

A Modification of the Swenson Technique for Congenital Megacolon*

ASA G. YANCEY, M.D., F.A.C.S., J.E. CROMARTIE, JR., M.D.,
JOHN R. FORD, M.D., REUBEN R. NICHOLS, JR., M.D. and A. F. SAVILLE, JR., M.D.
Department of Surgery, Veterans Administration Hospital, Tuskegee, Alabama

TRIBUTE TO DR. CHEATHAM

IT is a distinct pleasure to visit the Sixth Annual Convention of the Homer G. Phillips Hospital internes Alumni Association. I feel the same sense of warmth on attending this meeting as do the members, by virtue of having had one brother who lost his life while interning at the Old City Hospital No. 2, and another who completed his internship there. The unfortunate accident occurred because of defective X-ray equipment.

It was during that period of inadequate facilities that Dr. Anderson William Cheatham gave the most productive twenty-five years of his life to the St. Louis community. Dr. Cheatham saw the value and need for institutional training beyond the internship and constantly encouraged those about him to partake of such opportunities. He was a surgeon who maintained such purity of heart, energy, and foresight as constantly to find means of improving the minds of men about him and the buildings in which they worked. He sponsored study groups among doctors and aided the community with its health problems. He spoke out for intensive training at a time when the value of such was not too much appreciated. He was of aid in organizing a summer refresher course for physicians in cooperation with one of the local medical schools.

It was the pattern of thinking of Dr. Cheatham, and men of his calibre, that led to the excellent

hospital facilities and the efficient and well organized staff of the present Homer G. Phillips Hospital. A meeting such as this Internes Alumni Association is presently sponsoring, within these well equipped walls, with the voluntary cooperation of the medical schools of this community — actually renders immortal, the thinking pattern of Dr. Anderson William Cheatham.

INTRODUCTION

With the recognition that the basic defect in congenital megacolon is aperistalsis in the rectosigmoid immediately distal to the dilated portion of the colon, Swenson introduced a procedure in which the rectum was removed and the distal end of the dilated colon was sutured to the anal canal, (Fig. 1, left). This technique has met with considerable success but involves the hazard of injury to pelvic nerves. In an attempt to develop an easier procedure which would involve less danger of injury to the nerves of the lower urogenital tract, the authors have devised a procedure in which the basic features of the Swenson technique are retained, but the rectum is left *in situ*. The rectum is stripped of its mucosa, however, and the megasigmoid is pulled through the tube formed by the rectal muscularis and sutured to the walls of the anal canal, (Fig. 1, right).

ETIOLOGY

The etiological concept of Hirschsprung's disease has been greatly clarified by the work of Swenson and Neuhauser.¹ The basic defect in the Hirschsprung disease entity is an absence of the myenteric ganglia which are essential for intestinal peristalsis. Neuhauser, Swenson, Rheinlander, and Diamond² demonstrated an aperistaltic rectosigmoid which produced a constant partial intestinal

* The Anderson William Cheatham Memorial Lecture at the Sixth Annual Meeting of the Homer G. Phillips Hospital Internes Alumni Association, April, 1951.

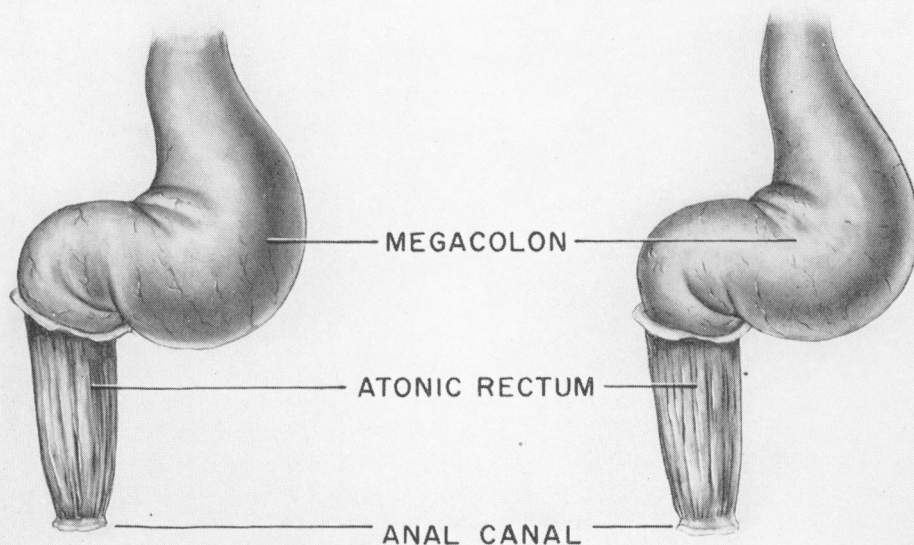
Published with permission of the Chief Medical Director, Department of Medicine and Surgery, Veterans Administration, who assumes no responsibility for the opinions expressed or the conclusions drawn by the authors. This study was supported by a grant from Veterans Administration funds for experimentation.

The authors are grateful to the School of Veterinary Medicine of Tuskegee Institute for the use of its laboratories and its cooperation.

Information on megacolon and suggestions made by Dr. A. B. Conger, Jr., are warmly appreciated.

SWENSON'S OPERATION

Authors' modification



(Before operation)

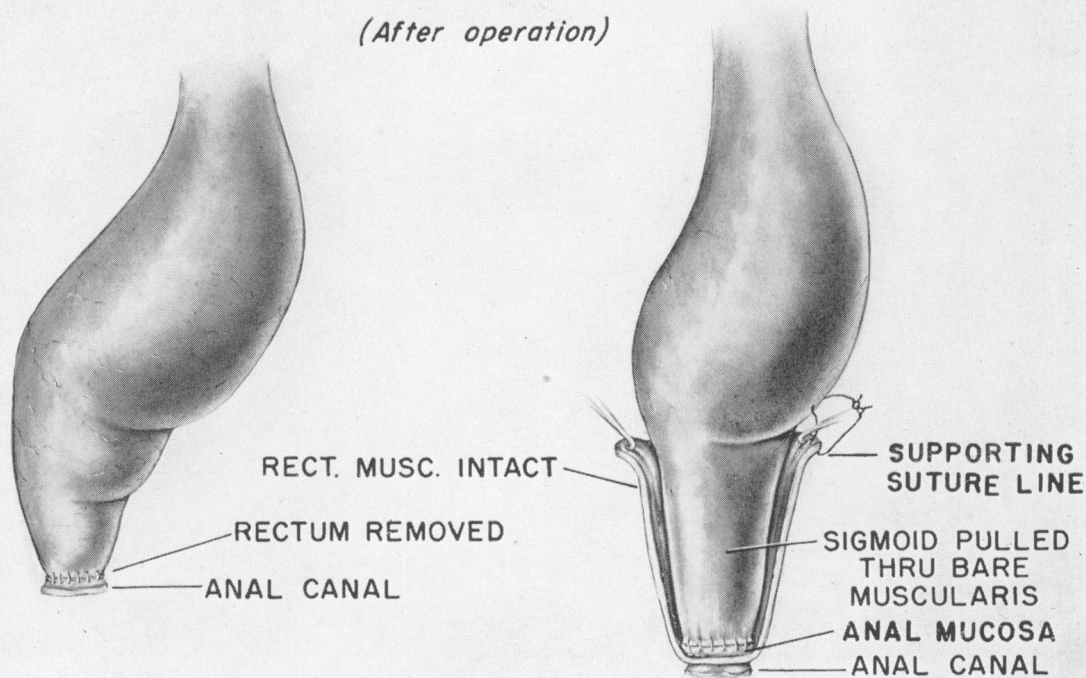


Fig. 1—SWENSON'S OPERATION (left). The atonic rectum is removed and the distal sigmoid sutured to the anal canal. Damage to the urogenital nerves may result from this procedure.

AUTHOR'S MODIFICATION (right). The rectal mucosa alone is removed. The distal sigmoid is then drawn through the hollow tube formed by the rectal muscularis and sutured at two points. Damage to the urogenital nerves is avoided.

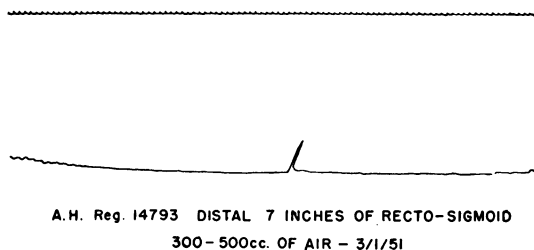


Fig. 2—Kymographic tracing of rectum of patient A. H., diagnosis megacolon, with 300 and 500 cc. of air in the balloon. There is no increase in the base line nor any peristaltic waves elicited.

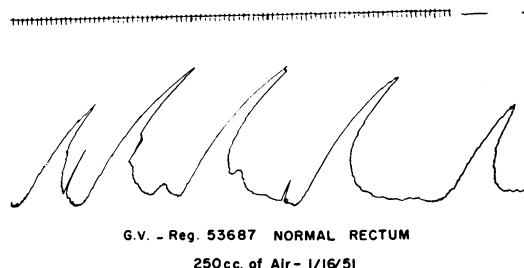


Fig. 3—Kymographic tracing of patient, G. V., with normal rectum showing large amplitude of peristaltic waves with only 250 cc. of air.

obstruction due to lack of function. The word, aperistaltic, perhaps best describes the abnormality existing in the rectosigmoid, immediately distal to the dilated portion of colon.

Figure 2 shows a kymographic tracing of the rectosigmoid of our patient, A. H., (with congenital megacolon), after injection of 300 cc. and 500 cc. of air. The base line of the curve is not elevated, nor are any peristaltic waves elicited. Figure 3 represents a tracing of a normal rectum after injection of 250 cc. of air into the balloon. Both of these patients had a transverse colostomy.

It is obvious from a comparison of these kymographic tracings that the patient with the megacolon had an aperistaltic rectosigmoid. Since this diseased colon is not grossly narrowed, functionally spastic, nor the site of disease which by its presence is harmful, then excision is not necessary, if it can be effectively by-passed.

After having operated on one case of Hirschsprung's disease, using the classical Swenson technique (with good results), it was considered possible (A.G.Y.), that there could be developed an easier procedure and one that would involve less



Fig. 4—Photograph of sigmoid and rectum of two dogs sacrificed four and eight weeks after modified Swenson procedure. The center hemostat is at the anal orifice. The hemostats at the sides indicate the line of anastomosis of the sigmoid to the anal canal mucosa.



Fig. 5—Barium enema in A. H., showing a normal size rectosigmoid and a greatly dilated sigmoid colon.

risk of injury to the nerves of the lower urogenital tract. Swenson, Sequit, and Shedd² have reported as high as 45 per cent asymptomatic, but definite, urinary bladder dysfunction in cases of congenital megacolon prior to surgery. Swenson² has received reports of other operators who have had the misfortune of permanent injury to the anal and bladder sphincters. Lee, Bebb and Brown³ state that, "The dissection should be kept close to the fascia propria of the rectum. Employment of the technique usually used for resection of cancer of the rectum can result in the impotence and impaired bladder function so often observed after radical surgery for carcinoma." The need for an atraumatic dissection, close to the rectum, to avoid injury to all extra-rectal structures is well emphasized by Swenson.²

EXPERIMENTS

Mongrel adult dogs were used in an effort to work out a technically easier procedure and one which would be less likely to produce injury to the nerves of the pelvic urogenital system and the anal sphincter. Three dogs were operated on by

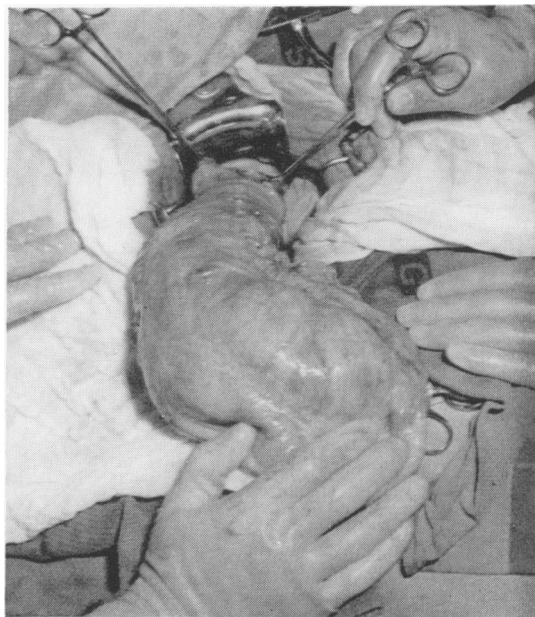


Fig. 6—Dilated sigmoid and normal size rectosigmoid as seen at operation. Patient A. H. (Looking toward pelvis).

the technique to be described: The abdomen was opened and the colon transected at the estimated point of the rectosigmoid junction. The superior hemorrhoidal artery was ligated and cut. The proximal end of the sigmoid was closed by a continuous suture of 0 chromic catgut and the ends left long. The mucosa of the proximal end of the distal segment of rectum was dissected from the muscularis for about two centimeters. An 0 chromic catgut suture was passed *via* the anus through the rectum and the mucous membrane edge (which had previously been dissected from the muscularis for two centimeters) was closed by a continuous stitch and the remaining end of the catgut passed back through the rectum and out of the anus before pulling the last stitch tight. Traction was then applied to the ends of the catgut suture by an assistant and the tensile strength of the mucosa was sufficient to permit the mucosa to be stripped down to within one centimeter of the anal orifice in one continuous pull, and brought to the exterior, out of the anal orifice. Hemorrhage was no problem. An instrument was then passed through the everted rectal mucosa, past the anal orifice and through the rectal muscularis (laid bare by having its mucosa stripped away) and the sigmoid grasped and

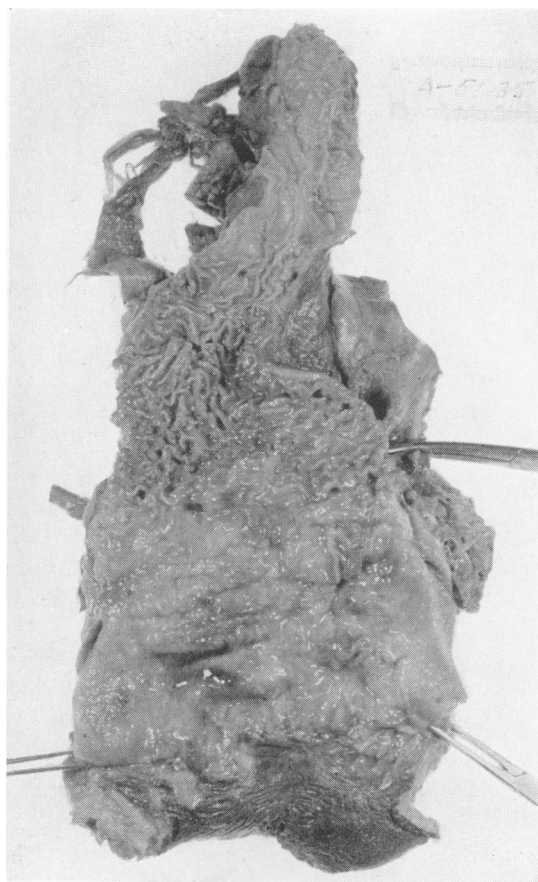


Fig. 7—Autopsy specimen of modified Swenson procedure showing muscularis of rectum and full-thickness sigmoid from patient A. H. The opposing Allis clamps indicate line of suture of sigmoid to mucous membrane of anal canal. Solitary hemostat indicates proximal edge of rectal muscularis.

pulled out through the anal orifice. The muscularis of the rectum was then circumferentially sutured by interrupted 4-0 black silk to the seromuscular layers of the sigmoid. The abdomen was closed. The operation was completed from below. The redundant sigmoid and the rectal mucosa, with a small portion of the anal canal mucosa, were excised. The sigmoid was sutured to the mucous membrane of the anal canal, circumferentially, by means of interrupted 3-0 chromic catgut sutures. After reduction of the bowel, the distal anastomotic line lies just inside the anal orifice. No preparation of the colon was used other than a cleansing enema. Healing and function were quite satisfactory in all dogs, though one died of causes unrelated to the technique de-

scribed. One dog was sacrificed four, and another, eight weeks, postoperatively. Both showed excellent healing at both lines of anastomosis and of the muscularis of the rectum to the serosa of the sigmoid. No stenosis was present. (Fig. 4.)

This technique was then tried on cadavers and failed because the tensile strength of the mucosa of the human rectum is less than that of the blood vessels crossing from the muscularis to the mucosal layer. Hence, when traction was applied to the mucosa, it simply tore. It was necessary, therefore, to use sharp and blunt dissection by means of scissors in order to separate the human mucous membrane from the muscularis. This was technically possible in the cadaver and hence it was decided to use this procedure on our next patient.

Case Report—A. H., Reg. 14793 was a male, 53 years of age, who had been on the Psychiatric Service since 1935. He had had an X-ray diagnosis of megacolon since 1943. The patient developed signs of an acute phase of obstruction which was not controllable by drugs and enemas, hence, a laparotomy and transverse colostomy were done on September 9, 1950. At that time, the immense sigmoid megacolon was directly observed. Subsequent barium enema on March 7, 1951, showed the normal calibrated recto-sigmoid and dilated sigmoid even so long as 162 days after a transverse colostomy. (Fig. 5.)

After preparation of the colon with multiple injections of a solution of streptomycin *via* the colostomy, a modified (see below) Swenson procedure was done on March 21, 1951. The patient, unfortunately, developed obstruction of the small intestine and another laparotomy was done on March 29, 1951. At this time volvulus of the small intestine was found with necrosis of all of the small intestine except three inches of terminal ileum and one and one-half inches of jejunum, by actual measurement. The necrotic bowel was resected and an end-to-end jejunoileostomy performed. At the time of this laparotomy (8 days after the modified Swenson procedure) the abdominal portion of the operation for megacolon was noted to be clean and healing. The patient died on April 7, 1951, (17 days after the modified Swenson) due to perforation of the remaining segment of jejunum originally thought to be viable. Autopsy revealed gross evidence of quite satisfactory healing (in the region of the modified Swenson procedure) at both lines of anastomosis and of the serosa of the sigmoid to the muscularis of the rectum. (Fig. 6.)

Because of the unfortunate fatal incidental complication, we have no follow-up of function of the colon with this technique. But since the fecal material would be in contact with the normal functioning bowel wall and since we believe that no true *spasm* exists in the muscularis of the rectum, we have reason to speculate that function with this technique would be satisfactory.

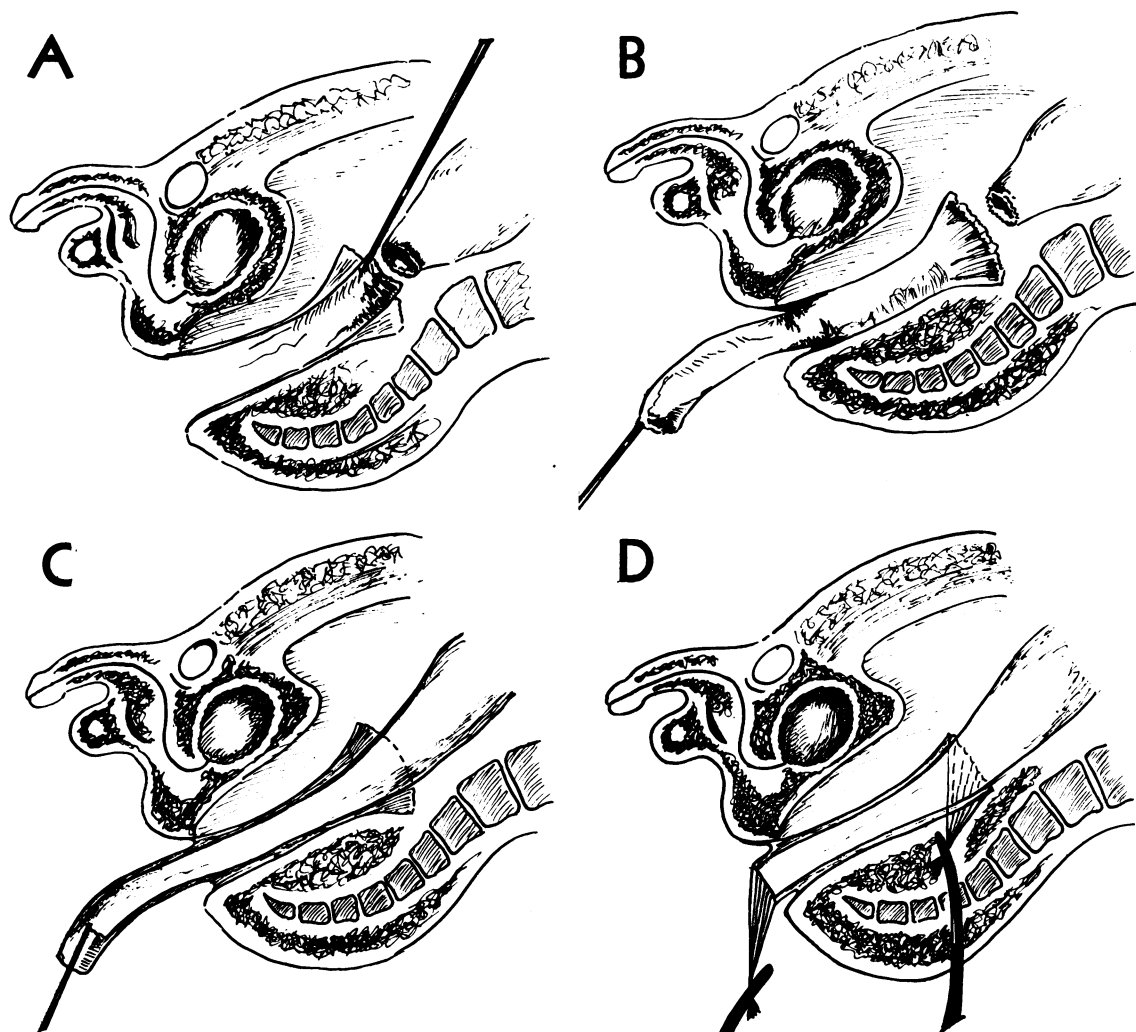


Fig. 8—(A) The colon is transected at about the level of the fourth sacral vertebra. Gentle traction is applied to the mucous membrane as it is dissected from the muscularis with scissors.
 (B) The mucosa is dissected from the muscularis down to within 1.5 cms. of the anal orifice; then the mucosa is pulled through the anal orifice to the exterior.
 (C) The sigmoid is pulled through the rectal muscularis to the exterior.
 (D) The muscularis of the rectum, proximally, is sutured circumferentially to the sigmoid serosa. The mucosa of the anal canal is sutured circumferentially to the sigmoid.

THE TECHNIQUE

A left paramedian incision was made and the peritoneal cavity opened. The peritoneum was incised on both sides of the sigmoid and the two incisions joined anteriorly to the rectum, just posterior to the urinary bladder. The superior hemorrhoidal artery was ligated at the level of the fourth sacral vertebra and cut. The rectum was not dissected from the sacrum: thus, there was no "dead space" to drain postoperatively. The rec-

tosigmoid was transected at about the level of the fourth sacral vertebra. The end of the sigmoid was closed by suture to prevent spillage. The rectal mucous membrane was grasped by Allis clamps at four opposing points and dissected from the muscularis by sharp and blunt dissection with scissors. Hemostasis was effected by means of the electro-coagulator. Gentle traction was maintained on the mucosa in an upward direction as the dissection proceeded down to the anal canal. (Fig.

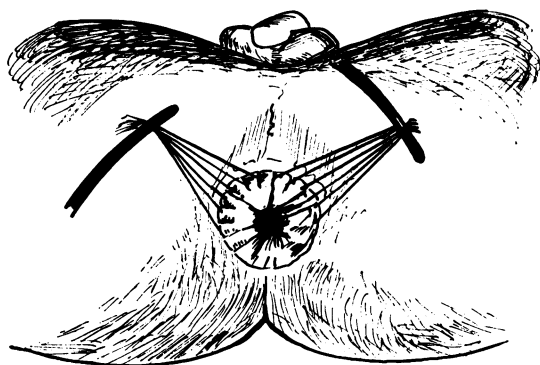
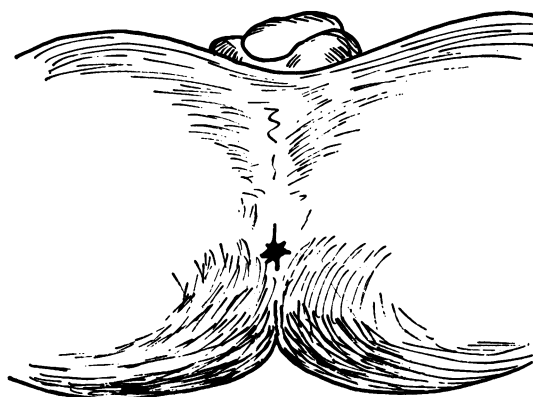


Fig. 9—Perineal view of circumferential suturing of the sigmoid to the anal canal mucosa.

8.) The muscularis of the rectum remained in situ; hence, there was no possibility of injury to any pelvic organ or nerves to the pelvic urogenital viscera.

The mucosa of the rectum was pulled through the anal orifice to the exterior. The freed sigmoid was then brought down through the rectal muscularis, through the anal canal, anal orifice, and mucous membrane of the rectum. The muscularis of the rectum was sutured to the sigmoid by circumferential sero-muscular 4-0 black silk material. The peritoneal floor was reconstructed. The abdominal wound was closed. (If two teams are available, the perineal portion can be done while the pelvic floor and abdominal wall closure are being effected). The perineal portion consists of excision of the redundant sigmoid and all of the rectal mucosa plus one centimeter of the anal canal mucous membrane. (Care should be taken to leave the sigmoid a bit longer than an even fit, recalling that the megacolon returns almost to normal size and therefore lessens in length and diameter.) The sigmoid was circumferentially sutured to the distal one and a half centimeters of mucosa of the anal canal by interrupted 3-0 chromic catgut sutures. The serosa of the sigmoid may be sutured to the muscularis of the proximal anal canal by four opposing 4-0 black silk sutures, if one desires, prior to the placing of the sigmoid to anal mucosa stitches. The distal anastomotic line is reduced above the dilated anal sphincter and as the muscles of the pelvic floor contract, the distal anastomosis lies one centimeter inside the anal orifice and the anus appears normal exteriorly. There is no need for drainage of the area of the



NO DRAINAGE NEEDED

Fig. 10—Perineum appears normal after reduction of distal line of anastomosis. No drainage needed.

hollow of the sacrum for no dissection has been done there. The two lines of the anastomosis—usually 10 to 12 centimeters apart—add protection against leakage of the site of anastomosis.

SUMMARY

1. A modification of the Swenson technique for megacolon is presented. This modification is technically practicable and will heal. (Since we are not likely to see another case of megacolon in a Veterans Hospital in many years, it was decided to publish this technique with speculation as to its possibilities, though we do not have proof of a long-time follow-up.)
2. With this technique, damage to pelvic viscera and the nerves to the pelvic urogenital organs would be at an absolute minimum.
3. No drainage of the presacral space is needed because no dissection is done there.
4. The two lines of anastomosis—usually 10 to 12 centimeters apart—would mitigate against leakage at the site of anastomosis.
5. This procedure is much more simple in the dog than the Swenson technique. (While it cannot be claimed that this technique is far easier than the Swenson procedure in the human being, it is not more difficult and may be of value in selected cases wherein dysfunction of the urinary bladder is evident prior to surgery and one would have reason to believe that any damage to the pelvic nerves might enhance this dysfunction.)
6. We have been unable to find any record of this technique having been used for megacolon.

LITERATURE CITED

1. HIATT, R. B.: The Pathological Physiology of Congenital Megacolon. *Ann. Surg.* 133: 313-320, 1951.
2. SWENSON, O., R. H. SEQUIRZ and R. H. SHEDD: Hirschsprung's Disease. New Surgical Treatment. *Amer. J. Surg.* 81:341, 1951.
3. LEE, C. M., JR., K. C. BEBB, and JOHN R. BROWN: The Selective Management of Megacolon in Infants and Children. *Surg., Gyn. and Ob.* 91: 281-295, 1950.
4. BARGEN, J. ARNOLD: Recent Advances in the Treatment of Megacolon. *The Med. Cl. of N. Amer.* 32:981-987, 1948.
5. BILL, ALEXANDER H., JR.: A New Concept of the Cause of Hirschsprung's Disease or Congenital Megacolon, with a New Method of Treatment by Surgery. *Northwest Med.* 49, 341-344, 1950.
6. BODIAN, MARTIN, F. D. STEPHENS, and B. C. H. WARD: Hirschsprung's Disease. *The Lancet* I: 1:19-22, 1950.
7. BURNARD, E. D.: Hirschsprung's Disease in Infancy: *Brit. Med. J.*, 1:151-156, 1950.
8. CREECH, BENNETT: Megacolon. *N. Car. Med. J.* 11:241-246, 1950.
9. DIXON, CLAUDE F. and D. B. JUDD: The Surgical Treatment of Congenital Megacolon. *The Surg. Cl. of N. Amer.* 28:889-901, 1948.
10. HERMANN, LOUIS G.: The Management of Megacolon. *The Surg. Cl. of N. Amer.* 26:1170-1196, 1946.
11. HERSH, JOSEPH: Congenital Megacolon—Hirschsprung's Disease. *The Amer. J. of Surg.* 74:815-119, 1947.
12. HIATT, R. B.: The Surgical Treatment of Congenital Megacolon. *Ann. Surg.* 133:321-329, 1951.
13. LAW, JOHN L.: Treatment of Megacolon with Acetyl-beta-Methylcholine Bromide. *Amer. Dis. Child.* 60; 262, 1949.
14. BOSWORTH, B. M., H. D. STEIN, and J. R. LISA: Modern Management of Megacolon. *Amer. J. of Surg.*, 75:808-816, 1948.
15. STEPHENS, F. D.: The Diagnosis and Management of Hirschsprung's Disease. *Ann. Royal Coll. Surg. Eng.* 7:257-268, 1950.
16. SWENSON, O.: A New Surgical Treatment for Hirschsprung's Disease. *Surgery*, 28; 371-381, 1950.
17. SWENSON, O., E. B. D. NEUHAUSER, and L. K. PICKETT: New Concepts of Etiology, Diagnosis and Treatment of Hirschsprung's Disease. *Pediatrics*, 4:201-209, 1949.
18. SWENSON, O., H. F. RHEINLANDER, and I. DIAMOND: Hirschsprung's Disease: A New Concept of the Etiology. *New England J. Med.*, 241:551-556, 1949.
19. TELFORD, E. D., and H. A. HAXTON: Congenital Megacolon. *Brit. Med. J.*, 1:827-828, 1948.

ON THE SACRED DISEASE

It is thus with regard to the disease called Sacred: it appears to me to be nowise more divine nor more sacred than other diseases, but has a natural cause from which it originates like other affections. Men regard its nature and cause as divine from ignorance and wonder because it is not at all like to other diseases. And this notion of its divinity is kept up by their inability to comprehend it, and the simplicity of the mode by which it is cured, for men are freed from it by purifications and incantations. But if it is reckoned divine because it is wonderful, instead of one there are many diseases which would be sacred; for, as I will show, there are others no less wonderful and prodigious, which nobody imagines to be sacred. The quotidian, tertian, and quartan fevers, seem to me no less sacred and divine in their origin than this disease, although they are not reckoned so wonderful. And I see men become mad and demented from no manifest cause, and at the same time doing many things out of place; and I have known many persons in sleep groaning and crying out, some in a state of suffocation, some jumping up and fleeing out of doors, and deprived of their reason until they awaken, and afterward becoming well and rational as before, although they be pale and weak; and this will happen not once but frequently. And there are many various things of the like kind, which it would be tedious to state particularly. And they who first referred this disease to the gods, appear to me to have been just such persons as the conjurors, purificators, mountebanks, and charlatans now are, who give themselves out for being excessively religious, and as knowing more than other people. Such persons, then, using the divinity as a pretext and screen of their own inability to afford any assistance, have given out that the disease is sacred, adding suitable reasons for this opinion, they have instituted a mode of treatment which is safe for themselves, namely, by applying purifications and incantations, and enforcing abstinence from baths and many articles of food which are unwholesome to men in diseases.