

An International, Multicenter, Prospective, Observational Study of the Side-to-Side Isoperistaltic Strictureplasty in Crohn's Disease

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PURPOSE: The side-to-side strictureplasty is a bowel-sparing alternative to resection in the treatment of strictureing Crohn's disease. This study was initiated to review the adoption of the side-to-side strictureplasty as a new surgical technique and the relative outcomes a decade after its description. **METHODS:** A total of 184 unique patients from six centers in the United States, Italy, and Japan served as the basis for this study. A questionnaire instrument was used to assemble prospectively acquired preoperative, intraoperative, perioperative, and postoperative data from each center into a computer-generated database. **RESULTS:** Average age at surgery for patients selected for a side-to-side strictureplasty varied significantly between centers (minimum, 31.0 years; maximum, 39.5 years, $P < 0.006$). Use of the side-to-side strictureplasty technique for primary Crohn's disease *vs.* surgically recurrent disease also varied significantly by center (primary minimum, 16.7 percent;

maximum, 68.6 percent, $P < 0.03$). Furthermore, length of diseased bowel selected for construction of a side-to-side strictureplasty was significantly different among centers (minimum, 20.8 ± 9.9 cm; maximum, 64.3 ± 29.3 cm, $P < 0.001$). Use of synchronous bowel resection away from the site of the side-to-side strictureplasty was relatively common (minimum, 21.1 percent; maximum, 66.7 percent) as it was with the use of additional synchronous strictureplasties (minimum, 41.9 percent; maximum, 83.3 percent). The six centers experienced a low number of complications (minimum, 5.7 percent; maximum, 20.8 percent). Forty-one of 184 total patients required surgery for recurrent disease, with an average time to recurrence of 35 months. The difference of reoperation-free five-year survival experienced by the patients in the six centers was not statistically significant, with a cumulative reoperation-free five-year survival of 77 percent across all centers. **CONCLUSIONS:** Worldwide implementation of the side-to-side strictureplasty technique and its variations has occurred. This procedure carries a very low mortality and morbidity rate, with acceptable recurrence rates. [Key words: Crohn's disease; Bowel-sparing technique; Side-to-side strictureplasty; Strictureplasty]

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In the past 25 years, surgeons have accrued experience with bowel-sparing procedures for Crohn's

disease. First described by Lee from Oxford¹ and then popularized by Alexander-Williams,² strictureplasties are now an integral part of the surgical armamentarium for patients affected by obstructive Crohn's disease.

The most commonly performed strictureplasty is the Heinecke-Mikulicz.³ With this technique an enterotomy is placed on the antimesenteric side of the strictured bowel and it is closed transversally to create a diamond-shaped deformity with enlargement of the intestinal lumen. This strictureplasty is well suited for strictures 5 to 7 cm long. For longer strictures up to 15 cm, a Finney strictureplasty⁴ is a better option. The Finney strictureplasty is fashioned by folding the bowel on itself and creating an entero-enterostomy between the two intestinal loops.

Several modifications have been described to adapt the use of these strictureplasty techniques to two consecutive strictures located near each other,⁵ to strictures complicated by a fistula, and to strictures with a considerable disparity in the size of the proximal and distal intestinal lumen.⁶ With increased expertise and confidence in bowel-sparing procedures, strictureplasties, originally devised to address primary small-bowel strictures, have now also been employed in other intestinal districts such as duodenum and colon, and in recurrent small-bowel and neoterminal ileal disease.

Unfortunately, the Heinecke-Mikulicz and the Finney techniques are ill-suited to address jejuno-ileitis or recurrent neoterminal ileitis with multiple sequential strictures over a significant length of small bowel. Historically, these strictures have been handled with extensive bowel resections or with multiple strictureplasties. Massive resections have the potential to precipitate short-bowel syndrome or predispose the patient to it after further resections for recurrent disease. Alternatively, multiple strictureplasties are time-consuming and may create undue tension on the many suture lines. To address this challenge, the principal author (FM) devised a new technique, called the side-to-side isoperistaltic strictureplasty, in 1992.⁷ Since then, this technique has been adopted by many surgeons with expertise in the surgical treatment of Crohn's disease; a decade after its description, it is time to review the results obtained worldwide.

MATERIALS AND METHODS

Center Identification

Since its inception in 1992, the side-to-side isoperistaltic strictureplasty and its variations have been adopted by a growing number of international centers

specialized in inflammatory bowel disease (IBD). Identification of IBD centers for this study followed two approaches: first, a literature search was conducted to identify investigators who had published on the side-to-side isoperistaltic strictureplasty technique or its variations; second, a directory of leading IBD surgeons was assembled and contacted. These surgeons were then solicited directly to inquire if they had adopted the technique but not yet published their results.

The literature search used the United States National Library of Medicine PubMed search engine. Specifically, all articles published on strictureplasty in the treatment of Crohn's disease between 1992 and 2004 were searched. Articles were individually reviewed to isolate reference to the side-to-side isoperistaltic strictureplasty technique or surgical description of variations of the original technique. The experience of each of the investigators who had published on the side-to-side strictureplasty technique or its variations was included in this study.

A directory of leading international IBD surgeons was assembled through the membership database of The American Society of Colon and Rectal Surgeons and was expanded further by the network of surgeons known by the principal author. These surgeons were contacted *via* email to inquire regarding their experience with the side-to-side strictureplasty procedure at their center.

Based on the literature search and the directory of surgeons, six centers of excellence where the side-to-side strictureplasty technique or its variations had been performed were identified. We defined a center as a surgeon or a group of surgeons at an accredited medical center with a multidisciplinary practice and expertise in inflammatory bowel disease who had performed at least five side-to-side strictureplasty procedures or variations (we apologize in advance if any center that has performed more than five side-to-side strictureplasty procedures was not included; please contact us so that we can include and recognize your findings in future publications). These centers represent a mix of international facilities on three continents: two in the United States, three in Italy, and one in Japan. Henceforth, institutions and operating surgeons for each institution are organized in the following manner (year of first-performed side-to-side strictureplasty or its variation, when reported to the principal author, is indicated in parenthesis): Center 1: University of Chicago, Michelassi and Hurst (1992); Center 2: University of Bologna, Poggioli and Pierangeli (1994); Center 3: Cleveland Clinic, Fazio; Center 4:

University of Milan, Taschieri and Sampietro (1993); Center 5: University of Florence, Tonelli (1996); Center 6: University of Tohoku, Sasaki and Funayama.

Questionnaire and Databases

Data for this study were collected using a questionnaire instrument and then organized into independent databases for analysis. The questionnaire instrument was designed to collect four general categories of data: preoperative (severity, extension, and location of disease); intraoperative (extent of disease and nature of surgical procedure performed with descriptions of exact location and type of strictureplasty performed, length of bowel involved, and other surgical treatments applied); perioperative (postoperative course and perioperative complications); and follow-up care (detailed long-term outcome with additional preoperative, intraoperative, and postoperative data for those patients in whom Crohn's disease recurrence required reoperation). All patient data regarding these categories were collected on a per-patient basis with a generic identifier (e.g., patient 1 and patient 2) used to enumerate patients. No patient-identifying information, other than age and gender, was used. Patient confidentiality was strictly maintained throughout the data management process. Institutional Review Board approval was obtained by the primary investigating center for this study (Center 1), and also, where required, by investigators at the other centers.

Data collected from responses to the questionnaire were used to populate an independent computer-generated database for each center. These databases represent queries of prospectively acquired patient information from six leading IBD centers. A total of 184 unique patients from six world centers serve as the basis for this study.

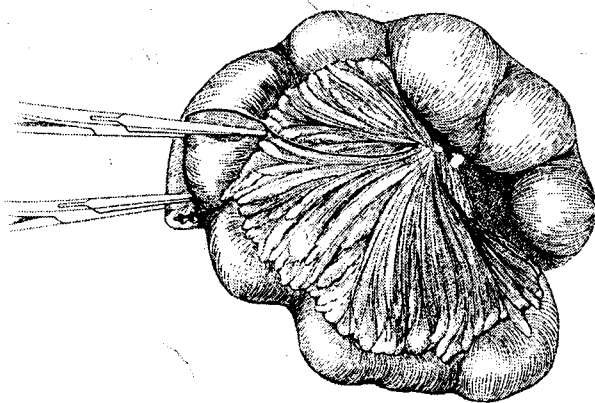


Figure 1: The mesentery of the diseased bowel segments is divided and the proximal intestinal loop is moved over the distal one in a side-to-side fashion.

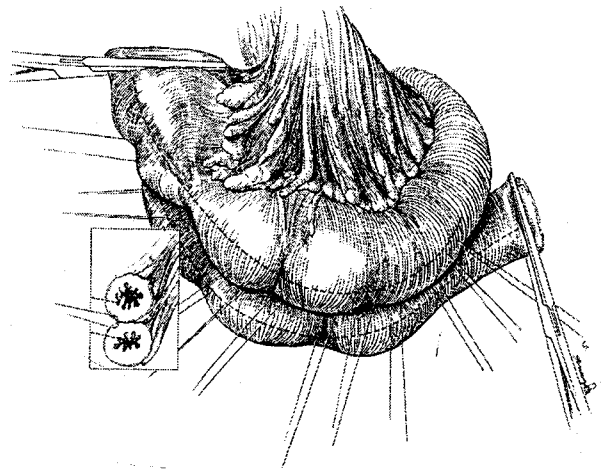


Figure 2: The two loops are approximated by an outer layer of interrupted seromuscular nonabsorbable sutures.

Surgical Method

The side-to-side isoperistaltic strictureplasty procedure was first performed in 1992 and described in 1996.⁷ It is briefly reviewed here. First, the mesentery of the diseased loop is divided at its midpoint, and the small bowel is severed between atraumatic intestinal clamps. If necessary, the midportion of the diseased loop is resected if it contains a long continuous stricture with a thick, unyielding wall. The proximal intestinal loop is moved over the distal one in a side-to-side fashion (Fig. 1). Care is taken to ensure that stenotic areas of one loop are placed adjacent to the dilated areas of the other loop. The two loops are then approximated by a layer of interrupted seromuscular Cushing stitches using nonabsorbable 3-0 sutures (Fig. 2). A longitudinal enterotomy is performed on both loops (Fig. 3) and the intestinal ends are tapered to avoid blind stumps (Fig. 3, inset). Biopsies of suspicious areas of disease are obtained for frozen section to exclude occult malignancy. Hemostasis is obtained with suture ligatures or electrocautery. The outer suture line is reinforced with an internal row of running, full-thickness 3-0 absorbable sutures, continued anteriorly as a running Connell suture (Fig. 4). This layer is reinforced by an outer layer of interrupted seromuscular Cushing stitches using nonabsorbable 3-0 sutures (Fig. 4, inset).

Variations of the side-to-side isoperistaltic strictureplasty procedure have been described.⁸⁻¹² These variations fall into three distinct categories: integration of traditional strictureplasty techniques (e.g., Heineke-Mikulicz) with the side-to-side isoperistaltic strictureplasty technique, length of bowel selected for strictureplasty, and bowel location selected for

strictureplasty. Data regarding these different approaches are examined in the Results section.

Statistical Analysis

Age at surgery, length of hospital stay, average length of side-to-side isoperistaltic strictureplasty, and average total length of side-to-side isoperistaltic strictureplasty are reported as means with standard deviations. Analysis of variance (ANOVA) was used to calculate *P* values for age at surgery and length of hospital stay. The Wald test was also applied to original length and total length of strictureplasty performed. *P* values for all other data were calculated using Pearson's chi-squared test or Fisher's exact test, as appropriate. Transformation of the data was required in some cases because of nonnormality, and either the log or the square root transformation was used. For the reoperation-free survival analysis, a log-rank test was applied, and those patients who had not required a reoperation were censored at the time they were last known to be reoperation-free.

RESULTS

The preoperative, intraoperative, and postoperative patient characteristics are listed in Table 1 according to

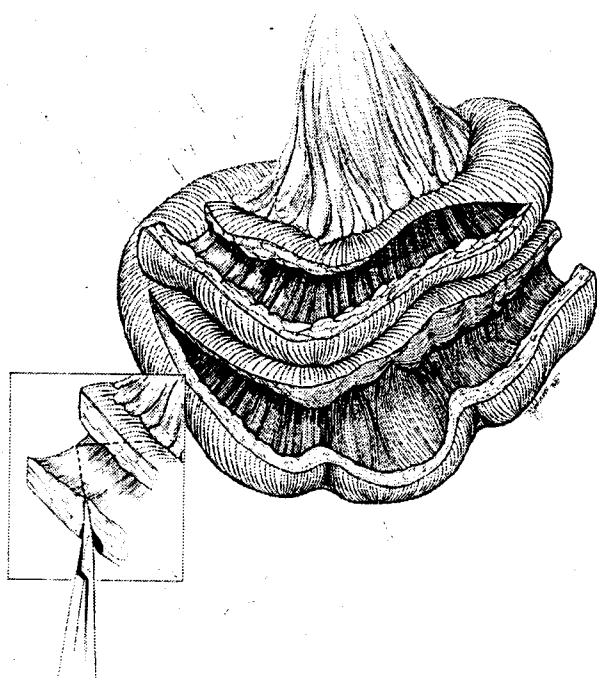


Figure 3. A longitudinal enterotomy is performed on both loops and the intestinal ends are spatulated to avoid blind stumps. A running full-thickness inner absorbable suture line is used to anastomose the back wall of the enterointerostomy.

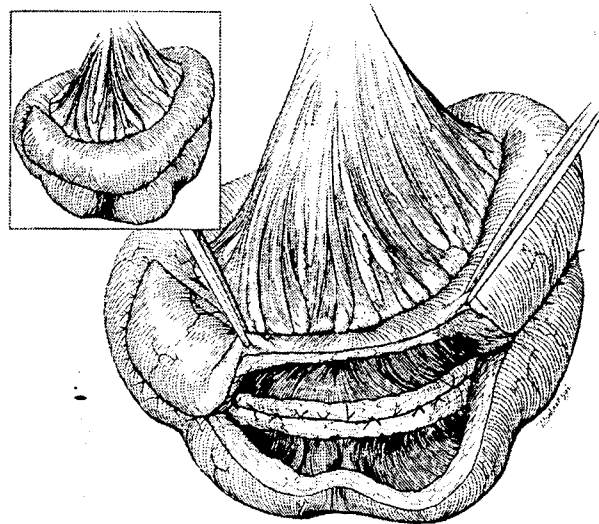


Figure 4. Both outer and inner suture lines are continued and finished anteriorly.

IBD center. Significant variations among centers were noticed in the preoperative use of steroids ($P < 0.002$), immunomodulators ($P < 0.027$), and total parenteral nutrition ($P < 0.001$). The average age of patients selected for a side-to-side strictureplasty technique varied significantly among the centers (from 31.0 years at Center 4 to 39.5 years at Center 5; $P < 0.0059$). Taken together, the average age of a patient selected for surgery was 34.3 (standard deviation [SD] = 11.5) years, of which more than one-half were maintained on regular preoperative steroids (57.6 percent) and close to one quarter required the use of preoperative immunomodulators or total parenteral nutrition (20.7 percent and 22.8 percent, respectively).

The side-to-side isoperistaltic strictureplasty technique was employed in the treatment of primary and recurrent Crohn's disease almost as frequently across the six centers (cumulative primary use of 48 percent), but analysis by center revealed significant variations (from 16.7 percent primary use in Center 3 to 68.6 percent primary use in Center 5 for primary Crohn's disease, $P < 0.03$). In addition, when used for recurrent Crohn's disease, the recurrence number at the time of performance of the side-to-side strictureplasty differed considerably among centers (1.38 in Center 4 to 2.48 in Center 1, $P < 0.015$; cumulative recurrence, 1.78 ± 1.18).

Length of diseased bowel selected for a side-to-side isoperistaltic strictureplasty varied significantly among centers (from 20.8 cm in Center 4 to 64.3 cm in Center 1, $P < 0.001$). The incidence of resection of part of the diseased bowel before construction of the side-to-side strictureplasty varied among centers (from 0 percent in Centers 2 and 3 to 91.7 percent

Table 1.
Preoperative, Intraoperative, and Postoperative Characteristics According to Center

	University of Chicago	University of Bologna	Cleveland Clinic	University of Milan	University of Florence	University of Tohoku	P Value	Cumulative Experience
Number of patients	30	19	6	70	35	24		184
Age	37.1 ± 11.4	33.2 ± 9.8	37.7 ± 18.1	31.0 ± 10.9	39.5 ± 11.7	32.8 ± 9.7	0.0059	34.3 ± 11.5
Range (years)	15–62	20–58	14–63	10–59	21–65	20–67		10–67
Gender (M/F)	15/16	12/7	4/2	47/23	18/17	15/9	0.47	111/73
Number of SSISs	31	20	6	80	35	29		201
Preoperative steroid use (%)	54.8	89.5	100	44.3	62.9	54.2	0.002	57.6
Preoperative immunomodulators (%)	16.1	21.1	33.3	22.9	31.4	0	0.027	20.7
Preoperative TPN use (%)	19.4	5.3	16.7	4.3	34.3	79.2	<0.001	22.8
Use in primary Crohn's disease (%)	32.3	57.9	16.7	47.1	68.6	41.7	0.028	48.4
Recurrence number in recurrent Crohn's disease	2.48 ± 1.60	2.25 ± 0.71	1.4 ± 0.55	1.38 ± 1.06	1.64 ± 0.81	1.79 ± 0.89	0.015	1.78 ± 1.18
P-loop location (%)							<0.001 ^a	
Je	64.5	90	33.3	25	31.4	30.8		39.3
Il	16.1	10	66.7	65	68.6	57.7		50.7
Nti	19.4	0	0	10	0	7.7		8.0
Ce	0	0	0	0	0	0		0
As	0	0	0	0	0	3.9		0.5
not specified	0	0	0	0	0	10.3		1.5
D-loop location (%)							<0.001 ^a	
Je	64.5	80	33.3	25	8.6	30.8		34.3
Il	16.1	10	66.7	35	65.7	42.3		36.3
Nti	9.7	0	0	0	2.9	11.5		3.5
Ce	0	0	0	0	22.9	11.5		5.5
As	0	10	0	30	0	3.9		13.4
not specified	9.7	0	0	10	0	10.3		7.0
Undiseased P loop* (%)	0	0	16.7	0	9.4	13.8 ^d		4.0
Undiseased D loop* (%)	3.2	5	0	38.8	0	13.8 ^d		18.4
Presence of fistula in diseased loop (%)	19.4	0	0	30	22.9	8.3	0.019	20.1
Resection required to construct SSIS (%)	54.8	0	0	54.3	37.1	91.7	<0.001	48.9
Additional resection required distant from SSIS (%)	64.5	21.1	66.7	21.4	34.3	29.2	<0.001	33.2
Additional strictureplasty required distant from SSIS (%)	41.9	42.1	83.3	45.7	57.1	83.3	0.007	53.3
Length*	51.1 ± 22.6	38.9 ± 17.2	36.2 ± 10.8	19.6 ± 9.4	50.3 ± 28.8	20.7 ± 15.9	<0.0001 ^b	32.4 ± 22.6
Range (cm)	10–109.2	12–80	20–50	8–40	7–110	7–60		7–110
Total length*	64.3 ± 29.3	42.9 ± 16.8	36.2 ± 10.8	20.8 ± 9.9	62.7 ± 22.3	25.2 ± 16.6	<0.0001 ^b	37.8 ± 25.9
Range (cm)	10–121.9	22–85	20–50	8–45	21–112	7–70		7–121.9
Complications (%)	9.7	15.8	16.7	5.7	11.4	20.8	0.27	10.3
Length of stay	8.0 ± 2.0	12.5 ± 5.1	9.0 ± 3.2	10.1 ± 5.0	12.7 ± 2.7	31.5 ± 14.1	<0.0001	13.3 ± 9.6
Range (days)	5–13	7–28	6–15	6–30	7–17	13–68		5–68
Reoperation-free 5-year survival probability**	0.77	0.88	1	0.74	0.46	0.83	0.61 ^c	0.77
Disease involvement at SSIS at time of reoperation (%)	57.1 (4 of 7)	66.7 (2 of 3)	– (0 of 0)	7.7 (1 of 13)	14.3 (1 of 7)	54.5 (6 of 11)	0.001	34.1 (14 of 41)

Je = jejunum; Il = ileum; Nti = neoterminal ileum; Ce = cecum; As = ascending colon; TPN = total parenteral nutrition; SSIS = side-to-side strictureplasty.

*Values are expressed as mean ± SD and range. "Total Length" is the total length of the diseased bowel before any resection; "Length" is the length of the diseased bowel that was used in the construction of the SSIS, after resection of part of it, if necessary.

**Reoperation-free survival calculated based on time until reoperation for any related abdominal procedure, including but not limited to surgical treatment of Crohn's disease, lysis of adhesions, or treatment of incisional hernia.

^aThese P values were calculated on a per-procedure basis and may be biased because of internal correlation.

^bWald test performed after regression models taking into account correlation between measures on same patient.

^cLog-rank test.

^dData were not obtainable for three patients.

Table 2.
Use of Additional Strictureplasty Separate from SSIS

	University of Chicago	University of Bologna	Cleveland Clinic	University of Milan	University of Florence	University of Tohoku	Cumulative Experience ^a
Number and percent of patients requiring strictureplasty	13 42%	8 42%	5 83%	32 46%	20 57%	20 83%	98 53%
Total number additional strictureplasties constructed	27	31	12	79	55	41	245
Average per patient	2.1	3.9	2.4	2.5	2.8	2.1	2.5
Type of additional strictureplasty used (%)							
Heineke-Mikulicz	81%	94%	75%	90%	64%	78%	81%
Double Heineke-Mikulicz	0%	0%	0%	0%	0%	17%	3%
Fazio-modified Heineke-Mikulicz	4%	0%	0%	0%	5%	0%	2%
Finney	11%	3%	25%	0%	11%	0%	5%
Jaboulay	4%	0%	0%	0%	0%	2%	1%
Combination	0%	3%	0%	0%	0%	2%	1%
Other strictureplasty techniques	0%	0%	0%	10%	20%	0%	7%

SSIS=side-to-side strictureplasty.

^aCalculated as weighted average based on number of patients or procedures, as appropriate.

in Center 6, $P < 0.001$) and was used in approximately one-half of all cases overall (48.9 percent). The length of bowel used in the construction of the side-to-side strictureplasty was significantly different from center to center (from 20.8 ± 9.9 cm in Center 4 to 64.3 ± 29.3 cm in Center 1, $P < 0.001$); this difference persisted even after subtracting the length of the resected diseased bowel (from 19.6 cm in Center 4 to 51.1 cm in Center 1, $P < 0.001$). Taken as a whole, the completed side-to-side isoperistaltic strictureplasty or its variation was greater than 30 cm in length (average length = 32.4 ± 22.6 cm), with resection of approximately 5 cm of diseased bowel to facilitate construction (average total length = 37.8 ± 25.9 cm).

The six centers chose to perform the side-to-side isoperistaltic strictureplasty technique with different incidence in different locations of the gastrointestinal tract. Centers 1 and 2 used the procedure prevalently in the jejunum, Centers 3 and 4 in the ileum, and Centers 4, 5, and 6 extending to the cecum and ascending colon ($P < 0.001$). In addition, every center occasionally used grossly normal intestine for either the proximal or the distal loop of the side-to-side strictureplasty, and the incidence of use of normal intestine varied from center to center (from 5 percent in Center 2 to 38.8 percent in Center 4, $P < 0.001$), with the distal loop being used more often (18.4 percent *vs.* 4.0 percent).

Table 3.
Complication Profile by Center and Cumulative

	University of Chicago	University of Bologna	Cleveland Clinic	University of Milan	University of Florence	University of Tohoku	Cumulative Experience
Number and percent of procedures with no complications	28 90%	16 84%	5 83%	66 94%	31 89%	19 79%	165 89%
Number and type of complications							
GI hemorrhage	1	1		1	1		4
Suture line dehiscence	1	2		2	1	1	7
Bowel obstruction				1		2	3
Other complications	1	1	1		3	2	8

GI=gastrointestinal.

^aCalculated as weighted average based on total number of procedures.

Occurrence of an enteric fistula in the loop of bowel selected for a side-to-side isoperistaltic strictureplasty varied from 0 percent to 30 percent ($P < 0.02$, Table 2) and occurred in a fifth of patients overall (20.1 percent). Use of synchronous bowel resection and/or strictureplasty was commonly required away from the site of the side-to-side strictureplasty. Additional resections were performed in one third of patients overall (33.2 percent), and concomitant additional strictureplasties were constructed in over one-half of all cases (53.3 percent). The rate of use varied significantly among centers: rates of additional resection varied from 21.1 percent in Center 2 to 66.7 percent in Center 3 ($P < 0.001$); rates of additional strictureplasty varied from 41.9 percent in Center 1 to 83.3 percent in Centers 3 and 6 ($P < 0.001$). Table 2 details the average number of additional strictureplasties performed per patient, the total number of additional strictureplasties performed, and the kind of strictureplasty technique employed.

The six centers experienced a similar complication profile (Table 3). Percent of complications associated with surgery varied from 5.7 percent in Center 2 to 20.8 percent in Center 6. The most commonly encountered complications were gastrointestinal (GI) hemorrhage (2 percent cumulative average incidence), suture line dehiscence (1 percent), and bowel obstruction (1 percent). One patient died suddenly of massive pulmonary embolism on postoperative Day 8 (total mortality rate of 0.5 percent).

Length of stay varied significantly among centers despite similar complication profiles. Average length of stay was shorter in the United States centers compared with that in the Italian centers, with the longest in the Japanese center ($P < 0.001$, Table 1). All patients on preoperative total parental nutrition were weaned off postoperatively.

Forty-one of 184 total patients required surgery for recurrent disease. The average time between surgical interventions was 35 months. The difference of reoperation-free five-year survival experienced by the patients in the six centers was not statistically significant (Table 1), with a cumulative reoperation-free five-year survival of 77 percent across all centers. Recurrence of disease activity at the site of side-to-side strictureplasty occurred in 14 patients and did vary significantly between centers (from 7.7 percent in Center 3 to 85.7 percent in Center 6, $P < 0.001$, Table 1). These 14 patients represent 7.6 percent of the entire group of 184 patients and 34.1 percent of the 41 patients who underwent reoperation.

DISCUSSION

Adoption of the side-to-side isoperistaltic strictureplasty in the treatment of extensive jejuno-ileitis and neoterminal ileal disease has steadily increased since its original description by the principal author. The procedure has now gained a defined place in the armamentarium of the surgeon dealing with Crohn's disease and worldwide implementation has occurred.

The procedure carries a very low mortality and morbidity rate, with acceptable recurrence rates. Traditionally, surgeons have worried that performance of an anastomotic suture line on diseased intestine may lead to an increase in postoperative morbidity and higher disease recurrence rates. These concerns have been demonstrated as unfounded by many large series of conventional strictureplasty^{4,9} and by the principal author's experience with the side-to-side isoperistaltic strictureplasty.¹³ The present study detailing a large multicenter experience with the side-to-side isoperistaltic strictureplasty offers additional data on the short-term and medium-term safety of the procedure. Continuous follow-up of this cohort of patients is necessary to assess the long-term safety of side-to-side strictureplasty with respect to local recurrence rates and possible neoplastic transformation.

The procedure offers an alternative to massive intestinal resections and sacrifice of large amounts of absorptive intestinal surface. Initially described for jejuno-ileitis, the technical aspects of the procedure have been modified to extend its indication to neoterminal ileal disease. Furthermore, although the initial description called for transection of the bowel in the middle of the diseased loop with subsequent construction of the side-to-side strictureplasty (SSIS) with two segments of diseased bowel, the technique has been modified to use grossly normal intestine for the proximal or the distal loop when indicated. Taken together, these modifications represent both acceptance of the procedure and extension of its technique.

This article highlights differences in the use of the side-to-side isoperistaltic strictureplasty technique among centers. Centers 1 and 3, both in North America, used the side-to-side isoperistaltic strictureplasty technique especially for patients with recurrent disease. However, the Italian and Japanese centers implemented the side-to-side isoperistaltic strictureplasty more often in primary Crohn's disease. When used for recurrent disease, the average recurrence number also reflected an earlier use of this procedure in all centers except Center 1. Differences also existed

in the use of side-to-side strictureplasty in the presence of an intraoperative finding of an enteric fistula originating from the diseased bowel loop or the preoperative use of steroids, immunomodulators, and total parenteral nutrition, but with significant use occurring on average across centers. Furthermore, the incidence of synchronous bowel resection and/or strictureplasty away from the site of the side-to-side isoperistaltic strictureplasty also varied between centers. These differences are probably to be explained by both differences in the severity of cases referred to each center and differences in the individual surgeon's attitude toward the amenability of the procedure to various operative sites. Taken as a whole, however, the side-to-side isoperistaltic strictureplasty technique or its variations appears successfully adaptable to a wide range of bowel involvement by stricturing Crohn's disease.

CONCLUSIONS

A decade after the original description of the procedure, the side-to-side isoperistaltic strictureplasty has gained a rightful place among bowel-sparing procedures for Crohn's disease. Its implementation offers a conservative solution to extensive stricturing Crohn's disease of the small bowel. The observation that disease activity becomes quiescent at the site of a previous side-to-side isoperistaltic strictureplasty¹³ confers further validity to this procedure. Further follow-up is necessary to evaluate the long-term recurrence rate at the site of the side-to-side isoperistaltic strictureplasty. Particular vigilance is also required to assess the risk of neoplastic transformation at the site of a side-to-side strictureplasty.

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