly associated with recurrence of the fistula in univariate analysis, was not a predictor of recurrence in multivariate analysis.

## Incontinence

More than 45 percent of patients complained of some degree of change in their continence status after fistula surgery (Table 3). Most patients complained of staining underclothing (32 percent) and difficulty holding gas (31 percent), but 13 percent of patients had accidental bowel movements (Fig. 1).

As expected, incontinence after surgical treatment of fistula-in-ano increased with the complexity of the fistula, being lowest for intersphincteric fistula (37 percent) and highest for extrasphincteric fistula (83 percent; Table 3). These differences were statistically significant ( $P < 0.01$ ; Table 4). Female sex was strongly associated with incontinence after fistula surgery (Table 3). Sixty-six of 104 females (64 percent) *vs.* 102 of 261 males (39 percent) complained of changes in their continence status after fistula surgery. This difference was statistically significant in univariate analysis ( $P < 0.01$ ; Table 4).

Rate of incontinence increased linearly with estimated amount of external sphincter divided during surgical treatment of the fistula (Table 3). It was 38 percent for fistulas not involving the external sphincter and 75 percent for those involving more than three-quarters of the external sphincter. These differences were statistically significant ( $P = 0.02$ ; Table 4).

Fistulotomy and marsupialization was less likely to cause incontinence (42 percent) than two-stage seton fistulotomy (63 percent) or cutting seton fistulotomy (67 percent). This difference reflects the higher complexity of fistulas treated by setons. Difference in the rate of incontinence among patients with (67 percent) and without (44 percent) previous fistula surgery (Table 3) was also statistically significant ( $P = 0.02$ ; Table 4).

**Table 3.**  
Incontinence After Fistula Surgery

	No.	Incontinence (%)
Type of fistula		
Intersphincteric	70/180	37
Transsphincteric	57/108	54
Suprasphincteric	1/5	80
Extrasphincteric	1/6	83
Unclassified	32/74	49
Sex		
Male	102/261	39
Female	66/10	64
External sphincter involved (%)		
None	52/138	38
<25	17/39	44
26-50	18/30	60
51-75	6/11	55
>76	12/16	75
Treatment		
Fistulotomy and marsupialization	123/293	42
Seton and fistulotomy	31/49	63
Cutting seton	8/12	67
Other	6/12	50
Previous operations		
Yes	20/30	67
No	148/335	44
Age		
<65 years	56/122	46
>65 years	111/242	46
Surgeon		
1	14/36	39
2	11/27	41
3	17/30	57
4	22/40	55
5	2/5	40
6	27/65	42
7	8/14	57
8	6/17	35
9	15/26	58
10	9/21	43
11	25/56	45
12	2/6	33
13	10/22	45
Location of internal opening		
Lateral	32/65	49
Posterior	60/134	45
Anterior	59/110	54
Internal sphincter involved (%)		
<25	44/95	46
26-50	33/76	43
51-75	9/15	60
>76	18/29	62

Patients older than 65 years had identical rates of incontinence after fistula surgery compared with patients younger than that age (Table 3). Incontinence

rate among patients who underwent surgery by different surgeons varied from 33 to 58 percent (Table 3), but these differences were not statistically significant in univariate analysis (Table 4). Incontinence rate after fistula surgery was higher for fistulas with the internal opening located in the midline anteriorly (54 percent) than laterally (49 percent) or the midline posteriorly (45 percent; Table 3). However, these differences were not significant in univariate analysis (Table 4).

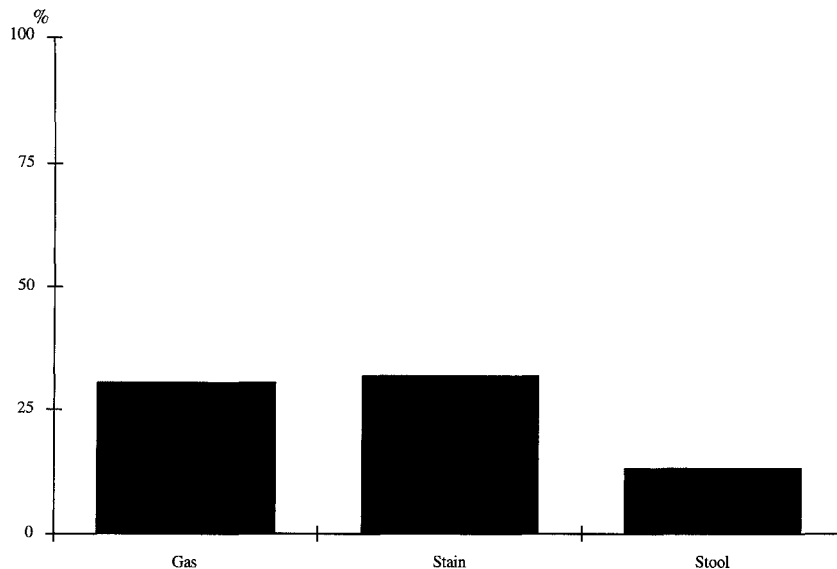
Female sex, increasing amount of external sphincter involved by the fistula, complex type of fistula, and treatment by two-stage or cutting seton fistulotomy, all of which were associated with incontinence in univariate analysis, were also significantly associated with incontinence in multivariate analysis (Table 4). Estimated amount of internal sphincter involved by the fistula, which had no significant influence on incontinence in univariate analysis, became an independent factor in multivariate analysis.

Most patients with postoperative staining of underclothing and difficulty holding gas complained of their symptoms more often than once a week. On the other hand, more than two-thirds of patients with stool incontinence had accidental bowel movements less frequently than once per month. Twenty-seven percent of the entire group of patients had to wear a pad, one-half of them more often than once per week (Fig. 2).

## DISCUSSION

Clinical follow-up after anorectal procedures for benign conditions is usually short. In our patients, average time between operation and last visit to the clinic was 2.5 months. Furthermore, data regarding functional results is rarely recorded in a systematic fashion. Therefore, to review our experience with surgical management of fistula-in-ano, we decided to use a mailed questionnaire to learn the long-term results. Our response rate, less than the 90 percent obtained by van Tets and Kuijpers,<sup>6</sup> is similar to that reported in other studies of anorectal surgery.<sup>7</sup> These variations reflect differences in the type of practice (referral *vs.* community-based) and population shifts.

Surgery for fistula-in-ano is complicated by varying degrees of recurrence and postoperative incontinence. Recurrence rates from 0 to 33 percent and disorders of continence as high as 54 percent have been reported in the literature.<sup>5, 6, 8-26</sup> It is generally



**Figure 1.** Type of incontinence after surgical treatment of fistula-in-ano.

**Table 4.**

Factors Associated with Incontinence After Surgical Treatment of Fistula-In-Ano

Univariate analysis	
Sex	$P < 0.01$
Fistula type	$P < 0.01$
Treatment	$P = 0.01$
% External sphincter involved	$P = 0.02$
Previous fistula surgery	$P = 0.02$
Age	NS
Surgeon	NS
% Internal sphincter involved	NS
Multivariate analysis*	
Sex	0.63
% External sphincter involved	0.61
Fistula type	0.58
Treatment	0.57
% Internal sphincter involved	0.44

NS = not significant.

\* Correlation coefficient regression values greater than 0.3 were considered very strong.

accepted that procedures that divide the tissue encircled by the fistulous track, although associated with relatively high rates of incontinence, are most effective in eradicating the fistula.<sup>6, 19-26</sup> Our recurrence rate was very similar to that reported by van Tets and Kuijpers,<sup>6</sup> who, like us, treated most fistulas by simple fistulotomy.

Successful surgical treatment of fistula-in-ano requires recognition of internal (primary) and external (secondary) openings and the track or tracks connecting them. Our results support the commonly held idea that fistula recurrence increases with complexity of the fistula and presence of horseshoe extensions.

High recurrence rate seen in unclassified fistulas suggests that uncertainty about the relationship of the fistula with anatomic structures of the anal region precludes effective treatment.

In reviewing the St. Mark's experience on management of problematic anal fistulas, Seow-Choen and Phillips<sup>27</sup> found that mistaken assessment of the primary track is a common cause of fistula recurrence. In our study, lack of identification of primary fistulous opening was strongly associated with recurrence in univariate analysis. Although statistical significance of this association disappeared in multivariate analysis, we believe that failure to identify the internal opening during the procedure is one of the main predictors of recurrence of fistula.

In agreement with previous reports,<sup>28</sup> almost 83 percent of our fistulas had the internal opening located in the anterior or posterior midline. Fistulas with the internal opening located off the midline had a higher recurrence rate in our series. Explanation for this finding remains uncertain.

Complaints about disorders of continence have been reported in up to 56 percent of patients who underwent surgery for fistula-in-ano.<sup>5, 6, 8-26</sup> These complaints, although very important to social and sexual life of patients, have often been neglected by surgeons. Percentage of our patients complaining of continence disorders is higher than patients reported by van Tets and Kuijpers.<sup>6</sup> These differences probably reflect differences in distribution of fistula type and definitions of incontinence. Although soiling of underclothing and insufficient control of flatus were the

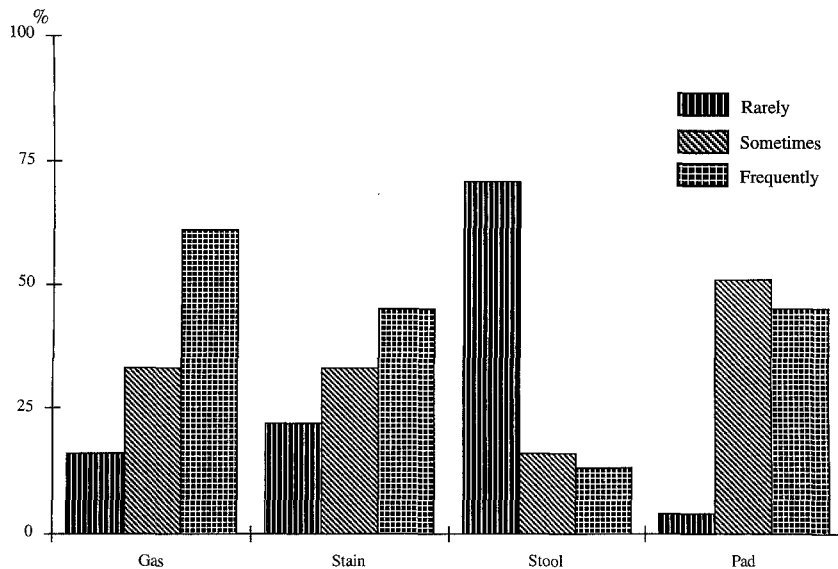


Figure 2. Frequency of incontinence events.

most common complaints reported, a significant number of our patients complained of incontinence to stool. The importance of these symptoms is underlined by the fact that 27 percent of the entire group have to wear a protective pad, almost one-half of them as often as once per week.

In our series, female sex was the strongest predictor of incontinence after fistula surgery. It is commonly believed that women are more prone than men to develop incontinence after surgical treatment of anterior anal fistulas because of a smaller sphincter mechanism that may also be impaired by vaginal childbirth. Indeed, Sultan *et al.*<sup>29</sup> demonstrated a 35 percent incidence of occult sphincter defects after vaginal delivery, often associated with disturbance of bowel function. In our series, association of incontinence with female sex was independent of location of fistula opening. Although we did not investigate the parity status of our female patients, we believe that higher risk of incontinence after fistula surgery in female patients is probably attributable in part to partial anal sphincter disruption and/or traction injury to the pudendal nerve, sustained during vaginal delivery.

Association of incontinence with complexity of the fistula was statistically significant in univariate and multivariate analysis. Furthermore, our results support the commonly held belief that division of the tissue encircled by the fistulous track carries a risk of incontinence that is proportional to the amount of muscle divided. Because of significant association of incontinence disorders with type of fistula and amount of

muscle encircled by the track, an effort should be made to precisely define the relationship of the fistula with the sphincter mechanism.

Setons have been used for centuries in treatment of high anal fistula. Rationale behind their use lies in the inflammatory reaction and fibrosis that they induce in the tissue surrounding the fistulous track. This fibrosis is intended to fix the sphincter and prevent its retraction once the portion of the muscle encircled by the seton is divided.<sup>3</sup> In our series, treatment of anal fistulas both by seton placement with subsequent fistulotomy and by cutting seton was an independent predictor of incontinence. Similar results have been reported by van Tets and Kuijpers,<sup>6</sup> who found no significant functional advantage with the use of setons in comparison with simple fistulotomy. However, it must be explicitly noted that seton use is reserved for "high" or complex fistulas, which treatment is most difficult and mostly expected to be associated with poorer functional outcomes.

Some of the factors associated with recurrence in univariate and multivariate analysis, such as lack of identification of internal fistula opening, were clearly operator-dependent; therefore, it was not surprising to find differences in recurrence among different surgeons. These differences, independent of years in practice and numbers of operations performed during duration of the study, were statistically significant in multivariate analysis. On the other hand, incontinence after fistula surgery was not significantly different among surgeons. Although recurrence and incontinence are both intimately related to complexity of the

fistula, recurrence depends more on identification of the track and the primary opening by the operating surgeon, whereas incontinence, at least in patients treated by division of the tissue encircled by the fistula track, is more dependent on anatomy of the fistula and functional status of the patient than on the surgeon performing the procedure.

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