

RESECTION OF RECTUM AND RECTOSIGMOID WITH PRESERVATION OF THE SPHINCTER FOR BENIGN SPASTIC LESIONS PRODUCING MEGACOLON

AN EXPERIMENTAL STUDY

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TWENTY patients with a clinical diagnosis of Hirschsprung's disease, or congenital megacolon, have been studied at The Children's Hospital in the course of the past two years. By the use of special roentgenologic technique it was possible to demonstrate, in all of these patients, an area of spasm in the rectosigmoid or rectum at the lower limit of the area of dilatation of the colon (Fig. 1). The technique used consisted of the slow instillation of a barium enema under fluoroscopic observation until the lowest portion of dilated bowel was seen. The flow of barium was then stopped and the bowel was manipulated through the abdominal wall with the patient under the fluoroscope. The area of spasm could then be demonstrated without being obscured by the overlying filled and dilated sigmoid (Fig. 2).

The disease was characterized in all the children by severe constipation, with bouts of obstipation, dating back to early infancy and tending to become more severe and distressing as the children grew older. Malnutrition in varying degree was present. The length of bowel involved and the degree of spasm probably account for the variations in the severity of the disease.

In the milder cases, treatment with a regime of Mechoyl, mineral oil, and enemas, as suggested by Law,¹ has been successful. In the more severe cases the use of Mechoyl has caused violent, cramp-producing peristalsis, often visible through the abdominal wall. This hyperactive peristalsis has been insufficient to propel the fecal stream through the area of spasm in the bowel in some of the patients. In six of the patients, colostomies above the area of spasm were lifesaving measures and completely alleviated the symptoms. In three of these last patients, closure of the colostomy was attempted. In each of the three cases the closure was followed by recurrence of obstruction, and full relief was obtained only by re-establishing a colostomy.

In the severe form of the disease we felt that excision of the spastic area of bowel, with re-establishment of bowel continuity, would offer a satisfactory means of treatment. However, total excision of the area of spasm may require removal of bowel down as far as the anus because the pathologic bowel frequently extends to this point. The conventional abdominoperineal resection with permanent destruction of the anal sphincter has obvious disadvantages in the treatment of this benign lesion in a child. A method of resection which

permitted removal of the sphincter, was

Historically, function has been the first of these was the anus. Removal of the to-end anastomosis (Hochenegg² in 1903) was simply performed by being sutured. and Weir³ in 1905



Fig. 1.—Roentgenogram showing amount of contraction.
Fig. 2.—Roentgenogram showing the large rectosigmoid.

segment of bowel (2) anastomosis. This was essential because we proposed aseptic anastomosis, minimizing the

No experimental procedure. The dogs to determine; (2) if the colon develops at the

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permitted removal of the rectosigmoid and rectum, with preservation of the anal sphincter, was conceived and is described herewith.

Historically, removal of the rectum with preservation of the anal sphincter function has been claimed by the proponents of various operations. Among the first of these was Krasko,² who in 1885 advocated an approach posterior to the anus. Removal of the cecum made possible resection of the rectum and end-to-end anastomosis of the bowel. A similar perineal approach was described by Hochenegg³ in 1889. In executing the second part of this operation the sigmoid was simply pulled through the intact anus and was left protruding without being sutured. An abdominoperineal technique was used by Maunsell⁴ in 1892 and Weir⁵ in 1901, with the added steps of (1) inverting the lower remaining

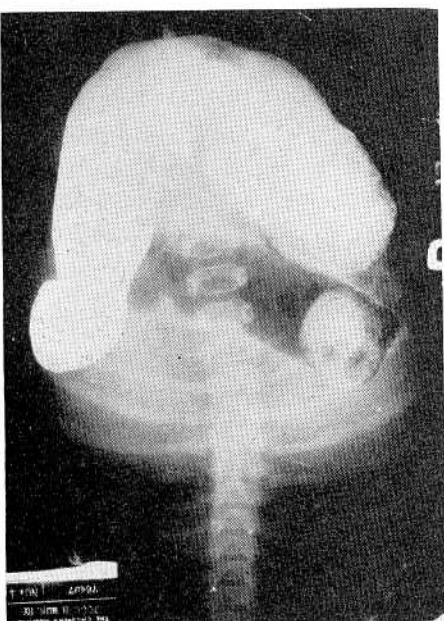


Fig. 1.—Roentgenogram of patient with rectosigmoid spasm after injection of small amount of contrast media into rectum.



segment of bowel and pulling the proximal segment out through this, and of (2) anastomosing the two ends of bowel with one layer of interrupted sutures. This was essentially the same plan that we had evolved, with the difference that we proposed to extend the resection down to the sphincter, and to make an aseptic anastomosis with two layers of fine, interrupted sutures in the hope of minimizing the development of stricture.

No experimental work had been done in regard to the latter type of procedure. Therefore, it was felt advisable to try this operation on a series of dogs to determine (1) if leakage and sepsis at the suture line would be a problem; (2) if sphincter control could be maintained; and (3) if strictures would develop at the line of anastomosis.

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EXPERIMENTAL WORK

Fifteen dogs were operated upon by the technique described here. All dogs used were healthy female adults, of varying sizes. Preoperative preparation consisted of withholding foods and fluids for twelve hours. No attempt was made to cleanse the lower intestinal tract. Intravenous nembutal was used as the anesthetic agent. Strict asepsis was observed throughout the operation and no chemotherapy or parenteral fluids were used before, during, or after operation.

The abdomen and perineum were shaved and prepared with Zephiran and alcohol, and a midline abdominal incision was made extending from the symphysis to the mid-abdomen.

The bladder was retracted toward the symphysis, as was the uterus. The sigmoid was brought into the field and the pelvic peritoneum divided at its reflection from the rectosigmoid (Fig. 3, 1). The rectosigmoid and rectum were freed completely from all attachments in the pelvis down to the anal sphincter.

The bowel was divided between clamps with a carbolic knife, as low in the pelvis as possible, and the two ends were turned in, using two layers of fine silk sutures (Fig. 3, 2). The ends of the silk were left long and tied together so that the two ends of bowel were attached by these pieces of silk, each 10 cm. in length (Fig. 3, 3). The abdominal incision was closed in layers, using interrupted silk.

The dog was then placed in the lithotomy position, and an Allis forceps, inserted through the anus, was used to grasp the rectal pouch and pull it out into view through the anus (Figs. 3, 4, 5). The whole perineal field, including the everted mucosa of the rectal pouch, was next cleaned, using alternate sponges of Zephiran and alcohol (Fig. 4, 6), and drapes were applied.

With the rectal pouch everted and surgically prepared, an incision was made $1\frac{1}{2}$ cm. from the anal skin in a transverse direction through the rectal wall (Fig. 4, 7). This incision gave access to the pelvic cavity and through it the silk suture to the proximal segment of bowel could be reached and the end of this segment pulled down into view (Fig. 4, 8). The proximal and distal bowel were then in approximation, with the upper segment telescoped into the lower segment like a finger in a glove (Fig. 4, 9).

A suture line of interrupted black silk was then started between the muscular coat of the everted rectum and the muscular coat of the upper bowel. The lower pouch was cut off as the sutures were placed (Fig. 5, 10). Completion of this suture line sealed off the pelvic cavity from future contamination from the operative site. The proximal bowel segment was opened and a sponge soaked in aqueous Zephiran was inserted into its lumen to prevent the flow of bowel contents into the operative field (Fig. 5, 11, 12).

The mucosa was approximated with interrupted 0000 chromic catgut sutures, which were placed as the silk sutures were cut (Fig. 5, 13, 14). After the mucosal sutures were tied and cut, the Zephiran pack was removed and the protruding bowel and its suture line replaced through the anus into the pelvis (Fig. 5, 15).



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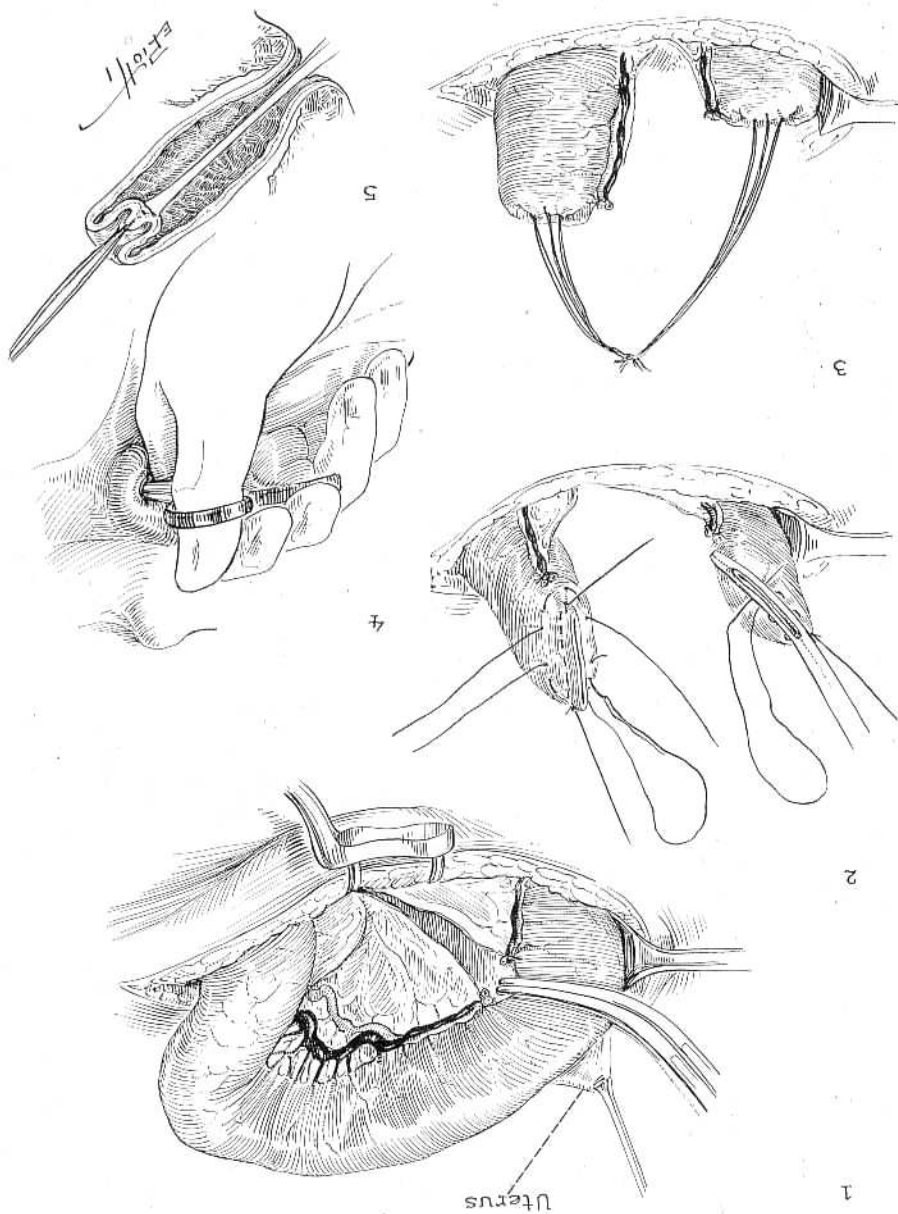


Fig. 3.—1, The rectosigmoid and rectum have been freed down to the levator ani and clamps have been applied in preparation for division of the bowel. 2, The two ends of bowel are closed with two layers of black silk sutures. The first layer is a simple basket weave type of suture to seal the ends and the second, interrupted sutures to turn the ends in. 3, The ends of bowel are attached by three long sutures. 4 and 5, With the animal in lithotomy position an Allis forceps is inserted through the anus and the lower segment of bowel is grasped as shown in the cross sectional drawing, Fig. 6.

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Table I shows the results.

It will be seen that of the fifteen dogs operated upon, twelve lived and had normal bowel control. Nine were sacrificed on an average of fifteen weeks post-operatively, and in each case the anastomosis was found to be well healed without stricture (Fig. 6). Three animals are still living and well. Two of the animals

did not recover completed. One anastomosis, three We felt that that no preopera

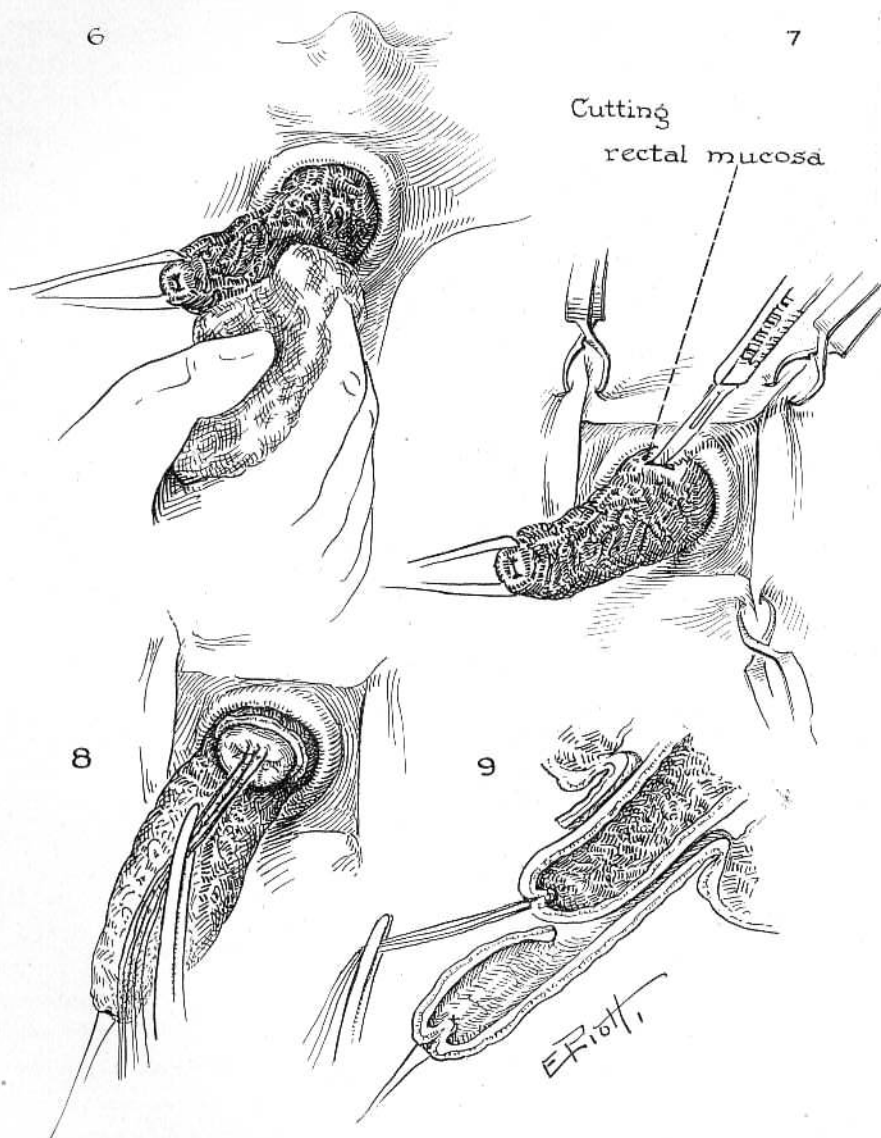


Fig. 4.—6, The lower segment of bowel has been everted through the anus and is being prepared with Zephiran and alcohol sponges. 7, A transverse cut 2 cm. from the anal skin is made through the bowel wall. 8, The silk sutures are grasped and the proximal bowel is pulled through the anus and the opening in the lower bowel. 9, The relationship of the proximal and distal bowel segments is shown in this cross sectional drawing.

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Fig. 5.—10, segments. 11, An inserted to prevent ruptured chronic ca 15, The anastomosis

did not recover from anesthesia after the operation had been satisfactorily completed. One animal died of sepsis and peritonitis, with a breakdown of the anastomosis, three weeks postoperatively. We felt that our results were encouraging, especially in view of the fact that no preoperative preparation of the bowel was done and no chemotherapy

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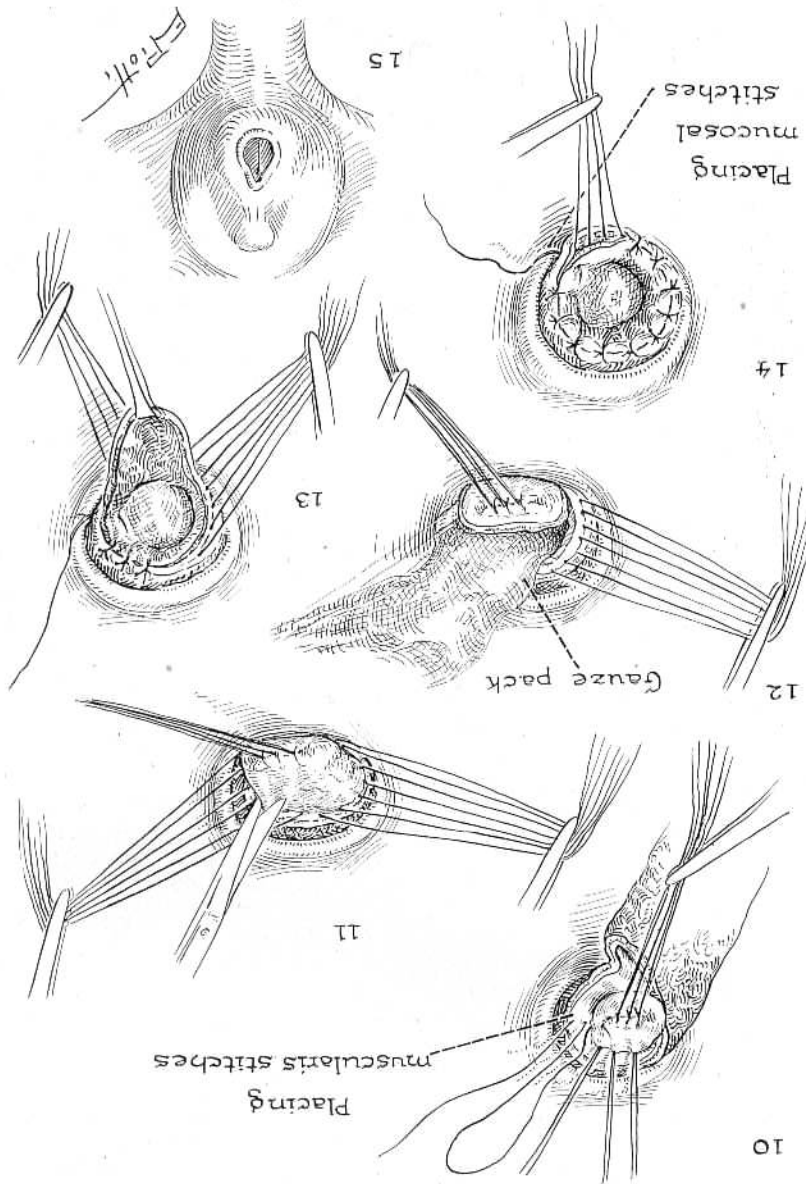


Fig. 5.—10, Interrupted silk sutures are placed through the muscular coats of the two segments. 11, An opening is made in the proximal segment of bowel. 12, A gauze pack is inserted to prevent gross contamination. 13 and 14, The mucosa is approximated by interrupted chronic catgut sutures. The silk sutures are cut as the mucosal sutures are placed. 15, The anastomosis has been pushed back through the anus.

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used. We were impressed by the fact that the dogs had normal postoperative bowel control and habits, beginning in the immediate postoperative days, and that no stricture developed in any of the nine animals sacrificed (Fig. 6).

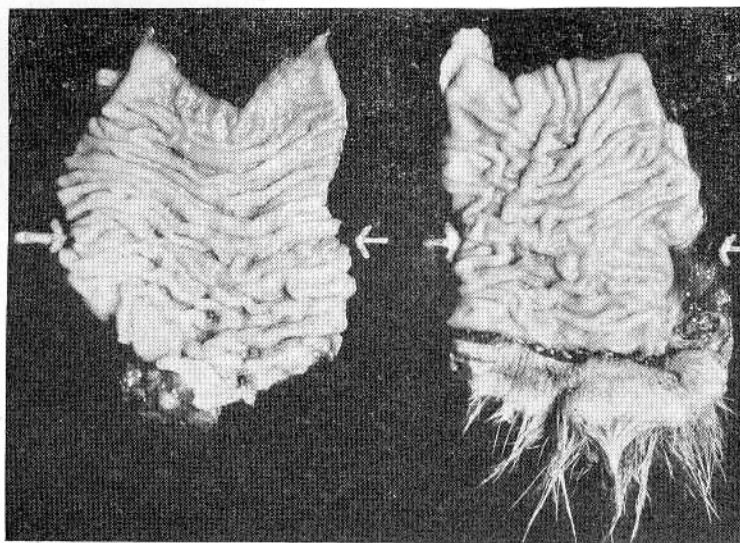


Fig. 6.—Photograph of two specimens removed from animals three months after operation. The line of anastomosis, indicated by the white arrows, shows no infection or stricture.

On the basis of our experimental work, the method described was used on one child. His history follows.

CASE REPORT

J. M., a boy 6 years, 9 months of age, had intermittent constipation and obstipation of increasing severity since birth. He was admitted seven times to The Children's Hospital for this disorder, starting at the age of 14 months, when he was first completely obstructed by impaction of feces in a megacolon. Conservative treatment gave increasingly poor results. A megacolon above a spasm of the rectosigmoid and rectum was repeatedly demonstrated by x-ray examination. The spasm extended from the low sigmoid downward to the anus.

At the age of 4½ years, a new bout of obstruction required a sigmoidostomy. The sigmoidostomy was closed sixteen months later and was followed by recurrence of the obstipation. Spinal anesthesia, lumbar sympathetic block, and Mecholyl were of no avail in either relaxing or overcoming the spasm. Re-establishment of a colostomy completely relieved the symptoms once again.

Finally, at the age of 6 years, 9 months, it was decided to excise the area of spasm, using the technique worked out in the laboratory. The patient was admitted and the operation was performed with a transverse colostomy still functioning. The amount of bowel to be removed was determined by the fact that the bowel down to the old sigmoidostomy was known to function normally. Therefore, resection was planned to extend from above the site of sigmoidostomy to the anus. The area of attachment of the old sigmoidostomy was freed, and the bowel below it was dissected down to the anal sphincter. The superior hemorrhoidal vessels were divided at the promontory of the sacrum, and the middle hemorrhoidal vessels were also cut. The bowel was then divided just above the site of the old sigmoidostomy. The ends were turned in with two layers of silk. The peritoneal

TABLE I. RESULTS WITH END-TO-END

DOG NUM- BER	LENGTH OF LIFE AFTER OPERA- TION
1	Died on table
2	3 mo.
3	3 mo.
4	8 hr.
5	2½ mo.
6	10 mo.
7	7 weeks
8	10 weeks
9	4 mo.
10	7 weeks
11	6 mo.
12	3 weeks
13	6 weeks
14	6 weeks
15	5 weeks

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TABLE I. RESULTS OF EXPERIMENTAL EXTERNAL RESECTION OF RECTUM AND RECTOSIGMOID WITH END-TO-END ANASTOMOSIS AND PRESERVATION OF THE SPHINCTER IN FIFTEEN DOGS

DOG	LENGTH	OPERATION	CAUSE OF DEATH	CONDITION OF ANASTOMOSIS	COMMENTS
1	Died on table	Anesthesia		Excellent	(Operation satisfactory; animal recovered from anesthesia)
2	3 mo.	Sacrificed		Excellent	Dog in good health with normal bowel control
3	3 mo.	Sacrificed		Excellent	Dog in good health with normal bowel control
4	8 hr.	Anesthesia		Excellent	Operation satisfactory; animal was far advanced in pregnancy and never recovered from anesthesia
5	2½ mo.	Sacrificed		Excellent	Dog in good health with normal bowel control
6	10 mo.	Sacrificed		Excellent	Dog in good health with normal bowel control
7	7 weeks	Sacrificed		Excellent	Dog in good health with normal bowel control
8	10 weeks	Sacrificed		Excellent	Dog in good health with normal bowel control
9	4 mo.	Sacrificed		Excellent	Dog in good health with normal bowel control
10	7 weeks	Sacrificed		Excellent	Dog in good health with normal bowel control
11	6 mo.	Sacrificed		Excellent	Dog in good health with normal bowel control
12	3 weeks	Infection		Dehiscence	Infection in abdominal wall and breakdown of anastomosis
13	6 weeks	Still living			Dog in good health with normal bowel control
14	6 weeks	Still living			Dog in good health with normal bowel control
15	5 weeks	Still living			Dog in good health with normal bowel control

attachments of the upper segment were cut and this segment, with its blood vessels, was found to be long enough to reach the perineum with some difficulty.

With the abdomen still open and in charge of the assistant, the rectal segment, including the area of spasm, was everted from below, as in the laboratory. The mucosa and perineum were cleaned and the area draped. A transverse incision was then made 2 cm. from the anal skin through the everted rectal wall, and the upper segment of bowel was pulled down through the pelvis and anus with the guidance of the assistant. The redundant end of the sigmoid was then performed 2 cm. from the anal sphincter. The redundant end of the lower pouch, including the area of spasm, was cut off. The bowel was then put back in place, and the pelvic peritoneum was sutured and the abdominal incision closed.

Seven weeks later the colostomy was closed. For the four months from then until the time of this writing, the boy had normal bowel movements without the aid of diets, laxatives, enemas, or drug therapy.

Operation has been done in two additional similar cases since that time and the patients are doing well two months, and three weeks, respectively, after operation.

DISCUSSION

We feel that this method will be a useful adjunct for the treatment of benign lesions of the rectum and rectosigmoid, such as severe spasm. It may have no place in the treatment of carcinoma. However, the work of Westlunds

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and of Collier and associates⁷ tends to show that metastasis from rectal cancer is in an upward direction rather than in a lateral one. This leads us to feel that a selection might be made of small, localized lesions which could be treated by the procedure we have described. Babcock,⁸ Bacon,⁹ Wangenstein,¹⁰ and Mandl¹¹ feel that this can be done, using, as they do, the same general approach.

In the technique of the operation, the most important step is to be certain that the blood supply to the proximal end of bowel is of adequate length to permit the sigmoid to be pulled out through the anus. It is also important that the anastomosis be done in two layers with extreme care, to make sure that there be no leakage into the pelvis.

SUMMARY

1. A series of twenty cases of megacolon with spasm of the rectosigmoid in children is reported.

2. A method of resection of the rectum and rectosigmoid, with preservation of the sphincter, is described. This method was evaluated in a series of fifteen dogs. Results showed (a) infection in but one case, (b) good sphincter control in all, and (c) no postoperative strictures.

3. The operation has been successfully used on three children.

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