

Clinical and Manometric Evaluation of Continence after the Bacon Two-stage Pull-through Procedure

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Twenty-eight patients who underwent the Bacon pull-through operation were evaluated for continence by clinical and radiologic means. Six patients were available for anal manometry. Eighty-three percent of those patients followed for function did not have the sensation to defecate spontaneously. They had normal functioning of the external sphincter, failure of reflex inhibition of the internal sphincter, and decreased rectal compliance secondary to fibrosis of the presacral space. These factors created a distal high-pressure zone which, when combined with sensory loss due to transection of the levators, rendered the patient continent but without the ability to defecate spontaneously unless an enema was administered. [Key words: Anorectum; Sphincter, anal; Sphincter-saving procedure; Manometry, anorectal; Cancer, rectal]

SELECTED EMBRYOLOGIC MALFORMATIONS, such as Hirschsprung's disease, imperforate anus, the meningo-myelocele, have serendipitously provided models that allowed investigators to study the complex physiologic mechanisms of continence. The Bacon pull-through operation selectively removes the levators and preserves the internal and external sphincters, thus providing another class of patients by which the mechanisms of defecation can be evaluated. In this study, the function of the transplanted colon "pulled through" the levator-less sling was evaluated by clinical, manometric or radiologic means.

Materials and Methods

Twenty-eight patients underwent the two-stage Bacon pull-through operation according to his modified technique.¹ After mobilization of the sigmoid colon by the abdominal operator, perineal excision of the rectum is performed sparing the external and internal sphincter. A plane is created posteriorly where the internal sphincter thins out. The perineal operator places traction on the levators and removes them at their origin. The rectal cancer and sigmoid colon are "pulled through" and

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handled in the classical manner. One week postoperatively, the colo-anal anastomosis is performed.

Twenty-eight patients were available for review from 1960 to 1982. There were 19 males and nine females whose ages ranged from 36 to 76 years (median, 60 years). There were three Dukes' A, 16 Dukes' B, and six Dukes' C. Three patients with synchronous liver metastasis underwent the pull-through operation as a palliative procedure. Mortality was three of 28 patients (11 percent); no mortality was observed, however, in the last 15 years of the study. Of 22 patients followed for cure, four patients were converted to abdominoperineal resections, one for intractable stenosis, one for local recurrence, and two for perforation by an irrigating catheter (one patient 17 years after the Bacon pull-through was performed). Of the 18 remaining patients, three with moderate stricture underwent successful anoplasty. Enemas were required by 15 patients to initiate defecation and three evacuated spontaneously. At the time of the study, 15 patients were alive, seven for ten years, five for four years, and three for two years.

Manometric Results

Six patients underwent anal manometric testing by the method described by Schuster.² The three balloon system was attached to a transducer and Narco-physiograph® (Narco Bio-Systems, Inc., Houston, TX), which transcribed our results. The insufflated rectal balloon allowed us to measure subjective sensation to colonic distention as well as compliance. The internal and external sphincter functions were measured by the respective balloons. Subjective sensation was normal in all six patients, as they could ascertain insufflation of 5 to 15 cc of air at the 7- to 12-cm level. The external sphincter functioned normally in magnitude and duration, contracting to 20 mm Hg for 30 to 45 seconds, and demonstrated augmentation with biofeedback. The internal sphincter failed to undergo reflex inhibition but, rather, showed elevated pressures to distention. Compliance was decreased in all our patients with pain at insufflation to approximately 40 cc of air.

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Controls experienced pain between 200 and 400 cc of air. Lateral barium radiographs showed an increase in the presacral space secondary to fibrosis from the pelvic dissection (Fig. 1).

Discussion

Since the late nineteenth century, when Hochenegg of Vienna devised a pull-through method (Duerchzug) for preserving the rectum in midrectal cancer,³ there have been various modifications of his technique. Bacon⁴ showed that 53.4 percent of 573 patients survived for five years, rates that were consistent with survival of his patients with abdominoperineal resections, the current standard. After the pull-through operation, 61 percent of his patients required enemas to initiate defecation and 0.7 percent needed pads for leakage. Thirty years later, the clinical characteristics described by Bacon remain the same. Using manometry and radiographs demonstrating the anorectal angle, investigators have tried to describe the reasons for his clinical findings.

Iwai *et al.*⁵ described three patients who had a distal high-pressure zone after the Bacon pull-through operation. Two of three patients showed increased anal canal pressure during colonic distention. They believed that resection of the levator ani muscle, with some degree of impairment of the internal sphincter, contributed to the absence of the anorectal reflex. Increase in anal canal pressure was thought to be due to contractions of the external sphincter, which compensates for the resected levator muscle. Pescatori and Parks⁶ studied continence after a mucosal proctectomy with ileoanal reservoir and found that 49 percent of these patients lost the anorectal reflex. Since 86 percent of their patients were continent, they postulated that the inhibitory reflex was not required for continence in these patients. Patients with an S-pouch who require irrigation may be similar to pull-through patients who also have internal sphincter deficits requiring enemas.

Cortesini⁷ discussed his findings after pull-through when the levators were preserved. A decrease in the basal anal canal pressure occurred but, when the rectum was expanded, the anal pressure increased strongly in all patients.

Bennett and co-workers⁸ studied the Turnbull-Cuthbertson method of pull-through with intact levators and concluded that relaxation of the anal sphincter in response to rectal distention does not occur, but is replaced by increased contraction. The new rectum was less distensible, and smaller amounts of rectal contents produced relatively high intraluminal pressure with discomfort. Our results were similar to the latter study.

In our study, manometry clearly showed a normal functioning external sphincter that augmented with bio-

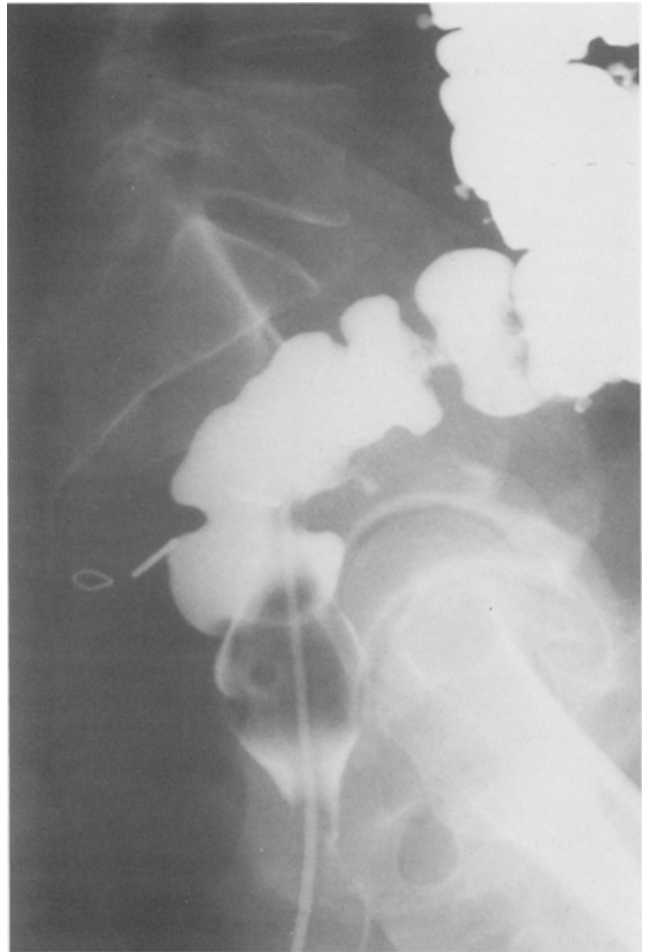


FIG. 1. Note the increase in the retrorectal space.

feedback. There was a failure of reflex inhibition of the internal sphincter. Barium-enema radiographs showed an enlarged presacral space secondary to fibrosis. Clinically, 83 percent of patients studied did not sense the urge to defecate when an enema was given. After an enema, they knew defecation had ended when the bowel movement became liquid and flatus escaped. This sensory loss was due to transection of the levators and, therefore, defecation relied on colonic peristalsis initiated by an enema. Fortunately, the distal high-pressure zone maintains continence.

The Bacon pull-through operation has been shown to have a comparable mortality with less morbidity than abdominoperineal resection. We agree with Kratzer and Matta⁹ that there will always be a need for this type of operation in selected patients with cancer of the mid-rectum, even with the capability of low anastomoses with the EEA instrument. Surgeons dealing with large numbers of patients with rectal cancer should consider the pull-through operation as an alternative to rectal sacrifice.

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