



## Functional Results after Treatment of Rectal Prolapse with Rectopexy and Sigmoid Resection

F.T. Huber, M.D., H. Stein, M.D., J.R. Siewert, M.D., F.A.C.S.

Department of Surgery, Technical University of Munich, Ismaningerstrasse 22, 81675 Munich, Germany

**Abstract.** Constipation and incontinence are frequent complications of rectal prolapse. Surgery should not only aim to correct prolapse but also improve bowel and sphincter function. From 1986–1991 42 patients with procidentia were treated by rectopexy and sigmoid resection. The mean age was 61.1 years. Thirty-nine patients were available for follow-up examination. Mean follow-up was 54 months. Functional data were collected prospectively before the operation and at follow-up and included clinical parameters, a constipation score, an incontinence score, anal manometry [mean resting pressure (MRP), mean maximum pressure (MMP)], proctography [anorectal angle (ARA)] and colonic transit studies [mean transit time (MTT), rectosigmoid transit time (RSTT)]. The postoperative complication rate was 7.1% ( $n = 3$ ), mortality was 0%. No recurrence was seen. Constipation complaints improved from 43.6% to 25.6% ( $p < 0.001$ ) and incontinence from 66.6% to 23.1% ( $p < 0.001$ ). MRP increased from 36.5 mmHg to 46.0 mmHg and MMP from 90.5 mmHg to 103.0 mmHg ( $p < 0.001$ ). ARA changed from 102 to 98 degrees ( $p < 0.001$ ) and correlated with sphincter tone and continence. MTT decreased from 47.8 to 38.5 hours, segmental transit (RSTT) from 21.1 to 12.7 hours ( $p < 0.001$ ). Our results indicate that rectopexy with sigmoid resection is a safe and effective procedure for rectal prolapse and improves functional disorders of bowel and sphincter.

Functional disorders of the anal sphincter and bowel movement are frequently encountered in patients with rectal prolapse. Most of these patients complain of incontinence or constipation, or both. A wide variety of surgical procedures have been suggested to deal with this problem using either the perineal or abdominal approach. Further knowledge about the etiology of procidentia and especially fluoroscopic studies demonstrating the intussusception of large bowel into the rectum [1, 2] led Frykman and Goldberg to propose an operation that would take care of the rectal prolapse and at the same time remove abundant sigmoid colon, thereby preventing further prolapse of loose bowel [3]. Because the sigmoid also plays an important role in chronic constipation, such patients should benefit even more from this procedure. The aim of this prospective study was to evaluate whether this operation is effective and safe and if it would indeed improve sphincter and bowel function.

### Patients and Methods

#### Patients

From 1986 to 1991 we treated 42 patients with rectal prolapse (incomplete,  $n = 5$ ; complete,  $n = 37$ ) by rectopexy and sigmoid resection. Their mean age was 61.1 years (range 30–78 years), and most were female (male/female ratio 1:20).

#### Operation

All patients underwent laparotomy. A careful sharp and blunt dissection of the posterior rectum was performed down to the level of the levator ani, preserving the lateral rectal stalks to avoid damage to the autonomic nerve supply of the rectum [4]. Low rectopexy was achieved with two or three nonabsorbable sutures securing the rectal stalks to the presacral fascia, partially restoring the anorectal angle. Great care was taken to avoid obstruction of the bowel lumen. After rectopexy the abundant sigmoid was resected above the level of the promontory, and a single-layer hand-sewn anastomosis was performed.

#### Follow-up

Of the original 42 patients, 39 were available for follow-up. Of the remaining three patients, two had died of old age, and one patient could not be contacted. The mean follow-up period was 54 months (range 9–81 months).

#### Examination

All patients were evaluated according to a fixed protocol preoperatively and at the time of follow-up. Data were collected prospectively. The protocol includes the following evaluations:

1. *Complaints of constipation:* A careful history was obtained, and complaints were classified as follows:

None: more than four stools per week; no evacuation problems; no use of laxatives

Mild: three stools per week; no emptying problems; no use of laxatives

Moderate: three or fewer stools per week and/or minor com-

plaints of emptying problems; occasional (at least once per week) use of laxatives

Severe: three or fewer stools per week and/or severe emptying problems; regular (daily) use of laxatives

2. *Complaints of incontinence:* Patients were divided into four groups: (1) none; (2) soiling (grade I); (3) flatus and liquid stool (grade II); (4) solid stool (grade III).

3. *Clinical examination:* Careful digital rectal and vaginal examinations were performed. Findings such as mucosal prolapse, bleeding, sphincter tone, perineal descent, rectocele, enterocele, and rectal prolapse were noted. The degree of prolapse was specified (incomplete or complete).

4. *Endoscopy:* Endoscopic examination included proctoscopy, rectoscopy, and colonoscopy (only preoperatively). The degree of prolapse (full thickness or mucosal) was specified. The bowel was inspected for areas of mucosal edema or hyperemia, solitary rectal ulcer, and neoplastic growth. Biopsies were performed where necessary.

5. *Anal manometry:* It was performed with a four-lumen water-perfused standard catheter using a classic station pull-through technique. Results were expressed as follows.

Mean resting pressure (MRP): Normal range 40 to 60 mmHg

Mean maximum pressure (MMP): Normal range 95 to 145 mmHg

Other calculated values (e.g., those obtained by computer-aided three-dimensional manometry) were not used in this study because these data were not yet available for some of the earlier preoperative examinations.

6. *Defecation proctography:* This procedure was done using semisolid barium with the patient in a squatting position. It was performed on every patient. The following findings were noted. Anorectal angle: Normal range  $90 \pm 10$  degrees (at rest);  $110 \pm 5$  degrees (during straining)

Perineal descent

Intussusception

Rectocele: Because rectocele is a regular finding in female patients and often without clinical significance, it was defined as anterior bulging of the rectum with incomplete emptying at defecation.

Enterocele: Enterocele was defined as prolapse of the small intestine into the space of Douglas and pressure on the anterior wall of the rectum.

7. *Colonic transit studies:* Patients were given 20 radiopaque markers on 6 consecutive days (Sitzmarks, Lafayette), and an abdominal radiograph was obtained on day 7. Transit time (TT) was calculated as hours per marker using the following formula.

$$TT = 1.2 \times \text{number of markers}$$

Segmental transit times were obtained by dividing the large bowel into right, left, and rectosigmoid regions. The markers were then counted in the various regions and segmental TTs calculated according to the above mentioned formula [5-7]. The following findings were used for the evaluation.

Mean transit time (MTT): Normal range  $38 \pm 5$  hours

Rectosigmoid transit time (RSTT): Normal range  $13 \pm 2$  hours

8. *Statistical methods:* Descriptive statistical methods (median, lower and upper quartile, range) were used to describe the changes in the functional data before and after treatment caused by nonparametric distribution. Data were assessed by the Wil-

**Table 1.** Preoperative classification of constipation and constipation status at follow-up.

Preoperative status		Follow-up status		No. of pts. with constipation at follow-up
Constipation	No. of pts.	Constipation	No. of pts.	
None	22	None	22	0
Mild	5	None	4	1
		Mild	1	
Moderate	9	None	3	6
		Mild	5	
		Moderate	1	
Severe	3	Mild	1	3
		Moderate	2	
Total pts.	39			
Total with constipation	17 (43.6%)			10 (25.6%)

coxon signed rank test. *p* Values of  $<0.05$  were considered significant for this study. All calculations were performed using the statistical software SPSS for Windows Release 5 (SPSS Inc., Chicago, Illinois, U.S.A.)

## Results

### Preoperative Examination

Complete prolapse was found in 37 patients and incomplete prolapse in 5. Rectocele was seen in 12 patients and enterocele in 3. Complaints of constipation were present in 17 of the 39 patients (43.6%). In three patients symptoms were classified as severe, in nine as moderate, and in five as mild. Incontinence was noted in 26 patients (66.7%); in 7 patients with solid stool (grade III), in 14 patients with flatus and soft stool (grade II), and in 5 patients with occasional soiling (grade I). Two patients presented with solitary rectal ulcer and incomplete prolapse. There was no evidence of neoplastic growth in any of the patients on endoscopic examination.

### Postoperative Complications

Only three complications occurred during the postoperative period. Two patients had minor infections of the abdominal wound, and one patient had to be readmitted to hospital 5 weeks after the operation for acute small bowel obstruction due to adhesions, requiring relaparotomy. There were no postoperative deaths.

### Clinical Evaluation (Follow-up)

No recurrence of the prolapse was seen on digital and proctoscopic examinations. Two patients had second degree hemorrhoids, which were treated with sclerotherapy. Persisting rectocele was noted in five patients compared with 12 patients preoperatively. Two patients had undergone posterior vaginoplasty.

*Constipation.* Chronic constipation complaints had subsided in most patients or at least changed from a major to a minor degree. Overall constipation decreased from 43.6% ( $n = 17$ ) preopera-

**Table 2.** Preoperative classification of incontinence and status at follow-up.

Preoperative status	No. of pts.	Follow-up status		No. of pts. with incontinence at follow-up
		Continence	No. of pts.	
Continence		Continence		
Continent	13	Continent	13	0
Incontinent		Continent	5	0
Grade I	5	Continent	9	
Grade II	14	Grade I	4	
		Grade II	1	5
Grade III	7	Continent	1	
		Grade I	2	
		Grade II	1	
		Grade III	1	4
<i>Total patients</i>	39			
<i>Total incontinent patients</i>	26 (66.6%)			9 (23.1%)

tively to 25.6% ( $n = 10$ ) at follow-up. Of the three patients preoperatively classified as having severe problems, two improved to a moderate form of constipation and one to a mild form. In the group with moderate preoperative constipation complaints, three patients were free of symptoms after the operation, five patients had mild complaints, and one patient remained unchanged. All but one of the patients with mild constipation had been converted to a regular bowel habit. None of the patients complained of severe constipation at follow-up (Table 1).

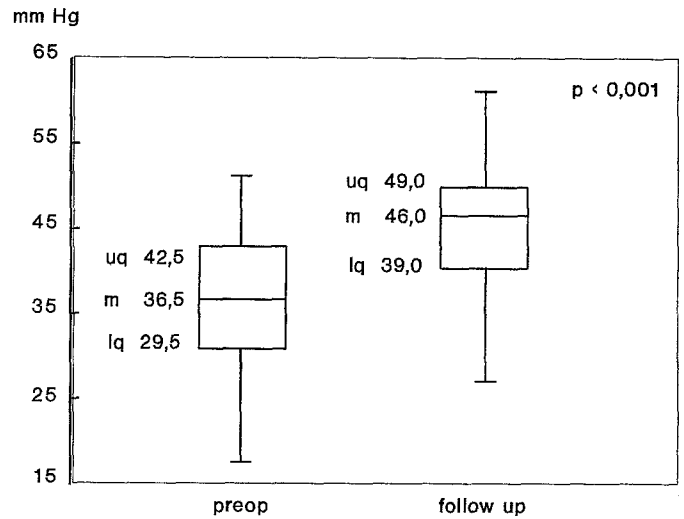
**Incontinence.** At follow-up 76.9% of patients had regained full fecal continence, and 23.1% of patients stated that their symptoms had lessened (Table 2). Of the group of preoperative third degree incontinence patients, one remained unchanged, one improved to second degree, and two to first degree; one patient regained full continence. Of 14 patients with preoperative second degree incontinence, only one patient was unchanged; four patients improved to first degree; and nine patients had normal continence at follow-up. All patients with preoperative first degree incontinence showed normal function after treatment. Three patients fully continent preoperatively noted an increase in stool frequency, yet without deterioration of continence function. Both *solitary rectal ulcers* had healed after successful rectopexy and sigmoid resection.

**Anal Manometry**

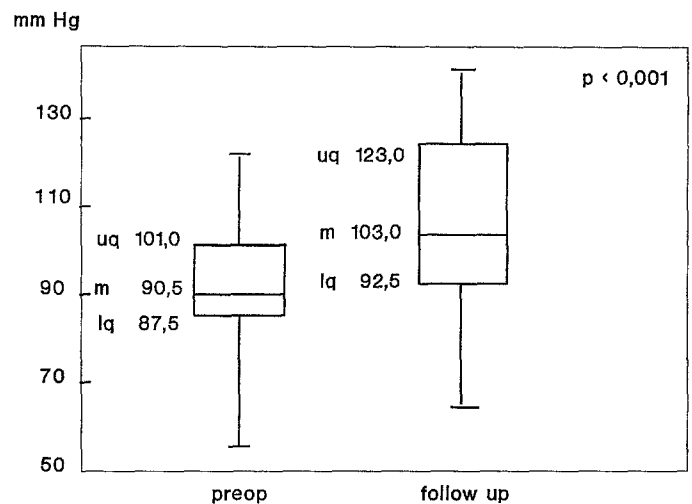
The two manometric parameters (MRP, MMP) assessed in this study showed a significant improvement towards normal values. The MRP increased from 36.5 mmHg to 46.0 mmHg ( $p < 0.001$ ) and the MMP from 90.5 mmHg to 103.0 mmHg ( $p < 0.001$ ) (Figs. 1, 2). Manometry results correlated strongly with fecal continence.

**Proctography**

Proctography revealed no recurrent occult intussusception. As already seen clinically, five patients showed a rectocele on follow-up examination. There was a slight decrease in the mean



**Fig. 1.** Mean resting pressure. Manometry data obtained preoperatively and at follow-up are described as median (m), lower quartile (lq), and upper quartile (uq). T-bars represent the range of data.



**Fig. 2.** Mean maximum pressure. Manometry data obtained preoperatively and at follow-up are described as median (m), lower quartile (lq), and upper quartile (uq). T-bars represent the range of data.

anorectal angle at rest (102 degrees preoperatively and 98 degrees at follow-up), which gained statistical significance when looking at the overall results ( $p < 0.001$ ). Improvement of the anorectal angle correlated with improved sphincter tone and continence (Fig. 3).

**Transit Studies**

Preoperative transit studies revealed prolonged colonic passage in more than 50% of the patients with clearly decreased transit time postoperatively (MTT 47.8 hours to 38.5 hours). It was also true for the segmental transit time in the rectosigmoid (RSTT 21.1 hours decreased to 12.7 hours) even though a small number of individuals did not improve as dramatically here as in total transit time (Figs. 4, 5).

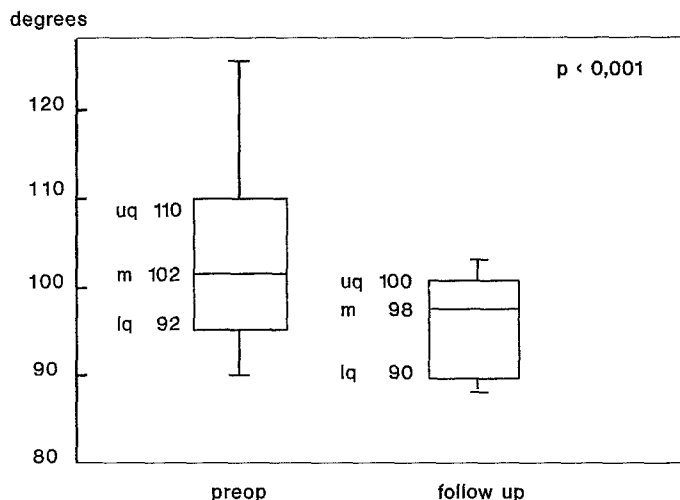


Fig. 3. Anorectal angle. Proctography data obtained preoperatively and at follow-up are described as median (m), lower quartile (lq), and upper quartile (uq). T-bars represent the range of data.

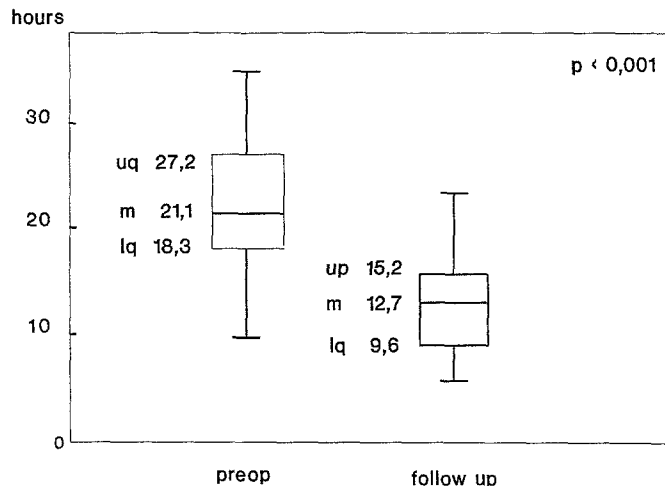


Fig. 5. Rectosigmoid transit time. Transit data obtained preoperatively and at follow-up are described as median (m), lower quartile (lq), and upper quartile (uq). T-bars represent the range of data. Note the fairly wide spread of data at follow-up in comparison with those for the mean transit time (Fig. 4).

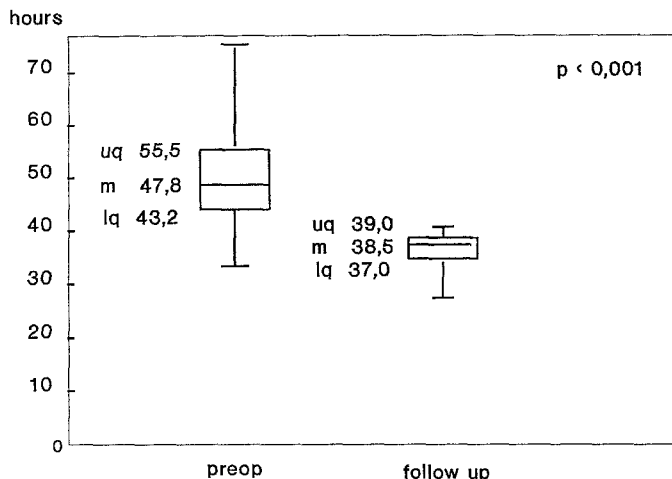


Fig. 4. Mean transit time. Transit data obtained preoperatively and at follow-up are described as median (m), lower quartile (lq), and upper quartile (uq). T-bars represent the range of data.

**Discussion**

Resection rectopexy is the most aggressive approach to rectal prolapse when compared with the numerous operations reported in the literature [8]. Even though left-sided colon resection has become safe in a modern surgical setup, complications can be severe if they occur. As our data show, however, they can be kept minor and at a low incidence if surgery is performed on strictly elective grounds and basic principles are regarded. The advantage of this procedure is that it does not include the use of great amounts of foreign material as needed for most abdominal techniques (Wells, Ripstein), which often leads to severe reactions and pelvic sepsis in addition to obstruction at the rectopexy site, which is frequently seen especially with Ripstein's procedure [9, 10].

Recurrent rectal procidentia is a well known problem of

prolapse surgery and explains why such a variety of operative procedures has been developed. The mechanism of prolapse is manifold and includes weak sphincter tone, loosening of the posterior rectal attachments, descending perineum, prolonged rectosigmoid facilitating intussusception, and probably pelvic outlet motility disorders [1, 2, 8, 11]. Most operative techniques deal with only one aspect, which explains the high incidence of recurrence not only after perineal procedures where recurrence is found in up to 50% [12] but also following abdominal rectopexy techniques with recurrence rates ranging from 0% to 20% [1, 7, 13-17]. In contrast, recurrence is found in only 0% to 3.6% of patients after resection/rectopexy [1, 3, 12, 18-20], a figure in concordance with our findings. A possible explanation for these favorable recurrence rates is the resection of abundant bowel, which prevents further intussusception, or as Frykman and Goldberg put it: "Of all the weaknesses or abnormalities required to produce rectal prolapse, the only factor that can be controlled with certainty is the length of the colon" [3].

The mechanism for chronic constipation with rectal prolapse is not known. It may be due to obstruction of the pelvic outlet by the intussuscepting bowel and therefore mainly a problem of fecal evacuation. Yet many patients have a history of chronic constipation and straining for many years, often decades, before prolapse becomes apparent, suggesting an inherent motility disorder of the large bowel. At the same time a prolonged sigmoid was found in more than 90% of our patients. Our preoperative transit data showed increased total colonic as well as segmental rectosigmoid transit times in a number of patients. Constipation disappeared or was alleviated after the operation in most of the patients. Whole bowel transit time returned to normal values postoperatively in all the patients with little deviation. Significant changes were also seen in the segmental rectosigmoid transit time, even though the spread of data was wider than for overall transit. This finding could mean that some of the remaining rectosigmoid still shows abnormal motility. To confirm this point, additional motility studies are necessary.

In comparison with other nonresection rectopexy procedures where postoperative constipation is encountered in up to 47% of the patients [4, 9, 21], these problems are not seen after resection/rectopexy [22]; as our results indicate, the constipation is alleviated. The careful preservation of the lateral rectal ligaments seem to play an important role in maintaining the function of the rectum. In a prospective randomized trial Speakman et al. [4] demonstrated a higher incidence of constipation and a significant change in rectal sensation after rectopexy with division of the lateral rectal stalks than in patients in whom the lateral ligaments were not divided. Division of the rectal stalks is believed to lead to some degree of neurologic damage and impairment of the evacuation mechanism, a phenomenon that was not seen when the lateral stalks were spared [4]. However preservation of the lateral rectal ligaments was associated with a higher incidence of recurrent prolapse in this study, a problem that was not seen in our trial. Speakman et al. [4] used a standard rectopexy technique without resection, which might explain the differing results, as in our patients the integrity of rectal innervation was maintained by preservation of the lateral stalks and the problem of recurrent intussusception taken care of by resection of abundant sigmoid.

Another important functional problem frequently accompanying rectal prolapse is fecal incontinence. In some patients sphincter function is impaired long before prolapse occurs and deteriorates with advancing prolapse probably caused by repeated stretching and dilatation. Other patients show normal sphincter control and have only minor complaints of soiling due to the protruding bowel. In recent studies sphincter recovery was found in most of the patients following prolapse repair [18, 22-24] and even more so after resection/rectopexy [22]. It is unclear, however, to what extent and in which way the sphincter recovers. In contrast to our own findings a recent study by Duthie and Bartolo [22] showed that only the resting pressure (internal sphincter) returned to normal, and squeeze pressures (external sphincter) remained at subnormal levels. In our patients both resting and squeeze pressures improved significantly. One possible explanation is the longer follow-up interval in our study (12 months versus 54 months). In addition, all of our patients took part in a strict postoperative pelvic floor training program for at least 6 months after the operation. This phase would also explain the improvement of the anorectal angle (ARA) at rest in most of our patients. In contrast to the Duthie and Bartolo study [22], the improved ARA correlated well with improved sphincter pressures and continence, even though great individual variations were noted. Therefore proctography alone could hardly be a strong predictor of successful prolapse repair.

In conclusion, our findings show that rectopexy and sigmoid resection is a safe, effective procedure for rectal prolapse. Recurrence rates are lower than with nonresection procedures. Sphincter function improves significantly. Constipation problems also improve in most patients, probably owing to the combination of preserving the lateral rectal ligaments, thereby avoiding damage to the innervation of the rectum, and to the resection of abundant sigmoid.

## Résumé

Des désordres fonctionnels du sphincter anal et une irrégularité des selles sont souvent rencontrés chez les patients ayant un

prolapsus du rectum. La majorité des patients se plaignent d'incontinence ou de constipation ou des deux. Une large variété de procédés chirurgicaux ont été avancés pour traiter ce problème que ce soit par voie périnéale ou par voie abdominale. Une meilleure connaissance de l'étiologie des prolapsus et surtout les études radioscopiques démontrant l'invagination du côlon dans le rectum ont amené Frykman et Goldberg à proposer une intervention qui traite en même temps le prolapsus et l'excès de longueur du côlon sigmoïde, contribuant ainsi à prévenir la récurrence du prolapsus du côlon. Puisque le côlon sigmoïde joue un rôle important dans la chronique, de tel patients relèvent doublement de ce procédé.

## Resumen

Alteraciones funcionales del esfínter anal y del movimientos intestinal y la defecación son hallazgos frecuentes en pacientes con prolapso rectal. La mayoría de estos pacientes sufre incontinencia y estreñimiento, o ambos. Se ha propuesto una gran variedad de procedimientos quirúrgicos para tratar este problema, tanto por abordaje perineal como por abordaje abdominal. El mayor conocimiento sobre la etiología de la prociencia (prolapso mayor) y, especialmente, los estudios fluoroscópicos que demuestran la intususcepción del intestino grueso en el recto, llevó a Frykman y Goldberg a proponer una operación que al tiempo que corrige el prolapso rectal reseca abundante colon sigmoide, con lo cual se evita un nuevo prolapso del intestino. Puesto que el sigmoide juega un papel de importancia en el estreñimiento crónico, tales pacientes deberían recibir beneficio adicional con el procedimiento. El propósito de este estudio prospectivo fue evaluar si esta operación es efectiva y segura, y si podría realmente mejorar la función es del esfínter y del colon.

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## Invited Commentary

Ralph J. Nicholls, M.D.

Colorectal Cancer Unit, St. Mark's Hospital, City Road, London EC1V 2PS, U.K.

Professor Siewert and colleagues have presented a detailed analysis of the effectiveness of rectopexy with sigmoid resection for rectal prolapse. They have reported a high rate of cure of prolapse itself with minimal morbidity. This report is reassuring to surgeons who might be concerned about combining a sigmoid resection with full mobilization of the rectum. The absence of any anastomotic complications vindicates the safety of the operation and the quality of the surgery.

Of further interest is the information concerning function. Many studies reporting the results of surgery for rectal prolapse have not prospectively established function as part of the preoperative assessment. This study, in company with a few others published recently, has done so. As a result it has been possible to assess accurately the effect of the procedure on bowel frequency and incontinence. The overall trend is toward alleviation of constipation after the operation. This result lends further support to the idea that the sigmoid resection is important in this respect. The study is unfortunately not controlled with another form of rectopexy, but it does demonstrate improved function in contrast

with many reports of rectopexy without resection. The physiologic data concerning sphincter function, anorectal angle, and intestinal transit have in part been reported previously. Of greatest interest among these items are the transit data. Clearly the authors have demonstrated an increase in transit resulting from the resection. The inference strongly supports the idea that constipation associated with rectal prolapse is likely due to some form of colonic inertia. The authors deal with this area adequately in the discussion and go on to consider the question of rectal denervation due to division of the lateral ligaments. They may be right in suggesting that removal of the sigmoid reduces rectal intussusception. The improvement of continence following rectopexy has been known for years. It occurs despite widening of the anorectal angle and certainly seems to be associated with an improvement in anal sphincter tone, as Huber et al. have demonstrated and as others have done before.

There has probably been a general decline in the number of conventional rectopexies carried out owing to the concern that constipation may worsen. Many surgeons have responded by using a perineal approach, for example, Delorme's operation or a modified rectosigmoidectomy. It must now be appropriate for a randomized controlled trial of rectopexy and sigmoid resection compared to Delorme's procedure. The thoroughness and comprehensiveness of the study of Huber et al. is a firm statement of the effectiveness of this operation for prolapse.