

Rectocolonic Exfoliative Cytology

A New Approach

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An instrument employing saline lavage with simultaneous suction has been devised. This instrument can assist in a) maintaining optimal visualization free of obscuring debris or hemorrhage and b) obtaining material for cytologic examination from the visualized 25-cm length of rectosigmoid and the more proximal bowel. Experience to date reveals excellent correlation of histologic and cytologic diagnoses for lesions within range of the proctoscope and for strictures in which roentgen and biopsy data are inconclusive. A high degree of accuracy (75%) has been demonstrated for sigmoid and left colon lesions. The technic is suitable for the general population as well as those with a higher risk of malignant degeneration (to facilitate the early diagnosis of cancer). Physician time and patient discomfort can be kept to a minimum, and the technic may be applicable as an office procedure.

This year 75,000 Americans will develop cancer of the colon and rectum; rectocolon cancer thus rates as the most common malignancy of an individual organ. Although the opportunity for cure is great, with a potential for saving two-thirds to three-fourths of all patients, the death rate is second only to lung cancer (1, 2).

The accumulated surgical experience of the last 30 years suggests that any increased survival is related to decreased operative mortality with improved pre- and postoperative care and anesthesia advances, rather than to improved basic surgical excision procedures. In addition, the time interval between onset of symptoms

and operation apparently has not decreased over 25 years (3-6).

It seems that, barring major developments in immunochemotherapy, any advance in survival rate in this potentially curable and relatively common disease must come from earlier diagnosis. Of the current practical technics utilized early in diagnosis, exfoliative cytology has proved to be definitive and highly accurate (7). Unfortunately, the vigorous preparation, time and patient education required to achieve the most acceptable results has deterred all but the most zealous of physicians.

The purpose of this report is to summarize the experience with an instrument devised to a) assist the endoscopist in evaluating the bowel without the alterations created by enemas, b) maintain optimal visualization free of obscuring debris or hemorrhage, and c) obtain material from multiple foci, the 25-cm length of visualized rectosigmoid and the more proximal colon for cytology. The procedure represents a means for facilitating the early diagnosis of rectocolonic cancer.

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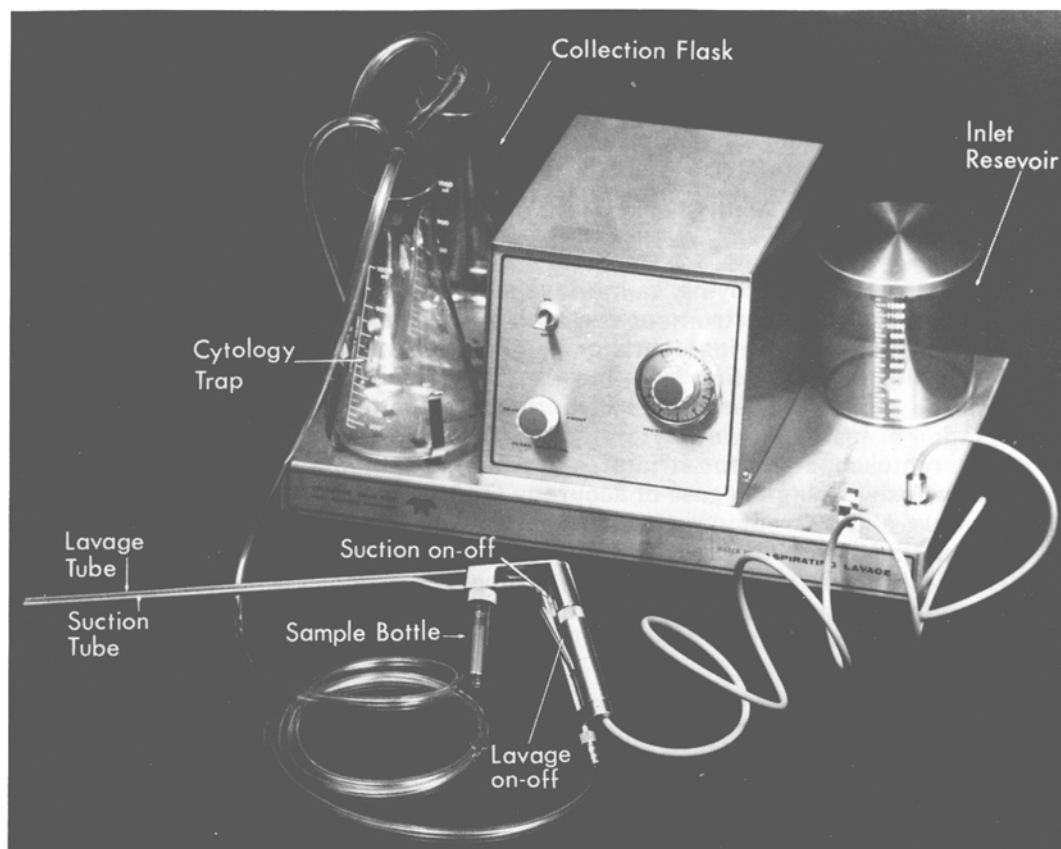


Fig 1. Proctosigmoid lavage and cytology instrument attached to double trap suction system and power unit.

This instrument* (Figure 1) combines the advantage of a water or saline spray under controlled pressure paralleled with a simultaneous suction outlet for collection of multiple aspirates or one continuous sample. It is inserted through a standard sigmoidoscope. Suction and lavage are under fingertip control.

The most recent modification of this instrument utilizes a double vacuum trap system controlled by a diverting switch. This permits the aspiration of a clear cytology sample with immediate diversion of any contaminating debris into a separate collection flask, obviating

the need for withdrawing the instrument and employing a separate suction unit for waste.

The power and suction units are enclosed in a single housing. The rate and pressure (psi) of delivery and suction can be graded accordingly with a maximum delivery of 1100 ml/min of saline and a vacuum range of 0 to 20 inches of mercury.

Preoperative patients (from New York Hospital, North Shore Hospital and Memorial Hospital for Cancer and Allied Diseases) with radiographic or previously documented proctoscopic or left colon lesions were examined in the knee-chest position. No preparative enemas were used in this initial series of rectal mass lesions or strictures. Approximately 500-750

*Diagnostic Lavage Instrument, Water Pik Oral Hygiene Appliance, Teledyne Aqua Tec, Ft. Collins, Colo.

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ml of the saline spray were required to clear mucus and debris from suspicious areas as well as provide an isotonic medium for collection of individual cytologic samples. Cytologic aspirates were obtained immediately via the sigmoidoscope and the instrument in a suction trap containing 300 ml of 95% alcohol. When necessary, alcohol was added to the trap to maintain equal volumes with the aspirate, the latter averaging 400 ml. Subsequently, sodium diatrizoate (Hypaque[®]) was introduced through the instrument. When contrast material was demonstrated as far proximal as the cecum, patients with more proximal radiographic lesions were then studied. If a right colon lesion was suspected, a fluid diet for 2 days preceding the examination was advised. With the patient in knee-chest position, 750–1000 ml of normal saline were introduced by the instrument through the sigmoidoscope. The instruments were withdrawn, the patient was turned on the right side and back, the lower abdomen was massaged, and the patient was then returned to the original position, the instruments reinserted and the aspirate collected. Subsequently, a saline enema was given prior to the examination, particularly when lesions beyond reach of the scope were studied, to minimize procedure time. However, no preparative enemas were used on patients with inflammatory bowel disease, active diarrheal states or active lower gastrointestinal hemorrhage. The cytology aspirate in alcohol was centrifuged at

2500 rpm for 15 min; smears were obtained from the centrifuge "button" and stained with the conventional Papanicolaou method. The remaining sediment was then examined in cell block. This material was interpreted by the Cytology and Pathology Services of Memorial and North Shore Hospitals and the Papanicolaou Laboratory of The New York Hospital.

RESULTS

Of 152 examinations to date, satisfactory specimens were obtained in all but 4 patients. Final histologic diagnoses were obtained at laparotomy in 85 patients. Only these 85 confirmed results are reported. All cytologic diagnoses were made preoperatively. Table 1 lists the initial experience with the instrument in obtaining material from 37 patients with lesions within range of the sigmoidoscope. In this group, which included 9 patients with adenocarcinoma, 1 with lymphosarcoma and 1 with penetrating prostate carcinoma, 100% correlation existed between the cytologic and final histologic diagnoses. In 8 patients a positive cytology diagnosis of adenocarcinoma was made despite a benign or inconclusive biopsy diagnosis. These biopsy specimens were obtained by experienced rectocolonic surgeons and were usually multiple. Additional information was frequently obtained from the cell block which contained fragments of intact tissue with preserved architecture (Figures 2 and 3).

Eight patients with rectosigmoid strictures

Table 1. Lesions in Range of Standard Sigmoidoscopy (25 cm)

No. of patients	X-ray	Endoscopy	Sigmoidoscopic biopsy	Cytology	Final histologic diagnosis
14	+	+	+	+	AnenoCa /LSA
7	+	+	-	+	Ca / LSA
15	+	±	-	-	Adenoma

+ = Compatible with criteria of malignancy; - = compatible with criteria of benignancy; ± = equivocal for malignancy

AdenoCa = adenocarcinoma

LSA = lymphosarcoma

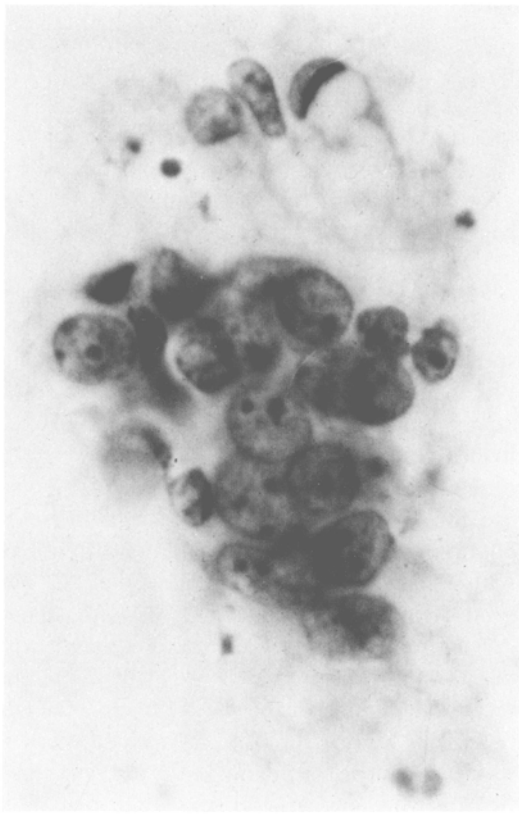


Fig 2. A group of malignant cells from a case of rectal adenocarcinoma showing characteristic large prominent nucleoli. ($\times 325$)

and in whom preoperative biopsy was not technically feasible had laparotomies yielding a final diagnosis of carcinoma in 5 and benign lesions in 3, all correlating exactly with the preoperative cytologic diagnosis. Cytology study was most helpful in this group. The following are brief examples (see Table 2).

Patient 1: A 36-year-old woman, 9 months postresection for adenocarcinoma of the rectum, had a follow-up barium enema which was equivocal for recurrence at the anastomotic site. Surgical biopsy was not technically feasible. The cytology was positive for malignancy, and this was confirmed at laparotomy.

Patient 2: A 59-year-old woman, 1 year postresection for adenocarcinoma of the rectocolon. The barium enema interpretation was consistent with recurrence at the anastomotic site with fistulous tract formation. The proctoscopic appearance of the anastomosis was inconclusive; definitive

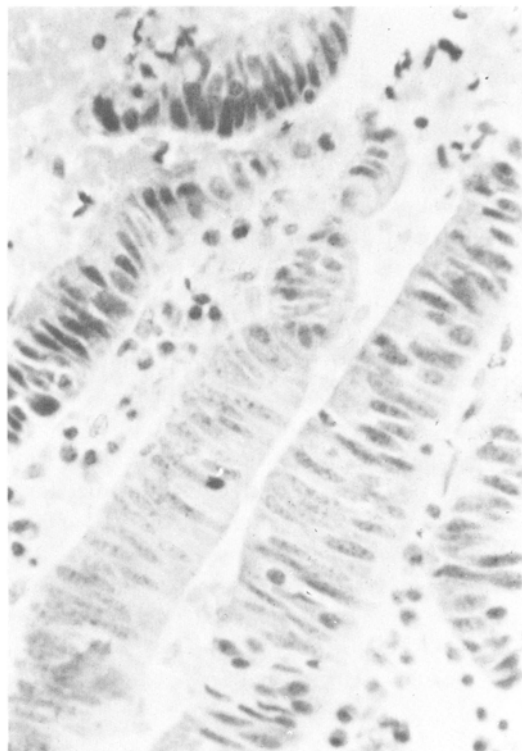


Fig 3. Cell block from a case of villous adenoma is essentially a "micro-biopsy." ($\times 145$)

biopsy was not feasible; cytology was negative. The area subsequently proved to be a surgical anastomosis with granulation tissue and no evidence of recurrent cancer.

Patients 3 and 4: Two patients with chronic ulcerative colitis with stricture formation in the distal loop (mucous fistulae) of their colostomies had barium studies which indicated possible malignant degeneration. The negative cytologic diagnoses were confirmed at laparotomy.

Patient 5: A 72-year-old woman was considered inoperable at another hospital with an adherent rectosigmoid mass and stricture. Ten months later the strictured area was evaluated at Memorial Hospital. Barium enema was interpreted as suspicious of malignancy. Cytology was negative for malignancy, and diverticular disease with stricture was confirmed at laparotomy.

Of 24 patients with sigmoid lesions who underwent laparotomy (Table 3), 12 of 16 patients with sigmoid carcinoma were diagnosed preoperatively. The four false negative studies were the very first patients studied with sigmoid lesions and may represent initial inexperience

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Table 2. Rectosigmoid Strictures

No. of patients	X-ray	Proctoscopy	Sigmoidoscopic biopsy	Cytology	Final histologic diagnosis
1	-	-	*	+	+ Recurrent AdenoCa
2	+	+	*	-	-Granulation tissue
3	+	±	*	-	-CUC stricture
4	+	-	*	-	-CUC stricture
5	±	-	*	-	-Diverticulitis

- = Compatible with criteria of benignancy; + = compatible with criteria of malignancy; ± = equivocal for malignancy

* Biopsy not technically feasible

AdenoCa = adenocarcinoma

CUC = chronic ulcerative colitis

with the technic. Cytologies of the 20 subsequent patients, in this series of 24 correlated completely with the final diagnoses. The correlation of preoperative cytology and final histologic diagnosis when limited to the carcinoma experience was 75%. As could be predicted, the yield in proximal colonic lesions was least productive. The diagnosis in right colon lesions is being further evaluated because of the few cases sampled. Positive cytology diagnoses were made from hepatic flexure and transverse colon lesions.

Of the 67 patients who did not undergo surgery, 3 developed carcinoma at 12, 14 and 18 months following their initial study. None of the 3 had returned in the interim for repeat cytologic studies. One patient with chronic ulcerative colitis developed a carcinoma 10 cm

proximal to a benign stricture; one patient, a malignancy at the site of a radiation-induced sigmoid stricture; and the other, a carcinoma in situ in a colonic polyp.

Another positive cytology for malignancy was made in a 22-year-old patient with chronic ulcerative colitis of 11 years duration and negative barium study for malignancy. A scalene node was positive for mucin-producing carcinoma; the primary site was presumed to be the bowel. No surgical confirmation has been made to date.

DISCUSSION

Early diagnosis of rectocolonic cancer is essential to improved survival (2). If the delay between onset of symptoms to time of therapy is

Table 3. Sigmoid Lesions Beyond 25 Centimeters

No. of patients	X-ray	Cytology	Final histologic diagnosis
12	+	+	+ AdenoCa
4	+	-	+ AdenoCa
8	+	-	- Diverticulitis/ adenoma

+ = Compatible with criteria of malignancy; - = compatible with criteria of benignancy

AdenoCa = adenocarcinoma

7 months, the 5-year survival rate is 25%. The survival increases to 40% if the delay is shortened to 3 months (8). The 5-year cure rate in the asymptomatic patient in whom the diagnosis has been diligently pursued and confirmed ranges from 72 to 88% (9, 10).

Of the current and practical technics utilized in the detection of colorectal cancer, exfoliative cytology is, in addition, highly accurate (7). The obvious difficulties in rectocolonic cytology lie in obtaining an adequate and representative specimen free from debris. This has prompted a variety of technics with varying degrees of success, including direct smears or aspirates of lesions (11-13), millipore centrifugation of washings (14), differential centrifugation (15) and silicone foam enemas and washings (16). The most productive and accurate yields, however, require vigorous cleansing enemas and purgation (7). This method has been modified, requiring a lesser degree of preparation in which the mucous strands of the washings are studied (17). Table 4 summarizes the experience of these methods and demonstrates the wide variation in accuracy.

With visible lesions in the range of the proctoscope, cytologic and histologic correlation has been excellent. This technic served as a valuable adjunct to biopsy, occasionally yielding more comprehensive and representative samples for diagnosis than biopsy alone. This is particular-

ly true for ulceronecrotic lesions and multiple lesions and may be applicable in the friable, thin-walled bowel of inflammatory disease when one is reluctant to biopsy multiple suspicious areas, especially above the peritoneal reflection.

This method has been of particular value in patients with a) strictures, where radiologic evaluation may be equivocal and biopsy may not be technically feasible and b) left colon lesions. Sigmoid washings have been easy to obtain and have yielded a high degree of correlation between preoperative cytology and final pathologic diagnosis.

Cytologic analysis, however, may fail to detect intramural tumor without mucosal penetration, thereby failing to exfoliate cells into the lumen or advanced ulcerated necrotic lesions with an overlying fibrin film (17). False positives may be troublesome in active ulcerative colitis with regenerating hyperplastic mucosal cells mimicking carcinoma (24) or fibroblasts from the bases of ulcerations (25). However, the experienced cytopathologist can usually distinguish the differences.

The clinical value of rectocolonic exfoliative cytology is apparent by its accuracy and specificity. The problem has been one of attitude (7) due to patient and physician reluctance to undertake the preparation considered prerequisite for an adequate specimen. This effort

Table 4. Experience with Rectocolonic Cytology

Technic	Reference	Accuracy (%)
Rectal smears through sigmoidoscope		
Direct smear of lesion	11, 18, 23	57-79
Smear below lesion	18, 23	5
Acridine orange fluorescence of rectal mucosal scraping	24	77
Rectocolonic lavage	7, 12 19-22, 28, 29	
With millipore filter	14	91.5
Silicone foam enema	16	80
Modified colonic lavage	17	74

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is potentially applicable to the population at large as well as to those groups with a pre-malignant potential (eg, familial polyposis, chronic ulcerative pancolitis, asbestos workers) (26). In evaluating patients with prior cancer surgery, this method may assist in detecting new lesions or recurrence at the colocolic anastomosis (27). Rectocolonic cytology studies can be performed with a minimum of physician time and patient discomfort and may be suitable as an office procedure.

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