Evaluation and Surgical Treatment of Severe Chronic Constipation

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Patients with chronic constipation may have one of several physiologic disorders, not all of which are amenable to operative therapy. The aim of this study was to test colonic and pelvic floor function preoperatively, to identify patients suitable for surgery based on these studies, and to determine operative outcome over time. Between 1987 and January 1991, 277 patients referred for severe symptoms of chronic intractable constipation underwent colon transit studies, measurement of anal canal pressures and reflexes, and measurements of anorectal angle movements and efficiency of evacuation. Balloon expulsion studies, electromyography of the pelvic floor, and defecating proctograms also were done. Based on these studies, patients were categorized as having: slow transit constipation (STC), 29 patients; pelvic floor dysfunction (PFD), 37 patients; STC + PFD, combined slow transit and pelvic floor dysfunction, 14 patients; and irritable bowel syndrome (IBS), 197 patients. Slow transit constipation patients underwent abdominal colectomy and reanastomosis. Pelvic floor dysfunction patients underwent pelvic floor retraining only. Patients with STC + PFD underwent pelvic floor retraining followed by abdominal colectomy. Irritable bowel syndrome patients were treated symptomatically. Among the 38 patients operated on (STC and STC + PFD), there was no operative mortality. Prolonged ileus developed in 13%, and small bowel obstruction occurred in 11% of patients. On follow-up, a mean of 20 months after ileorectostomy, no patient was constipated, none required a laxative, and none was incontinent. The mean number of stools per day was four. The authors concluded that a prospective evaluation of colonic and pelvic floor function reliably delineated constipated patients with slow transit, suitable for operative management, from those with pure pelvic floor dysfunction or irritable bowel syndrome, who were not. Abdominal colectomy and ileorectostomy in the slow transit patients was safe and effective, resulting in prompt and prolonged relief of constipation.

CONSTIPATION IS A symptom of a complex condition that results from different pathologic processes. The term constipation implies not only infrequent defecation but also difficult defecation. Perhaps the best general definition is that of Drossman et al.'s, "Two or fewer stools per week and/or straining at stool more than 25% of the time."[1] Extracolonic causes for constipation are legion[2] and need to be excluded primarily. The colonic causes are either structurally or functionally based, with the latter being further divided into constipation caused by colonic dysmotility[3] or disordered defecation.[4-7]

To achieve predictable success in managing constipated patients, it is important that underlying pathophysiologies are identified objectively; in this way patients amenable to aggressive surgical or medical intervention can be identified. We therefore developed an evaluation strategy to categorize constipated patients on the basis of physiologic tests, bearing in mind that documenting a physiologic abnormality may not necessarily mean that surgery is indicated. Indeed with a disorder such as constipation, one with multiple causes and possibly complicated by psychomotor overtones, the results of surgery, particularly abdominal colectomy and ileorectostomy, are unpredictable at best.[8-12]

Our evaluation strategy (Fig. 1) aimed to determine the cause of colonic constipation using quantitative tests of colonic, rectal, and anal canal function. The hypothesis was that patients could be evaluated accurately and placed into the appropriate pathophysiologic category such that only patients suitable for surgery would be operated on, with improved results and a predictable outcome. Our aim was to evaluate patients referred for severe constipation systematically to first select operative candidates and then to determine operative outcome over time.

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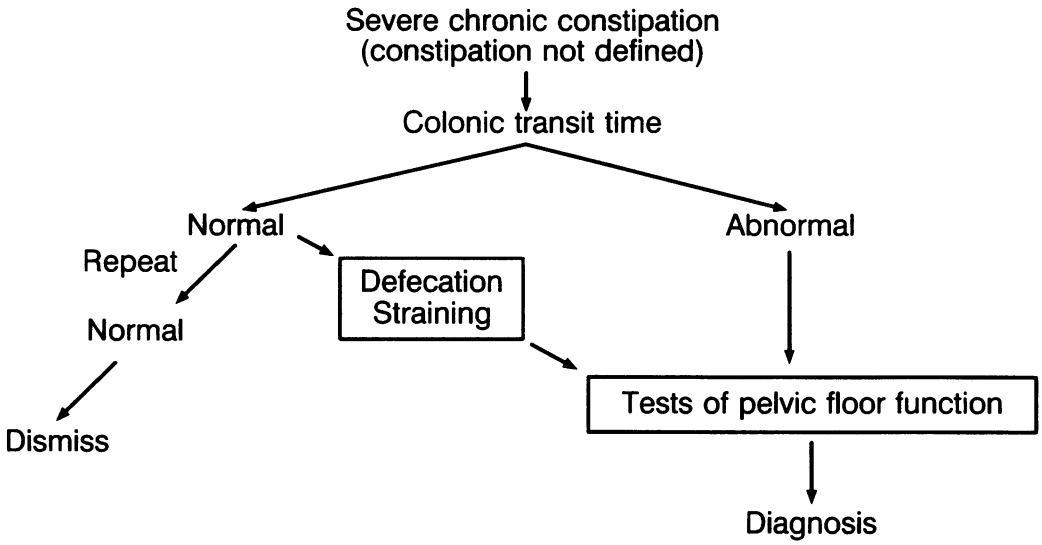

FIG. 1. Diagram of evaluation scheme used to categorize intractably constipated patients into diagnostic and therapeutic groups.

Patients and Methods

Between 1987 and 1990, 277 patients were referred for symptoms of severe constipation. Only patients with a protracted, chronic—sometimes lifelong—history of constipation and those who were deemed not amenable to further medical management by their referring physicians were assessed. Patients with recent onset of constipation were specifically not evaluated. Moreover physical examination and an initial series of tests, including barium enema or colonoscopy, had failed to uncover a contributing abnormality in all patients. Specifically patients had an anatomically normal colon; patients with megacolon, megarectum, volvulus, prolapse, evidence of colonic pseudo-obstruction, tumor, or polyp were excluded.

Patients studied underwent a series of tests of colonic and pelvic floor function that had been validated previously.

Physiologic Tests

Colonic Transit Test. Transit of solids through the colon was measured using a technique validated by Metcalf and others.[13] Transit through the different segments of the colon (right, left, rectosigmoid) also was determined. Mean colonic transit among 73 controls was 36 ± 4 hours. The upper limit of normal was 72 hours (2 standard deviations above the mean). Patients with transit times longer than 72 hours therefore were deemed to have slow colonic transit.

Pelvic Floor Function. The next step in the evaluation was to perform objective tests of pelvic floor function to quantitate defecation efficiency.

Anorectal Manometry. Perfused four-channel manometry determined resting and squeeze anal canal pressures, the presence of the rectal anal sphincter inhibition response, and compliance of the rectal wall.[14] High sphincter pressures have been associated with functional disturbances in some patients[15]; an absent rectal anal sphincter inhibitory response implies loss of ganglion cells (Hirschsprung's disease); and a highly compliant rectum implies impending megarectum.

Electromyography. Concentric needle electromyography (EMG) was performed to determine the electromyographic characteristics of the puborectal muscle and the external anal sphincter in response to squeeze and defecation straining. The normal response to defecation straining is silencing of the electrical activity and concomitant relaxation of the muscles. Some patients with defecation disorders have a characteristic paradoxical increase or no change in the motor activity of these muscles while straining,[16,17] and the muscles do not relax.

Scintigraphic Balloon Topography. This study defines movements of the anorectal angle and pelvic floor using scintigraphic techniques with low radiation exposure.[18] In previous preliminary studies,[19] among controls the anorectal angle opened a mean of 17 ± 3°, whereas in patients with defecation disorders the change was only 4 ± 4° ($p < 0.05$). Moreover in controls the perineum descended a mean of 2.3 ± 0.2 cm with straining, compared with 0.5 ± 0.1 cm in patients with disordered defecation ($p < 0.05$).

Scintigraphic Evacuation. The efficiency of defecation was quantified by measuring the amount of artificial radiolabeled stool evacuated from the rectum.[20] In preliminary studies[19] among healthy volunteers, the mean (± standard deviation [SD]) percent of stool evacuated in 10 seconds was 80 ± 3%, whereas in patients with defecation abnormalities it was 34 ± 6% ($p < 0.05$).

Balloon Expulsion. A test of integrated pelvic floor function, balloon expulsion, was introduced by Preston

et al.[21] We used a similar method. A balloon attached to a catheter was inserted into the rectum and inflated with 50 mL warm water. Subjects then attempted to pass the balloon spontaneously. If spontaneous evacuation did not occur, weight was added incrementally to the catheter until the balloon could be passed. In preliminary studies[19] we found that most control subjects could spontaneously evacuate the balloon. In controls who could not spontaneously pass the balloon, the mean amount of weight required to pass the balloon was 126 ± 41 g. Patients with defecation disorders, however, could not spontaneously pass the balloon, and the mean (± SD) amount of weight required to facilitate passage was 590 ± 114 g ($p < 0.05$).

Defecating Proctogram. This study, described by Mahieu and others,[22] documents the anatomy of the rectum and anal canal during straining. Among patients with difficult defecation, occult rectal prolapse and physiologically significant rectoceles are visualized readily. It is imperative that the studies be interpreted with caution, however, because some degree of intussusception is demonstrated in nearly half of healthy young volunteers.[23]

This series of tests of pelvic floor function was performed, because no individual study has been a reliable discriminator pathognomonic for pelvic floor dysfunction.

Upper Gastrointestinal Manometry. Multichannel perfused catheter studies have been described previously.[24] Patients were candidates for study if symptoms of upper gastrointestinal distress were present. These included nausea, vomiting, and bloating within 30 minutes of eating, weight loss, and upper abdominal pain.

Diagnostic Categories

Patients were placed into the following four diagnostic groups based on results of the function studies.

I. STC; slow transit constipation—in these patients, colon transit was abnormally slow and pelvic floor function normal.
II. PFD; pelvic floor dysfunction—these patients had normal colon transit but abnormal pelvic floor function.
III. STC + PFD; slow transit constipation and pelvic floor dysfunction—these patients had abnormally slow transit and abnormal pelvic floor function.
IV. IBS; irritable bowel syndrome—these patients had normal colon transit and normal pelvic floor function. They therefore had no quantifiable abnormality of transit or pelvic floor function and, for lack of a more precise term, these patients were diagnosed as irritable bowel syndrome.

Results

Patient Characteristics

Table 1 details the demographic and symptomatic data on the 277 patients by diagnostic category.

Patients. The largest group of patients was the one with normal parameters of bowel function (IBS). Importantly only 83 of 277 patients (30%) had objective evidence of either colon or pelvic floor dysfunction.

Age and Sex. Patients with either pure pelvic floor dysfunction (PFD) or pelvic floor dysfunction and slow transit constipation (STC + PFD) were significantly younger than the patients with irritable bowel syndrome (IBS) and tended to be younger than those with slow transit alone (STC). Over 80% of patients in each diagnostic category were women.

Symptoms. Spontaneous stools occurred least frequently in patients with STC, either alone or combined with PFD. Moreover these same patients had the least number of stools per week, whether spontaneous or facilitated by medication. Patients with slow transit as a component of their constipation therefore appeared to be more profoundly constipated than were patients who complained of constipation but who did not have slow transit.

There was a trend for more patients with a combined disorder (STC + PFD) to facilitate stooling using enemas compared with patients in the other groups. The type and frequency with which medications were used to aid stooling, however, did not appear to distinguish among the patient groups.

TABLE 1. *Characteristics of 277 Patients Presenting with Intractable Constipation by Diagnostic Category (Mean ± SD)*

Group	N	Age (yr)	Women (%)	Spontaneous Stools (% of patients)	Stools/wk (N)	Enemas (% of patients)	Laxatives (% of patients)	Facilitated Defecation (% of patients)
I Slow transit constipation	29	40 ± 16	84	3†	0.1 ± 0.2‡	44	67	11
II Pelvic floor dysfunction	37	36 ± 17*	89	18	1.2 ± 2.0	46	50	41§
III Slow transit constipation + pelvic floor dysfunction	14	33 ± 17*	89	0†	0.2 ± 0.4	78	67	11
IV Irritable bowel syndrome	197	43 ± 17	82	22	NA	50	60	17

* Groups II and III younger than Group IV ($p < 0.04$).
† Fewer patients in Groups I and III stooled spontaneously than patients in Group IV ($p < 0.02$).
‡ Stool frequency less than Group II ($p < 0.001$).
§ More patients in Group II facilitated defecation than patients in Groups I, III, and IV ($p < 0.02$).

Importantly patients with pure pelvic floor dysfunction (PFD) facilitated defecation digitally more often than did patients with STC alone or those with STC + PFD. These patients with PFD often reported straining endlessly on the toilet before digitally extracting the stool. Interestingly this was not a problem reported by patients with PFD and slow transit, perhaps because there was no stool in the rectum to extract.

Physiologic Results (Table 2)

Colon Transit. Patients with STC or STC + PFD had significantly slower colon transit times than did patients with pure PFD or IBS ($p < 0.05$).

Pelvic Floor and Anorectal Manometry. There were no differences among groups in mean resting or squeeze anal pressures or rectal capacity. The rectal-anal sphincter inhibitory response was present in all patients, thus ruling out Hirschsprung's disease in the entire group.

EMG. During defecation straining, some patients in all groups demonstrated paradoxical puborectal muscle contraction. In patients with PFD either alone or combined with STC (STC + PFD), 56% and 50% of patients had paradoxical contraction, respectively. In contrast only 43% of patients with STC alone and 34% of patients with irritable bowel syndrome had paradoxical activity in the puborectal muscle. It therefore appeared that abnormal motor activity of the puborectal muscle was not specific for PFD, although the highest incidence (56%) was in the group of patients with pure PFD.

Scintigraphic Balloon Topography. The magnitude of movements of the anorectal angle during defecation were similar across all groups. There was a trend for STC + PFD patients to open the anorectal angle less than all the other groups. The mean difference between rest and defecation angles in patients with STC + PFD was 3°, whereas it was 13° in patients with STC alone, 9° in patients with PFD alone, and 10° in IBS patients. None of these differences, however, were statistically significant.

Pelvic floor descent, however, was different among groups. Patients with PFD either alone or combined with STC had less descent of the pelvic floor than did patients with pure STC or IBS.

Scintigraphic Evacuation. Patients with STC + PFD had significantly less evacuation of radiolabeled artificial stool than did patients with STC or IBS.

Balloon Expulsion. Significantly fewer patients with PFD (19%) and patients with STC + PFD (13%) spontaneously evacuated the rectal balloon than did patients with either STC alone (60%) or irritable bowel syndrome (42%) ($p < 0.05$). Of the patients unable to evacuate spontaneously, patients with PFD or STC + PFD required greater weight to pass the intrarectal balloon than did patients with pure STC or IBS.

Defecating Proctograms. Eight patients, three with STC + PFD and five with STC, had symptoms of rectal fullness and tenesmus sufficient to warrant obtaining a defecating proctogram, even though previous studies, often including a defecating proctogram, had shown no diagnostic abnormalities. All three patients with STC + PFD were normal. Of the patients with STC alone, three patients were normal and one had a rectocele that did not significantly interfere with defecation. The remaining patient had a rectocele that impaired defecation; this patient underwent rectocele repair first and then abdominal colectomy and ileorectostomy.

Upper Gastrointestinal Manometry. Twenty-seven of two hundred seventy-seven patients had upper gastrointestinal manometry performed. Sixteen were normal and 11 showed evidence of small bowel pseudo-obstruction. Four of these patients underwent abdominal colectomy and ileorectostomy, including three patients from group I (STC) and one from group III (STC + PFD). Despite this diagnosis all four were doing well postoperatively, although one has required intermittent use of cisapride.

Management

Slow Transit Constipation. Having determined that all treatment modalities had been explored and had failed, and if the patient was psychologically fit, abdominal colectomy and re-anastomosis was performed in the STC

TABLE 2. *Results of Colonic and Pelvic Floor Function Tests in 277 Patients with Intractable Constipation (Mean ± SD)*

Group	Colon Transit (hr)	Pelvic Floor Descent (cm)	Scintigraphic Expulsion (% of instillate)	Balloon Expulsion (g needed to defecate)
I Slow transit constipation	117 ± 25*	2.4 ± 1.5	67 ± 21	70 ± 144
II Pelvic floor dysfunction	80 ± 38	1.4 ± 1.8†	58 ± 22	248 ± 182‖
III Slow transit constipation + pelvic floor dysfunction	118 ± 19*	0.6 ± 0.6‡	44 ± 23§	322 ± 203¶
IV Irritable bowel syndrome	68 ± 35	1.9 ± 1.6	66 ± 20	156 ± 187

* Transit slower than Groups II and IV ($p < 0.05$).
† Descent less than Group I ($p < 0.05$).
‡ Descent less than Groups I and IV ($p < 0.05$).
§ Percent expulsion less than Groups I and IV ($p < 0.05$).
‖ Weight required greater than Group I ($p < 0.05$).
¶ Weight required greater than Groups I and IV ($p < 0.05$).

group (n = 29). All patients underwent postoperative follow-up by a nurse and data clerk at 2 months, 6 months, and at yearly intervals thereafter.

Pelvic Floor Dysfunction. Patients with abnormal pelvic floor function (n = 37) underwent an intensive 10-day inpatient pelvic floor retraining program. Patients were admitted to an extended care facility of the hospital. Diet and activity were controlled. Pelvic floor retraining was performed after the manner of Bleijenberg and Kuijpers[25] and Weber et al.,[26] using biofeedback techniques. Patients were taught to relax the pelvic floor during straining and to correlate relaxation and pushing to achieve defecation.

Slow Transit Constipation + Pelvic Floor Dysfunction. Of the patients having a combined disorder (STC + PFD; n = 14), nine underwent pelvic floor retraining followed by ileorectostomy. Five patients completed retraining but have not had surgery performed.

Irritable Bowel Syndrome. Patients with normal studies were re-referred to their physicians with a diagnosis of IBS (n = 197) for further symptomatic care. No further diagnostic or any surgical maneuvers were performed in these patients.

Clinical Outcome

Thirty-six patients with STC alone and STC combined with PFD underwent colectomy and ileorectostomy; two underwent ileosigmoidostomy. The abdominal colon was removed using a conservative mesenteric dissection technique. The presacral space was entered, sparing the sympathetic nerves, the lateral rectal stalks loosened but not severed, and an ileorectal anastomosis into the proximal rectum was completed by a handsewn technique.

The colons from all patients underwent conventional histologic examination. There was no evidence of a myopathic process in any specimen; the smooth muscle appeared normal throughout. The mucosa harbored a mild to moderate degree of melanosis coli in only one patient. Special stains were performed in 25 specimens and ganglion cell and neuronal degenerative changes similar to those defined by Krishnamurthy et al.[27] were found in 15.

The mean (± SD) length of postoperative hospital stay was 12 ± 2 days for all patients. Bowel function returned in mean 6 ± 4 days after surgery. There were no deaths. The in-hospital morbidity rate (30-day) was low (Table 3). The complications that did occur were minor. Five patients had a prolonged ileus; such patients usually had bowel function return early, but, because the abdomen remained distended, they required prolonged nasogastric decompression. Hospital stay in this group of ileus patients, however, was no longer than that of patients without an ileus. No patient required reoperation during the immediate postoperative period.

One of the two patients who had had an ileosigmoidostomy developed recurrent constipation within 4 months of the original operation. This patient was reoperated on and an ileorectostomy was performed.

TABLE 3. *Early and Late Complications of Abdominal Colectomy and Ileorectostomy in Patients Operated on for Slow Transit (Group I) or Slow Transit + Pelvic Floor Dysfunction (Group III)*

Complication	No. of Patients (%)
Early	
Prolonged ileus	5 (13)
Wound infection	1 (3)
Urinary tract infection	2 (5)
Reoperation	0
Incontinence	0
Late	
Small bowel obstruction (no. episodes/no. patients/ patients reoperated)	6/4/3
Ventral hernia	1 (3)
Pancreatitis (resolved)	1 (3)
Incontinence	0

The most frequent long-term complication was small bowel obstruction. Six episodes of small bowel obstruction occurred in four different patients from 2 months to 4 years after operation. Three of these four patients required reoperation to lyse adhesions.

Follow-up was complete in all but one patient. The mean length of follow-up was 20 months. Except for the patient converted from ileosigmoidostomy, no patient had recurrent constipation. One patient with documented small intestinal pseudo-obstruction did, however, use laxatives for a few weeks postoperatively. The one patient who had an ileorectostomy after failed ileosigmoidostomy has remained free of constipation.

The postoperative stool frequency among all patients declined from 4 per 24 hours to 2 per 24 hours by 3 years (Fig. 2). Approximately two thirds of patients passed solid stools soon after operation, rising to 100% of patients at the 3-year follow-up (Fig. 3). Gratifyingly the number of patients with liquid stools even at the 2-month interval was less than 10%. The requirement for bulking agents declined from 40% at 2 months to none by 3 years after operation (Fig. 4). Importantly Lomotil® or Imodium® were used by only a few patients early after their operation and no patient used them after 1 year (Fig. 4). At every interval of follow-up from 2 months to 3 years, all patients were continent.

Discussion

We found that tests of colonic and pelvic floor function, administered prospectively in patients with intractable constipation, delineated patients with slow transit constipation alone or patients with slow transit constipation and pelvic floor dysfunction, who were amenable to operative management, from those with pelvic floor dys-

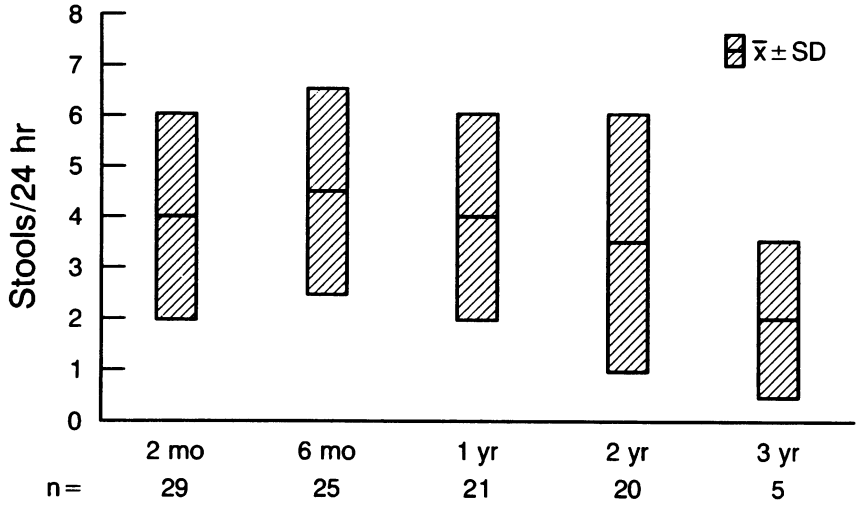

FIG. 2. Plot of stool frequency of 38 patients from 2 months to 3 years after abdominal colectomy and ileorectostomy for slow transit constipation (Group I; n = 29) and slow transit + pelvic floor dysfunction (Group III; n = 9).

function alone and irritable bowel syndrome, who were not. These observations confirm and extend those of others who have demonstrated several different causes for chronic constipation in adults.[3-7]

Hinton and colleagues[28] described the abnormally slow movement of radiopaque markers through the colon and later labeled such patients as having slow transit constipation.[3] The cause of slow transit constipation is unknown, but may be related to abnormalities of smooth muscle innervation.[27] Patients with profoundly slow transit as the sole cause of their constipation are likely to benefit from colectomy.[29]

Conversely Preston and Lennard-Jones,[4] Read et al.,[5] Turnbull and colleagues[6] and Barnes et al.,[30] in a series of interesting observations, have shown that impaired defecation is another significant functional cause of constipation. The typical patient is a young woman with severe chronic intractable constipation who describes difficulty with expulsion of stool, failure to pass an artificial stool, or failure to pass barium or a rectal balloon. The cause of impaired defecation was hypothesized to be failure of the puborectal muscle and external anal sphincter to relax on straining.[4] This was termed "anismus." Patients who underwent surgery for anismus, which entailed division of the puborectalis muscle, fared poorly.[30,31]

In addition to anismus, defecation disturbances are caused by anatomic abnormalities, such as Hirschsprung's disease, occult and complete rectal prolapse, descending perineum syndrome, and functionally significant rectoceles. Among these surgery for Hirschsprung's disease, complete rectal prolapse, and rectocele is likely to be successful.

Finally irritable bowel syndrome (IBS), a poorly understood problem, has been implicated as a key player in causing constipation in large numbers of patients.[32] These patients have constipation alone (constipation-predomi-

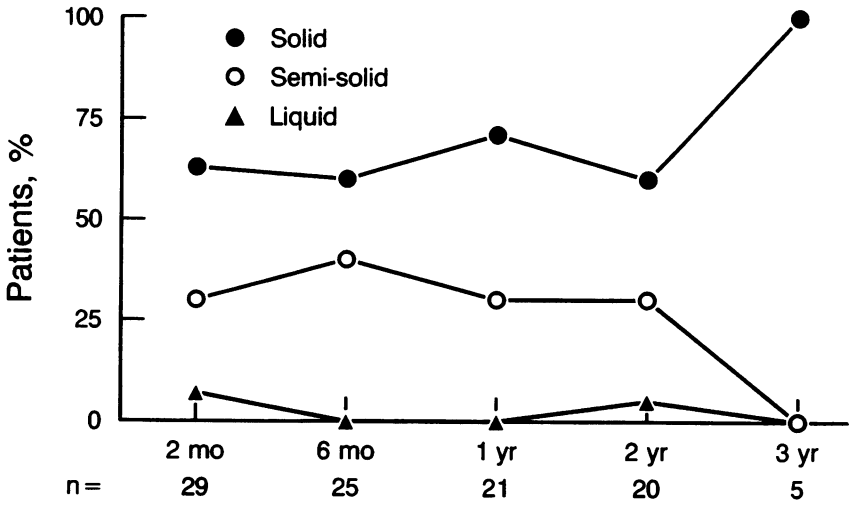

FIG. 3. Plot of stool consistency among 38 patients from 2 months to 3 years after abdominal colectomy and ileorectostomy for slow transit constipation (Group I; n = 29) and slow transit + pelvic floor dysfunction (Group III; n = 9).

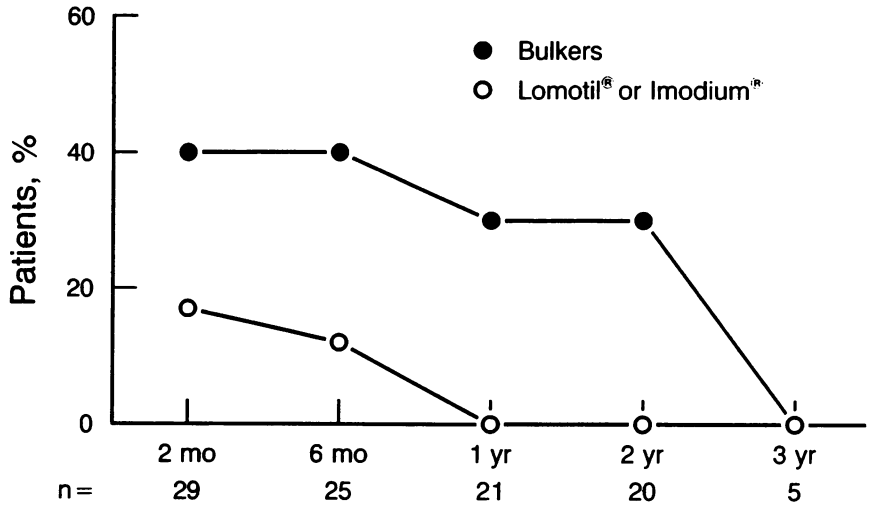

FIG. 4. Use of bulking agents and the hypomotility agents Lomotil (diphenoxylate) and/or Imodium (loperamide) among 38 patients from 2 months to 3 years after abdominal colectomy and ileorectostomy for slow transit constipation (Group I; n = 29) and slow transit + pelvic floor dysfunction (Group III; n = 9).

nant IBS) or alternating constipation and diarrhea. Characteristically patients complain excessively of abdominal pain, and pass small hard pellets of stool but usually have normal colon transit.[33] Our findings in patients with IBS, the largest group of patients evaluated by far, agree with these observations. Patients with IBS respond poorly to surgery; indeed ileorectostomy may be a spectacular failure, with end ileostomy the final result. We therefore did not operate on any of these patients.

There is little doubt that the key to selecting patients who will benefit from surgery is objective physiologic testing. To delineate causes we measured colonic and pelvic floor function quantitatively using tests previously validated in pilot studies in our laboratory. We found that these tests appeared to delineate patients into causative and treatment groups in a relatively straightforward and reliable manner, with predictable results. Importantly selection of patients who were candidates for operation and who subsequently did well was facilitated.

Certainly Keighley[8] is right in warning surgeons to be conservative when intervening surgically in patients with constipation. This stance and our conservative philosophy was based on the somewhat checkered history of surgery for constipation. Indeed results of surgery for constipation vary dramatically even in the most recent literature.[10,12,34–36] One major reason for this variability is that mechanisms of constipation were rarely investigated before operation; a quite heterogeneous patient population therefore was operated on, with highly variable outcomes the inevitable result. One small study did divide patients into slow transit and "outlet obstruction" groups.[29] Patients with slow transit did well after ileorectostomy, as they did in our series.

Even though the patients studied were already highly selected, systematic evaluation identified a quantifiable abnormality of colonic or pelvic floor function or both in only 83 of 277 patients (30%). The rest had normal studies. Twenty-nine (10%) of the entire group of 277 patients had slow transit constipation, 37 (13%) had pelvic floor dysfunction, and 14 (5%) had both; therefore only 15% of all patients presenting with intractable severe constipation were deemed possible candidates for surgery. It is not surprising therefore that the results of previous surgical series, which did not evaluate patients prospectively and thus did not categorize them preoperatively, were so variable.

When performed in patients with slow transit and normal pelvic floor function, abdominal colectomy and ileorectostomy was safe and effective; patients had four stools per day from 2 months to 2 years, decreasing to 2 per day at 3 years. No patient was incontinent. Importantly constipation has not recurred in this group. These results are similar to those reported by several authors,[29,37,38] but stand in direct contrast to others.[12,39,40] Although the mean follow-up was 20 months in our patients, function could indeed deteriorate over time and constipation could recur; continuing evaluation is therefore mandatory.

Among the two patients who underwent ileosigmoidostomy instead of ileorectostomy, one failed and an ileorectostomy had to be constructed. These observations agree with those of Vasilevsky et al.[34] and Belliveau et al.,[41] who reported relatively poor results in patients undergoing ileosigmoidostomy. Indeed in our studies segmental colon transits did not show a predominant degree of slowing in any one segment in particular; less than total colectomy with anastomosis into the rectum proper results in continuing constipation in most patients and should not be performed.

Colectomy has not been advocated in patients with small intestinal pseudo-obstruction because symptoms of constipation usually recur.[24] The four patients with manometrically documented small bowel pseudo-obstruction operated on in this series, however, did well; one

took a laxative for 3 weeks and stopped and one has been given cisapride intermittently for unknown reasons by her referring physician despite a lack of complaints. There is little doubt that problems might occur in these patients in the future, but at a mean of 20 months after operation, bowel function is stable and predictable.

Fourteen patients in our study had "combined" slow transit constipation and pelvic floor dysfunction. It seems possible that these patients may have failed ileorectostomy alone, because defecation abnormalities would have persisted postoperatively. Indeed continuing constipation has been reported to occur after ileorectal anastomosis for constipation[2,39,40]; patients who are constipated after ileorectostomy likely have abnormal pelvic floor function. Our patients therefore underwent pelvic floor retraining first. Thirteen of fourteen (93%) learned to stool spontaneously during this program and thus became candidates for colectomy. The results of ileorectostomy in the nine patients operated on did not differ from that of the larger group of pure slow transit patients (STC). No patient had recurrent constipation or incontinence.

Frequent watery stools and incontinence have been reported after ileorectostomy for constipation.[42] This did not occur in our series. One explanation might be that we did not, to the best of our knowledge, operate on patients with IBS.

In summary tests of colonic and pelvic floor function distinguished intractably constipated patients with slow colonic transit who were candidates for operation from those with pelvic floor dysfunction or irritable bowel syndrome who were not. Patients with pelvic floor dysfunction underwent pelvic floor retraining. Results in this group of patients await further analysis. A subgroup of patients with PFD and SCT, however, underwent pelvic floor retraining successfully first and then operation. Patients with IBS continued with medical management.

We concluded that abdominal colectomy and ileorectostomy in patients shown to have slow transit alone or combined pelvic floor dysfunction and slow transit constipation was safe and effective and resulted in prompt and prolonged relief of constipation.

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Discussion

DR. HARVEY J. SUGERMAN (Richmond, Virginia): I believe this is an important study by Dr. Pemberton that documents a small subset of patients with severe intractable constipation who have slow colonic transit and will benefit from a total abdominal colectomy and ileoproctostomy. Other studies have shown clearly that partial colectomy, as in one of their patients, is destined to fail, and routine studies, such as barium enema and colonoscopy, although necessary to rule out other causes of constipation, are normal in those with slow transit constipation.

The prime diagnostic test is rather simple; namely the passage of little pieces of cut-up radiopaque nasogastric tubing into the rectum within a reasonable period. The other critical test is to detect a rectal-anal sphincter inhibitory response to balloon distension using anal manometry to rule out Hirschsprung's.

I have several questions regarding the evaluation and management of these patients. Which of the other tests you performed—defecography, scintillation topography, balloon evacuation, scintigraphic evacuation, EMG of the puborectalis muscle, etc.—are necessary in the evaluation of these patients?

Although similar results were noted by Dr. Becker's group in a much smaller number of patients (Zenilman ME, Dunnegan DL, Soper NJ, Becker JM. Successful surgical treatment of idiopathic colonic dysmotility. Arch Surg 1989; 124:947–951) presented to the Western Surgical Association 2 years ago, Yoshioka and Keighley (Yoshioka K, Heighley MRB. Clinical results of colectomy for severe constipation. Br J Surgery 1989; 76:600–604) noted that 12 of 40 of their patients so treated required additional surgery, a permanent ileostomy in 6 of the 40, due to severe diarrhea, and a completion proctectomy and ileal pouch anal anastomosis in another six because of the recurrence of severe constipation. Mr. Nichols (Nichols RJ, Kamm MA. Proctocolectomy with restorative ileoanal reservoir for severe idiopathic constipation. Report of two cases. Dis Colon Rectum 1988; 31:968–969) also noted recurrence of severe constipation in two patients who had a subsequent excellent functional result with the ileo-anal procedure.

Do you believe the high incidence of diarrhea after colectomy and the ileo-proctostomy noted by Yoshioka and Keighley was the result of anal myomectomy performed in a number of their patients? Do you believe that there is any place for anal myomectomy in patients with pelvic floor dysfunction?

As your longest follow-up is only 4 years with a mean of 20 months, do you believe that is enough time to be certain that recurrent constipation will not occur? Finally do you believe there is any place for colectomy, proctectomy, and the ileo-anal procedure for severe constipation?

I very much enjoyed reading this paper and feel that it will provide a significant aid in the evaluation and management of this constipation problem.

DR. MARTIN S. LITWIN (New Orleans, Louisiana): This paper is unusual, because it calls to our attention a problem that surrounds us almost every day and that we frequently refuse or fail to recognize.

Intermittent abdominal distension with constipation and vague abdominal pain relieved by passage of flatus and stool are common chronic complaints, particularly among middle-aged women. Their symptoms are vague and their responses to conservative treatment, including laxatives and stool softeners, are so poor that they are often diagnosed as having intestinal problems of psychosomatic origin. Irritable bowel syndrome is an example.

Frequently they have earlier undergone hysterectomy or other pelvic procedures. In 1984 we reported four such patients, all of whom had earlier undergone gynecologic operations (*Am Surg* 1984; 50:479–481). In our patients their complaints were based on the presence of pelvic adhesions resulting from their earlier gynecologic operations. These adhesions were at the internal operative sites that had not been reperitonealized and severely distorted their sigmoid colon. This in turn produced partial and chronic sigmoid colon obstruction.

All the diagnoses were made during colonoscopy. At that time we noted sharp angulation of the sigmoid that was caused by contracture of the adhesions at the sites that had not been reperitonealized. At the time of colonoscopy, all patients noted induction of typical crampy pain not relieved by intravenous glucagon when the angulation was either passed or partially straightened with the colonoscope.

Once the diagnoses were made, treatment of these patients consisted of lysis of adhesions, restoration of the colon to its normal anatomic position, and reperitonealization of the exposed pelvic surfaces.

I would be interested to know from Dr. Pemberton the history of previous pelvic surgery, the success rate of the 183 patients that had the irritable bowel syndrome, and the method by which pelvic floor retraining was accomplished.

Additionally I would appreciate information as to his definition of constipation. Patients in his study appeared to me to have been relatively young.

DR. STANLEY M. GOLDBERG (Minneapolis, Minnesota): This is a most diligent attempt to develop a coherent physiologic directed treatment approach to the constipated patient.

We completely support the comprehensive evaluation of the constipated patient. We also have difficulty in classifying this condition, which has a recognizable overlap of physiologic abnormalities.

This brings me to my first question. In your group of patients with slow transit time constipation, at least 40% had an abnormality of their pelvic floor function, either an inappropriate puborectalis in 43%, or 40% failed the balloon expulsion test. Is it possible that a proportion of these patients with pelvic floor dysfunction would have benefited from biofeedback alone and avoided a colectomy?

Our experience has also led us to be very cautious in recommending subtotal colectomy for patients with pelvic floor dysfunction. We recently did anal-rectal physiologic assessments on 18 patients before subtotal colectomy. Our postoperative complication rate is similar. We had an 11% small bowel obstruction rate requiring laparotomy. Three patients with nonrelaxing puborectalis muscle underwent subtotal colectomy, and these three had a suboptimal result. We defined a suboptimal result as a subsequent need for an ileostomy or, quote, excessive straining at stool.

This brings me to my final question. Han Kuijpers of Nijmegen has shown that 14 out of 16 patients with pelvic floor dysfunction and slow transit time constipation were successfully managed with biofeedback therapy alone. I would be interested to know why all nine patients in