Posterior Sagittal Anorectoplasty: Important Technical Considerations and New Applications

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● Posterior sagittal anorectoplasty (PSARP) is a new technique for the repair of high anorectal malformations. It is based upon complete exposure of the anorectal region by means of a median sagittal incision that runs from the sacrum to the anal dimple, cutting through all muscle structures behind the rectum. It was learned through this procedure that the external sphincter is a functionally useful prominent structure. No puborectalis sling, as such, could be identified. It was possible, however, to recognize a muscle continuity from the skin to the sacral insertion of the levator ani. Since it is impossible to pull the generally ectatic rectum through without destroying the muscle structures present, the rectum must be tapered to allow suturing the muscle behind it. In all these anomalies, the rectum and urethra (or vagina) are very closely joined, sharing a common wall, and their separation calls for extensive exposure. A number of technical details clarified in the course of applying the procedure in 54 patients are fully discussed. This approach also proved to be very successful in the management of two patients with rectocloacal fistula, two with rectal atresia and two with stenosis. Colostomy has been closed in 27 patients and fecal continence may be described as excellent, except in those patients with severe sacral anomalies, and unquestionably superior to that obtained by us with other techniques.

INDEX WORDS: Posterior sagittal anorectoplasty; anorectal malformations; rectocloacal fistula; rectal atresia; imperforate anus.

SINCE the time of the now classical descriptions of Stephens and Smith,[1] the importance has been stressed of leaving the puborectalis sling intact and of pulling through the intestine inside it and behind the urethra in order to obtain optimum continence. Papers have also appeared in which the external sphincter is described as a rudimentary structure of little effect on continence, while others put forward its importance as a factor for that function.[1–4] The identification and delineation, intraoperatively, of the puborectalis sling, however, is confusing because the various authors have not described it accurately. This doubt, coupled with the embryological studies of one of us[5] and the surgical experience of the other[6] with the sacroperineal approach, led us to develop the posterior sagittal anorectoplasty technique. It was designed to provide extensive direct visualization of the muscle structures important for continence and thereby to facilitate repair of these malformations in a more effective manner.

This technique has been applied in 54 patients since October, 1980. In the course of this experience we have become aware of a number of technical details of importance for the success of the operation. The purpose of this paper is to describe them fully.

Furthermore, this approach has been used recently in the treatment of two cases of rectocloacal fistula. Hendren,[7] Raffensperger,[8] Mollit,[9] and Kay[10] have made important contributions in this condition and all agree on the importance of avoiding repair of the rectum while leaving that of the vagina to be done subsequently, particularly if the vagina enters the cloaca high. Our approach to the correction of this anomaly facilitates pulling through and reconstruction of the urinary, genital, and digestive tracts in a one-stage procedure we have called posterior sagittal anorectovaginourethroplasty (PSARVUP).

We also used the same approach in two cases of rectal atresia and two of stenosis. The studies of Stephens[1] and Magnus[11] on the origin and characteristics of malformations of this type show that all the structures required for fecal continence are present in these patients. Reports in the literature on treatment have, nevertheless, been scanty.[12–14] Most of the authors propose abdominoperineal pull-through and resection of the anal canal. Some mention a direct perforation of the rectal septum when it is found to be

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Table 1. Number of Patients and Type of Defect

Male	
Urethral fistula	25
High malf., no fistula	4
Vesical fistula	3
Low malformation	4
Complex malformation*	1
Secondary operation	2
	39
Female	
Vaginal fistula	1
High malf., no fistula	1
Low malf., no fistula	1
Rectal atresia and stenosis	2
Rectovestibular fistula	2
Complex malformation†	7
Secondary operation	1
	15

*Case #3, rectal atresia.

†Includes the cloacas, rectal atresia and rectal stenosis.

very thin. Upadhyaya[14] also reported a new simplified direct instrumental repair with good results. Our approach to the management of this particular group provided total exposure of the defect, rapid and easy repair, and the most dramatically favorable outcome of the entire series.

CLINICAL MATERIAL

Our experience consists of 54 patients (39 male and 15 female) operated upon (Table 1). Patients' ages varied from 8 mo to 9 yr. A laparotomy was necessary in seven cases for very high malformations or other special circumstances (Table 2).

Important Technical Considerations

The fundamental principle underlying this operation is obtaining fullest possible exposure of all structures while keeping to the midline in order to avoid damaging the neurovascular structures. All patients underwent a previous diverting colostomy.

Details of the operative procedure have been previously described.[15] Further attention will be given here to the situation when the rectum is opened longitudinally along the midline and a fistula can be visualized in its anterior wall or terminal portion (Fig. 1).

Table 2. Number of Cases Requiring Laparotomy

Very high vesical fistula	3
Intestinal-uterine fistula	1
Vaginal fistula opening at the lateral wall, not identified through the sacral approach	1
High tense sigmoidostomy	1
Complex malformation	
Rectal atresia, "H" type urethral fistula to the lower intestinal pouch, and bladder fistula from the upper pouch	1

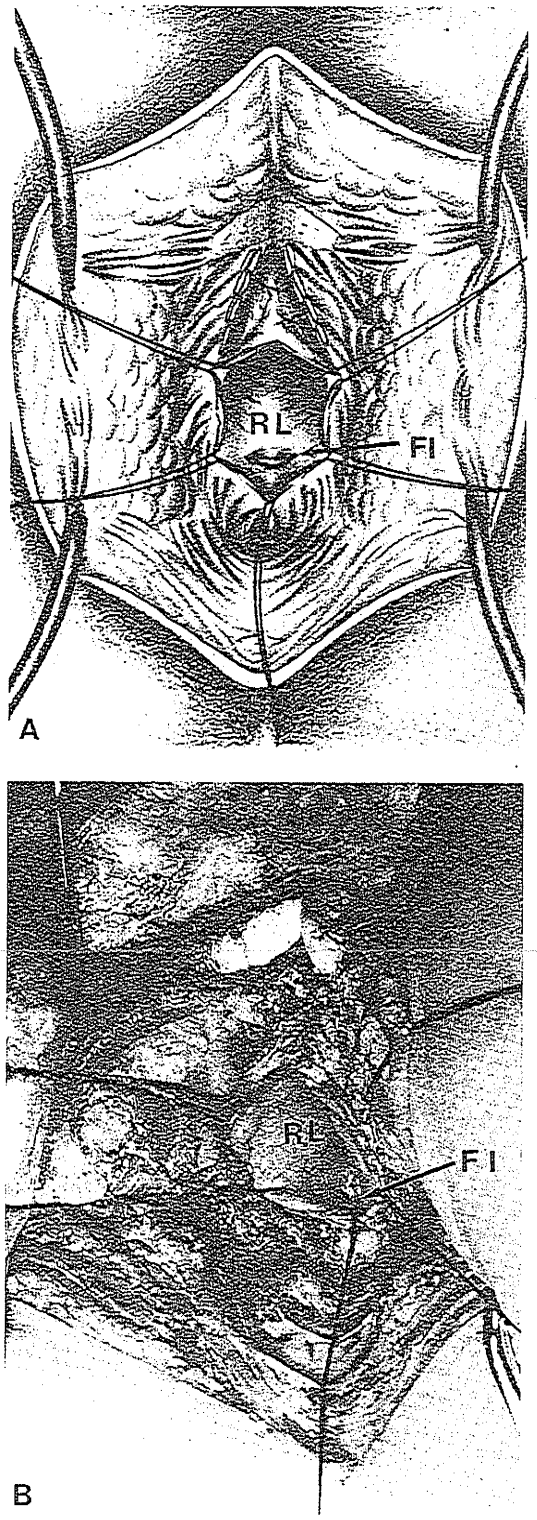

Fig. 1. (A) Rectum opened. RL, rectal lumen; FI, fistula. (B) Operative field of part A.

The critical step now is probably the separation of rectum and urethra, particularly at the upper part of the fistula where the two structures share a common wall. The procedure we follow is to place a number of stitches with 6-0 silk, taking up the intestinal mucosa immediately above the fistula. These stitches will serve for applying traction to lift the mucosa, separating it from the urethra. Dissection below the mucosa should be kept to the upper edge of the prostate, after which the surgeon may separate the total thickness of the intestinal wall, since the common wall shared with the urethra ends at that point (Fig. 2). The urinary fistula is closed with interrupted stitches of absorbable sutures. The surgeon can identify the seminal vesicles and vas deferens directly above the prostate.

Putting traction on the rectum makes it possible to identify bands and vessels of its wall. Since these impede its being pulled through, they must be cauterized and cut. It is unusual to find it necessary to open the abdomen because of the impossibility of pulling the intestine through (Table 2). In the course of this dissection, the surgeon is able to identify the peritoneum which must sometimes be dissected with extreme care in order to obtain greater rectal length. When opened, we generally recommend that it be closed before the operation is finished.

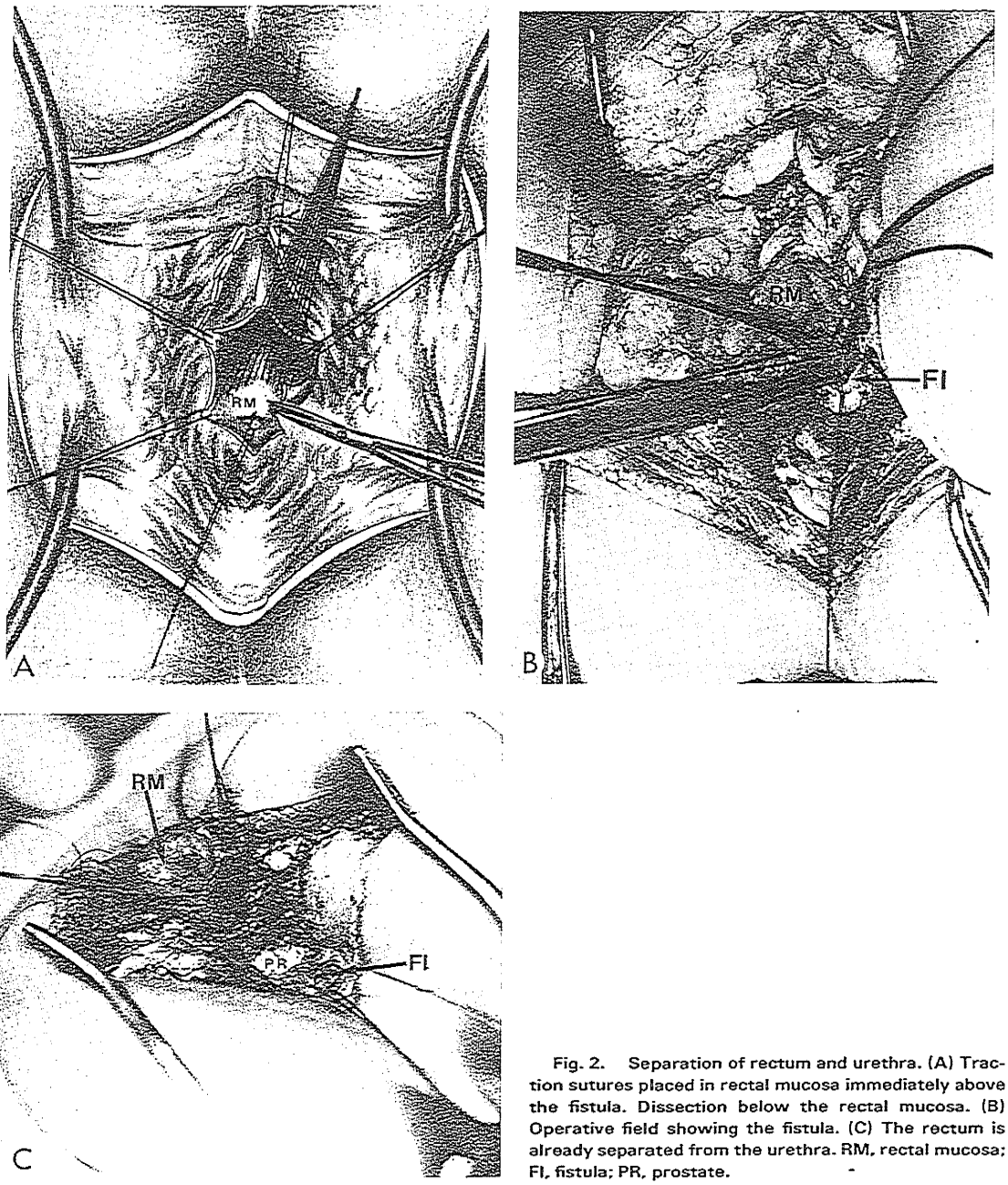

Fig. 2. Separation of rectum and urethra. (A) Traction sutures placed in rectal mucosa immediately above the fistula. Dissection below the rectal mucosa. (B) Operative field showing the fistula. (C) The rectum is already separated from the urethra. RM, rectal mucosa; FI, fistula; PR, prostate.

It very quickly becomes obvious that the space available for accommodating an ectatic rectum is extremely small. We must, therefore, proceed to tailor the rectum. This has also been described in our previous paper[15] and is illustrated in Fig. 3. After the caliber of the intestine has been reduced, it can be pulled through and the levator ani sutured behind it. We usually place the stitches at the edges of the levator ani before pulling the intestine through (Fig. 4). Having pulled the rectum through and tied off the sutures in the levator ani, our next objective is to wrap the terminal portion of the rectum in the so-called "muscle complex." To accomplish this, we place stitches that fix the striated muscle to the intestinal wall. These sutures also serve the purpose of preventing prolapse of the mucosa, so often observed in patients with repaired anorectal malformations. The anoplasty is done in simple form with interrupted sutures of nonabsorbable material. As a rule, the caliber of the anus is no greater than 5 to 12 mm. The new anus must be created in the center of the contraction of the external sphincter. The various planes of the incision and the muscle fibers are carefully brought together with interrupted sutures of nonabsorbable material. Figure 5 shows what we currently consider a complete repaired malformation.

Technique for the Repair of Rectocloacal Fistula

The general principles of the technique described above were also applied to two patients with rectocloacal fistula. Figure 6 shows the usual external appearance of a cloaca and an artist's conception of it.

After the posterior wall of the rectum and cloaca are cut,

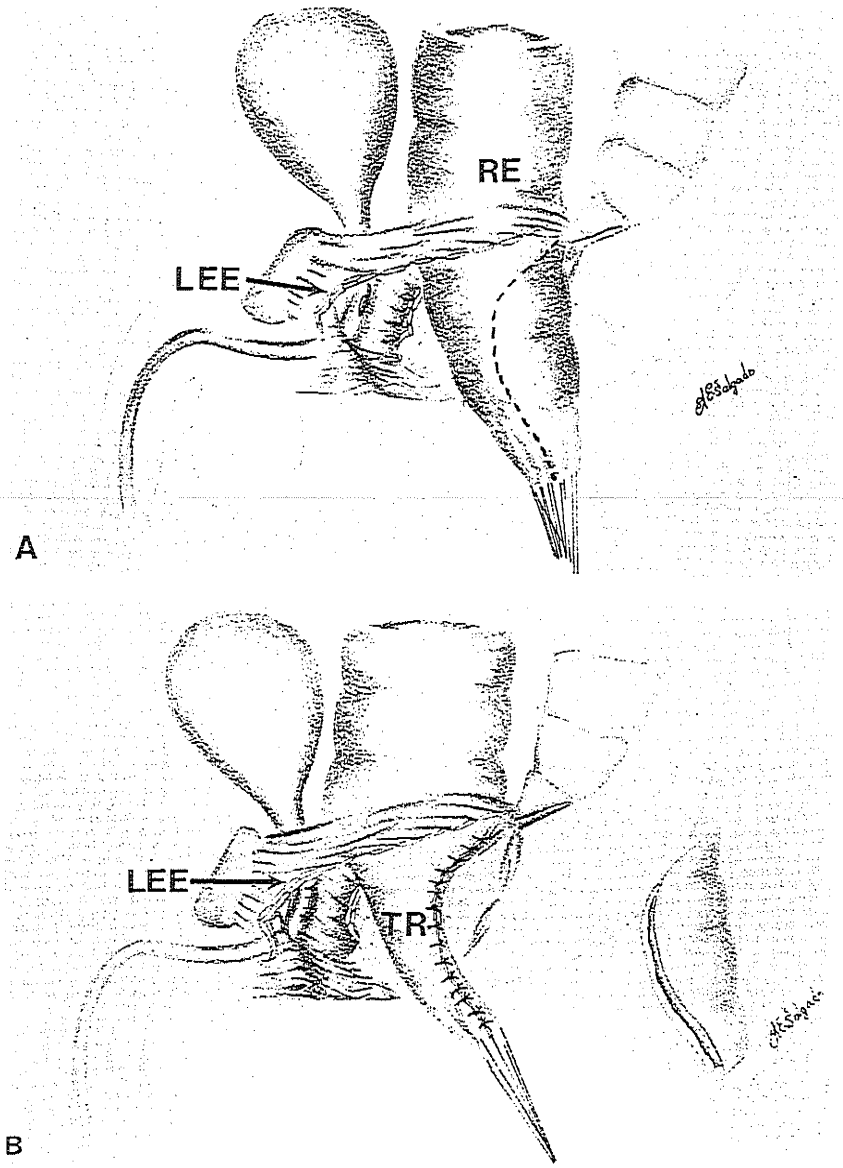

Fig. 3. Tapering of the rectum. (A) The tailoring is designed. (B) Posterior wall of the rectum has been removed. LEE, levator edge; RE, rectum; TR, tapered rectum.

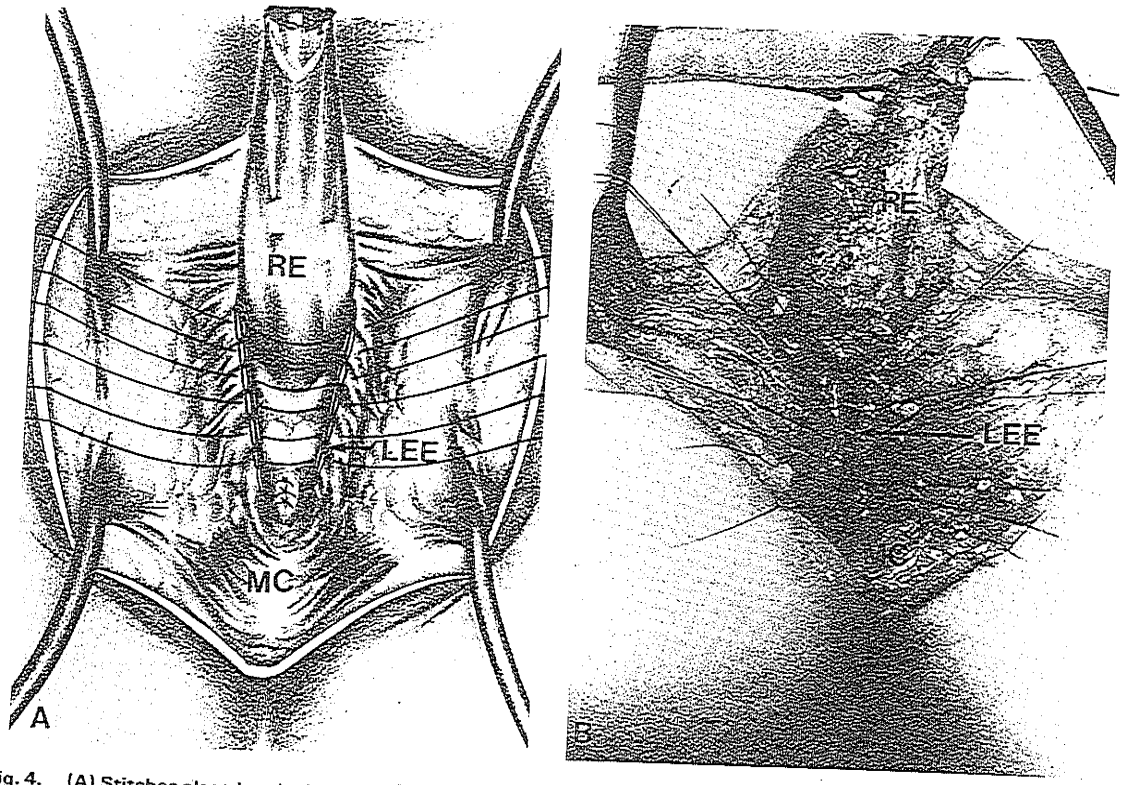

Fig. 4. (A) Stitches placed at the levator ani edges before pulling the intestine through. LEE, levator edge; RE, rectum; MC, muscle complex. (B) Operative field of part A.

the characteristics of the rectocloacal fistula may be recognized (Fig. 7). The next step is the separation of the rectum from the vagina which is accomplished by placing numerous stitches of 6-0 silk in the mucosa of the anterior rectal wall where it is joined to the vagina (Fig. 8) and then dissecting the common wall of the rectum and vagina with extreme caution. After the rectum has been separated, it is sufficiently dissected in the same way as in the preceding technique to provide enough length to anastomose it to the skin without tension.

The next step is separation of the vagina from the urethra. For this purpose, we place a number of stitches in the mucosa of the vaginal orifice which communicates with the cloaca (Fig. 9). These stitches serve for applying traction, as in the

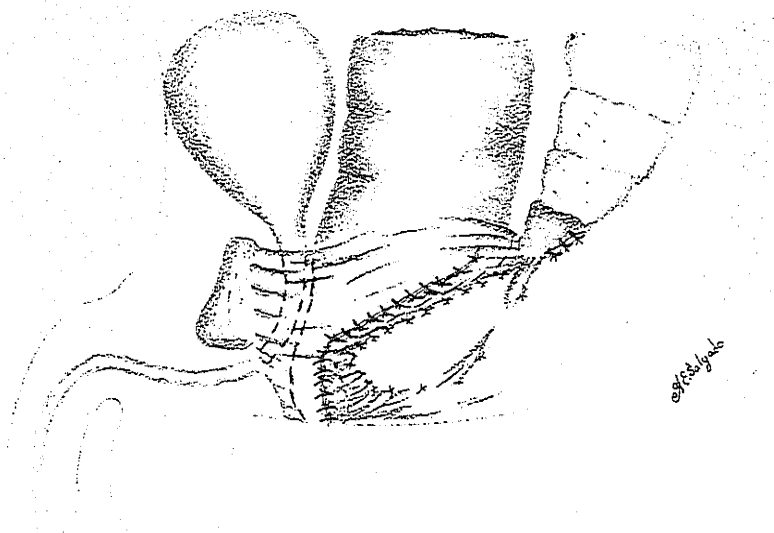

Fig. 5. The finished operation.

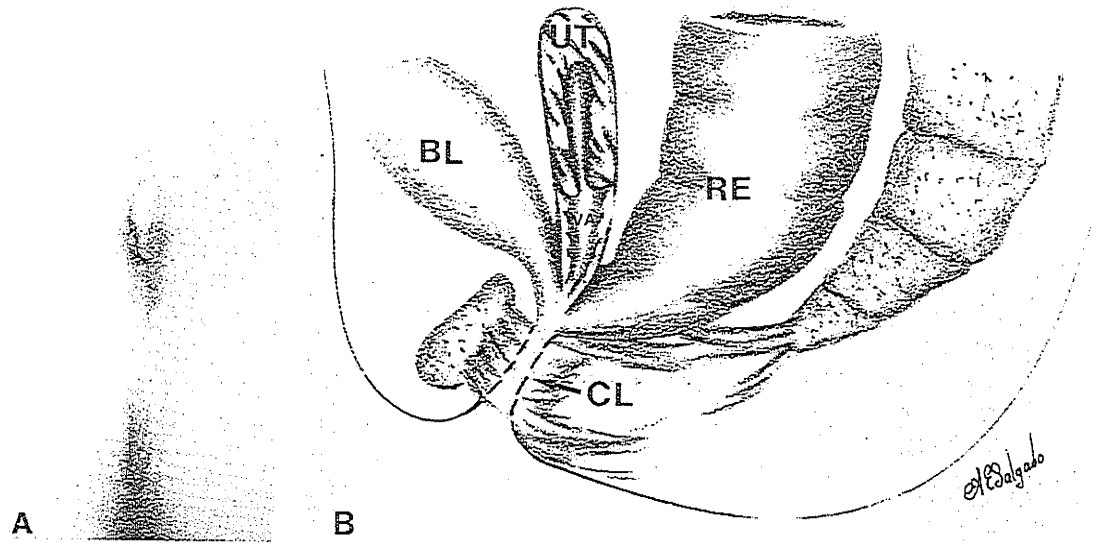

Fig. 6. The anatomy of a cloaca. (A) External appearance. (B) Internal anatomy. RE, rectum; VA, vagina; UT, uterus; BL, bladder; CL, cloaca.

case of the rectum, while we go on to make a plane of separation between the anterior wall of the vagina, the urethra, and the bladder neck.

We found that this dissection is much more complicated than that done between rectum and vagina, the common wall of the vagina and urethra being much thinner and less elastic.

Once the vagina and urethra have been separated, the vagina must be sufficiently dissected to gain the necessary length to anastomose it to the skin and create the new introitus. Figure 10 shows the dissected rectum and vagina.

The urethra is then reconstructed using the walls of the cloaca for the purpose. Both edges of the cloaca wall must be

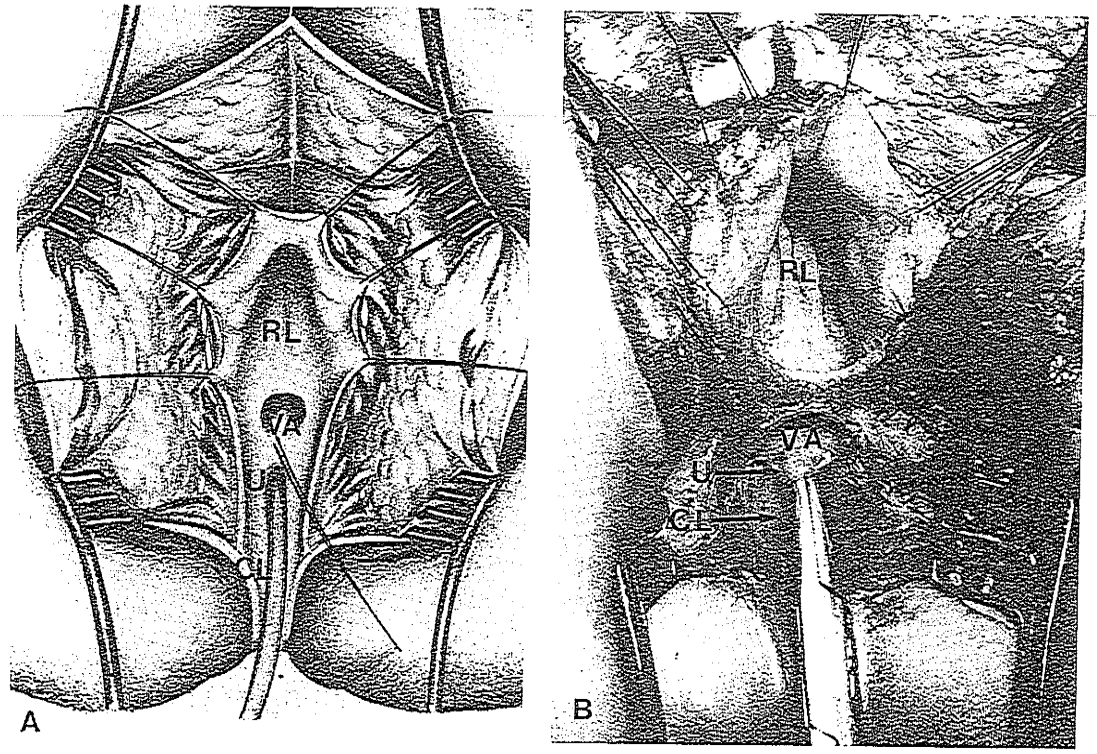

Fig. 7. Characteristics of the rectocloacal fistula after the posterior wall of the rectum and cloaca have been cut. (A) Foley catheter in the urethra. (B) Clamp showing the urethral orifice. RL, rectal lumen; VA, vagina; U, urethra; CL, cloaca.

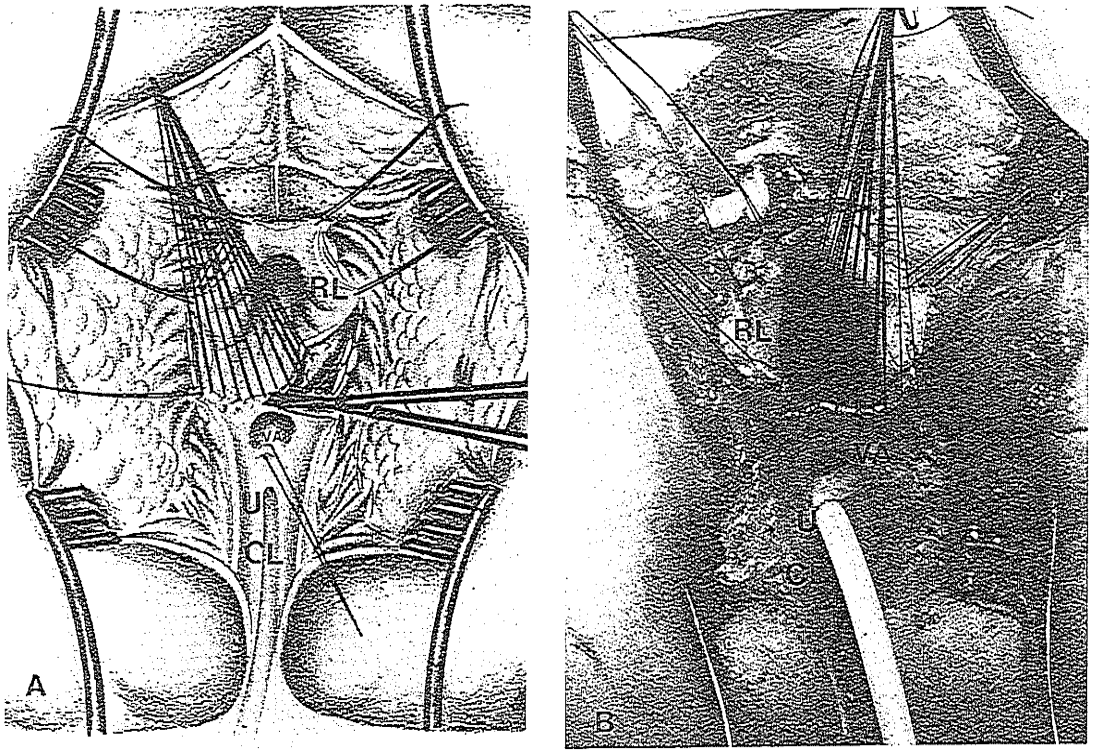

Fig. 8. (A) Separation of rectum and vagina. RL, rectal lumen; VA, vagina; U, urethra; CL, cloaca. (B) Operative field of part A.

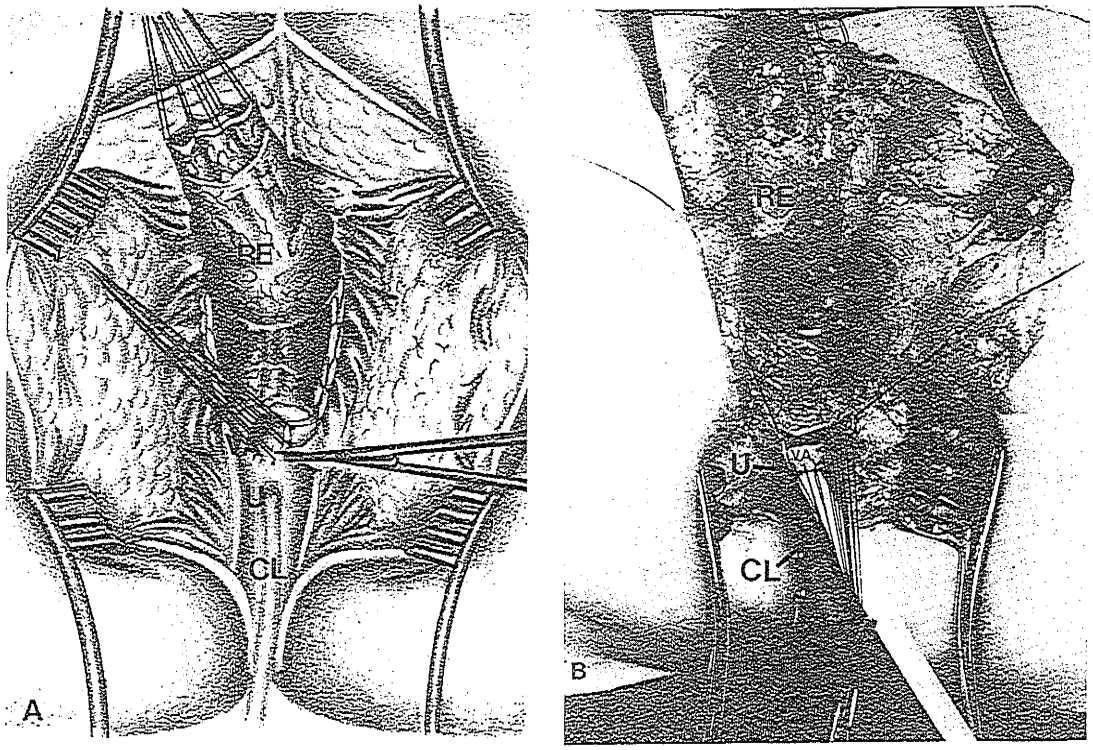

Fig. 9. (A) Separation of vagina and urethra. The rectum lies above, already separated. RE, rectum; VA, vagina; U, urethra; CL, cloaca. (B) Operative field of part A.

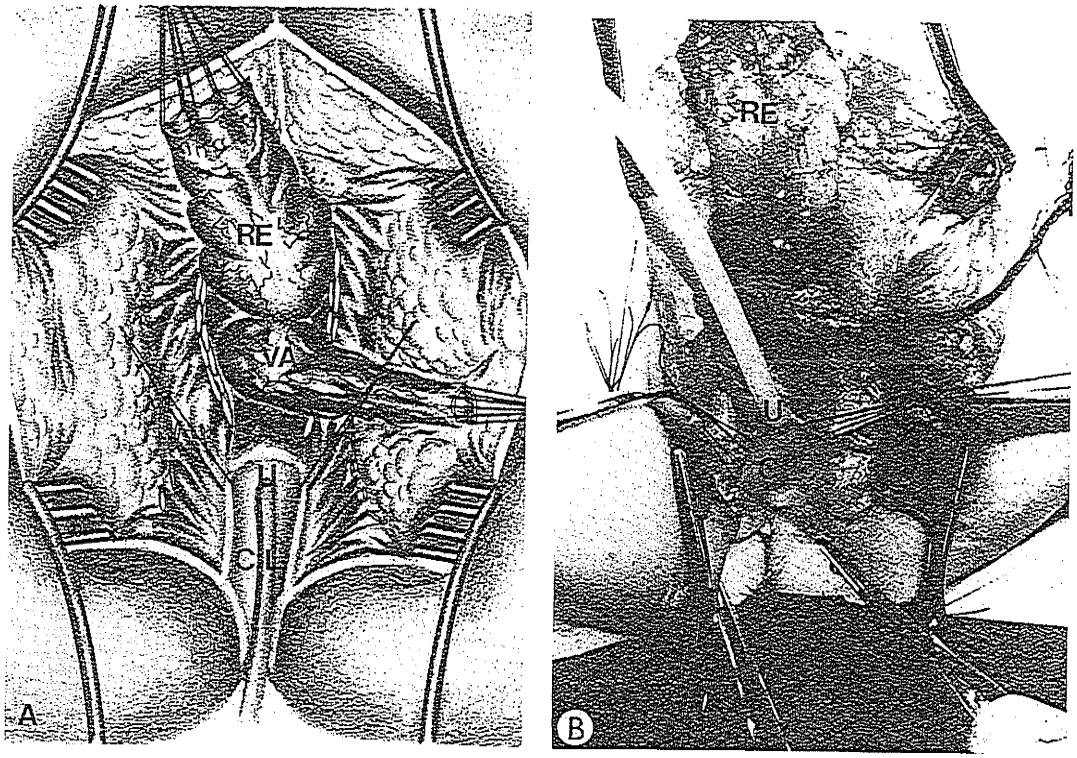

Fig. 10. Rectum, vagina and urethra are already separated. (B) Stitches are placed at cloaca edges for reconstruct of the new urethra around the Foley catheter. RE, rectum; VA, vagina; U, urethra; CL, cloaca.

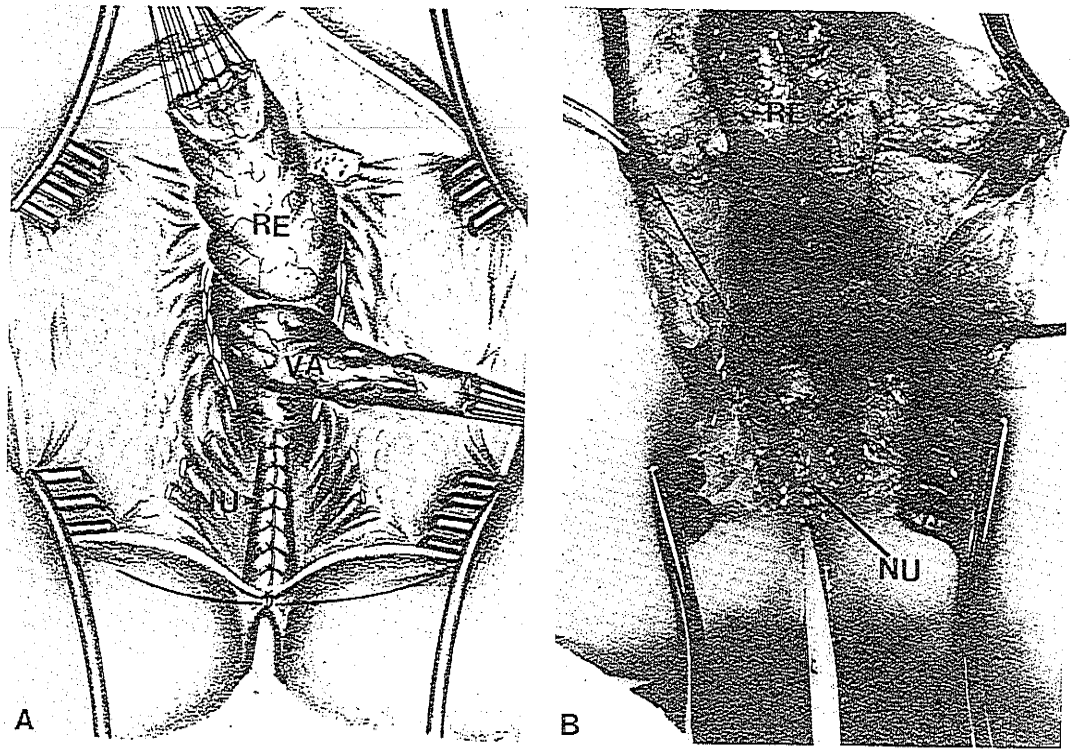

Fig. 11. (A) Urethral reconstruction from cloacal walls. RE, rectum; VA, vagina; NU, neourethra. (B) Operative field of part A.

dissected in order to be able to close them over the Foley catheter (Fig. 11). Following this, we reconstruct the new introitus by pulling the vagina through next to the urethra, and the rectum to a position behind the vagina. The muscle structures behind the rectum, including the levator ani and muscle complex are reconstructed in exactly the same way as described in the previous technique (Fig. 12).

Technique for Treatment of Rectal Atresia and Stenosis

The same approach was used in two cases of rectal atresia and two of stenosis (Table 3).

In cases 1 and 4 of rectal stenosis, after the muscle structures are cut and malformation exposed, a Heinecke-Mikulicz plastic procedure was used which provided good communication between the rectal pouch and anal canal. A wide anastomosis was performed in cases 2 and 3 of rectal atresia, with an ample duct obtained between the two structures. Case 3 called for adaptations of the technique. This patient had a complex malformation that could be classified as rectal atresia with the variant, however, of the presence of two urinary fistulas, one in the anal canal and the other in the upper pouch communicating with the bladder. The operation was initiated in the usual way and, after the anal canal was opened, it was possible under direct visualization to easily close the fistula communicating with the bulbar urethra. Since the upper pouch was intraabdominal, it could not be seen via our sacral approach. This made it necessary after the fistula had been closed, to turn the patient, and perform a laparotomy to divide the upper fistula, free the sigmoid, introduce and fix it in the presacral space. After the laparotomy, the patient was turned again and, through the sacral incision, the rectum was pulled through and an end-to-end anastomosis made with the anal canal. Subsequently, all the muscle structures posterior to the rectum and anus were reconstructed in the same way as in the original technique (Fig. 13).

Table 3. Rectal Atresia and Rectal Stenosis

1. Five year-old-female. Rectal stenosis
2. Two-year-old female. Rectal atresia
3. One-year-old male. Unusual rectal atresia. Double urinary fistula, upper rectum ending in bladder neck; anal canal communicating with bulbar urethra
4. Two-year-old female patient. Long rectal stenosis. Presacral mass. Rectovaginal fistula

Case 4 was a 2-yr-old female patient with a long rectal stenosis associated with a presacral mass that turned out to be a dermoid cyst. In addition, she had an "H" fistula between the lower part of the rectum and vagina. We were able to remove the presacral mass completely, close the fistula comfortably and perform the necessary plastic repair of the rectum (Fig. 14).

The Foley catheter is usually removed ten to fourteen days after operation. Fourteen days after operation, under light anesthesia, stitches were removed, the anus calibrated, and its dilatation begun in all these patients. At that point, we applied electrical stimulation in these patients and observed the response of the external sphincter. Dilatations were continued for approximately three months, after which the colostomy was closed.

RESULTS

Since no more than 27 colostomies have been closed so far, we do not consider evaluation of the results final. The most dramatically successful repairs, from the standpoint of continence, were in the two patients, one with rectal stenosis and the other with atresia whose colostomies were

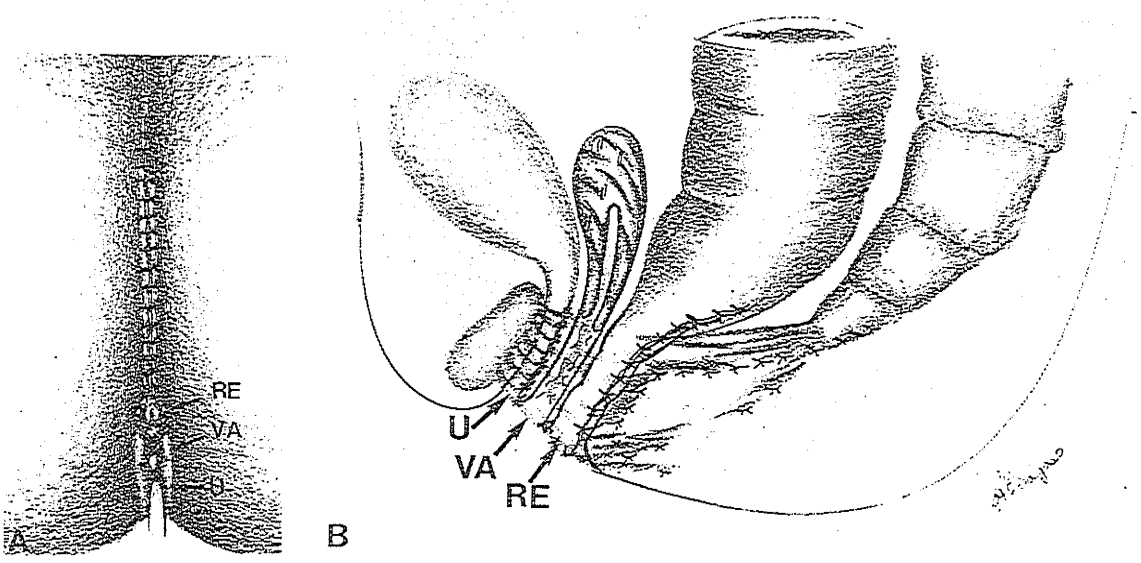

Fig. 12. Cloaca repaired. (A) External appearance. (B) Internal anatomy. RE, rectum; VA, vagina; U, urethra.

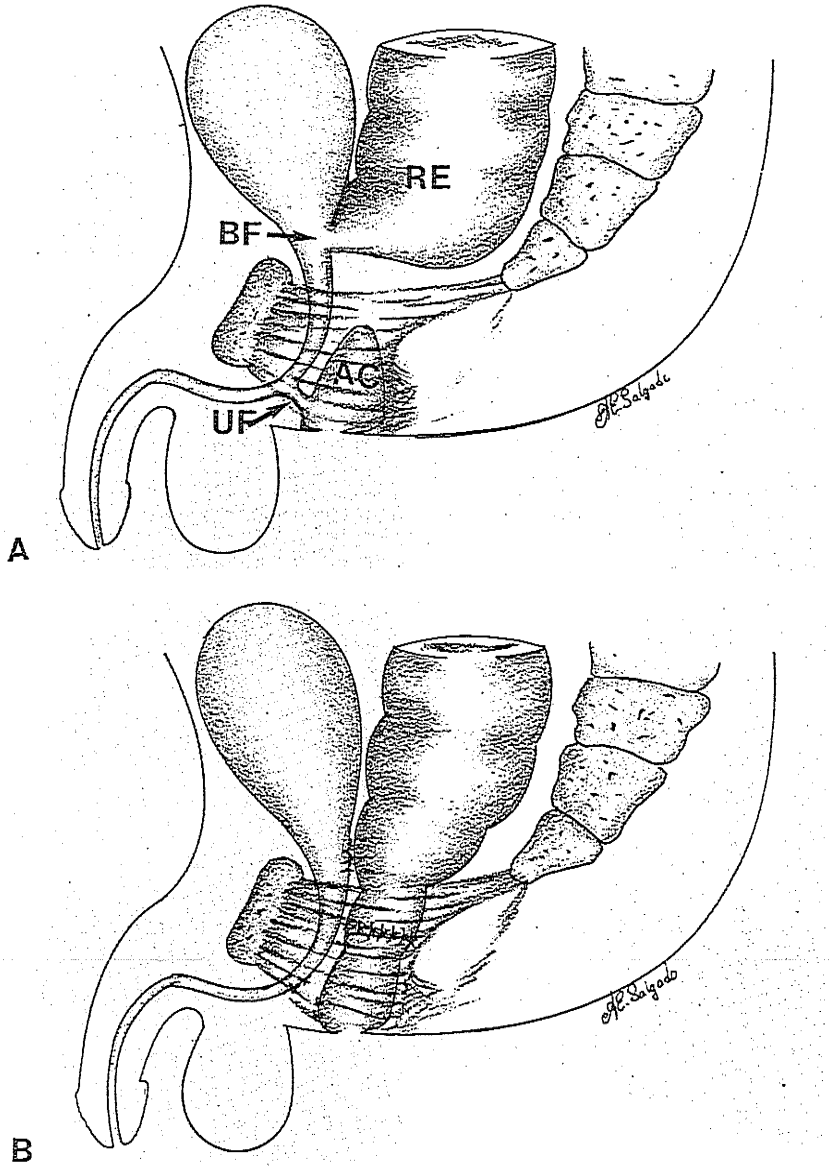

Fig. 13 Unusual form of rectal atresia. (A) Preoperative. (B) Postoperative. RE, rectum; AC, anal canal; BF, bladder fistula; UF, urethral fistula.

closed. Both patients may be considered normal in that they have one or two voluntary bowel movements daily and do not soil in between.

In the two cases of rectocloacal fistula, the results may be considered excellent from the cosmetic point of view. The colostomies have not been closed in these patients because the dilatations are still in progress.

The colostomies have been closed in 25 patients of the large group of cases of more common malformations for which the general technique was described. The results among the 25 children varied in accordance with their age and the associated vertebral malformations. In one patient of the same group who lacked a sacrum, fecal incontinence is severe; two patients with definitely abnormal sacrum soil slightly between bowel movements. Two patients over 5 yr of age are continent inasmuch as they have voluntary bowel movements with no soiling in between. Two patients 2 to 3 yr old now have voluntary bowel movements which was surprising in such young children; furthermore, they do not soil. The rest of the patients, all less than 3 yr old, are having from 1 to 3 involuntary bowel movements at day with no soiling.

Two paitents had to have secondary anoplasties performed because of difficulty in dilating at the level of the mucocutaneous junction. All other patients were satisfactorily dilated.

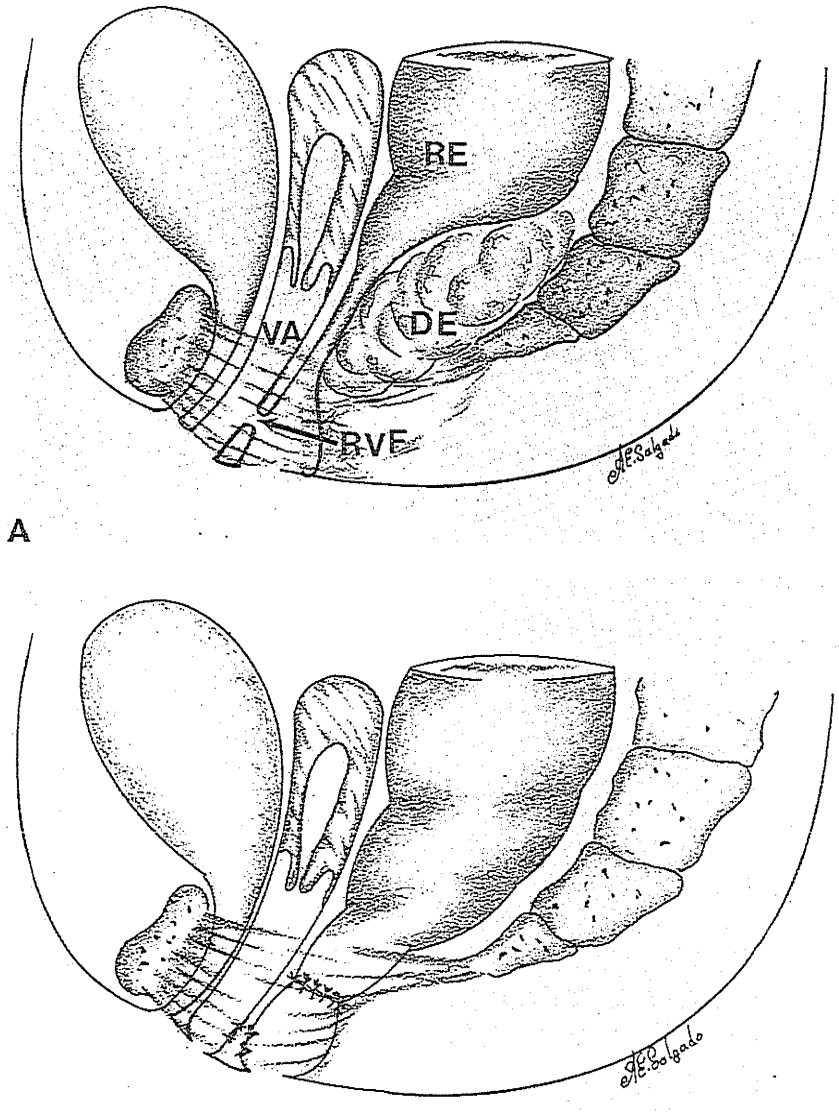

Fig. 14. Unusual type of rectal stenosis, associated to a presacral dermoid and a low "H" type rectovaginal fistula. (A) Preoperative. (B) Postoperative. RE, rectum; DE, dermoid; RVF, rectovaginal fistula; VA, vagina.

DISCUSSION

We consider that the outstanding advantage offered by this technique is the extensive exposure provided and the meticulous repair of the structures made possible thereby, as well as the utilization of all the muscle structures present in the patient for achieving optimum continence.

The contraction of the external sphincter we observed in all our patients was impressive. Of course, it varied in degree among them, but in every case it surpassed our expectations. We believe that it is an important element for attaining full continence in these patients and must be kept intact. If this structure is to be preserved a sufficiently small anus must be created.

The importance of the puborectalis sling has been recognized since the studies of Stephens and Smith.[1] The majority of authors with the greatest experience in the field[16–18] have supported this concept. Many of them stress the need for identifying the sling in order to ensure its preservation. However, the descriptions of it under direct visualization are not clear. Furthermore, the anatomical descriptions of the puborectalis sling[19] locate it in the lowest part of the levator ani which seems to suggest that probably nobody has actually seen it by means of the

conventional incisions. Our incision exposes all the muscle structures in the region. We do not deny the existence of the sling but we have been unable to identify it. Nor do we understand why it should be considered more important than the rest of the muscle structures we found. We have named the muscle structure where the external sphincter merges with the levator ani (probably in the zone assigned to the puborectalis sling) "muscle complex." It is our opinion that the group which includes the external sphincter, "muscle complex," and levator ani must be carefully preserved, as a whole, in order to obtain optimal continence. In any case, from the practical viewpoint of the surgeon who operates on these children, what he will find is a continuous funnel-shaped muscle structure reaching from the skin to the lower part of the anterior aspect of the sacrum which constitutes a muscle mass near the skin through the center of which the intestine must be pulled (Fig. 15).

The main source of complications arising from the application of this procedure is probably to be found in the separation of the rectum and urethra. This is due to the fact that both structures have a common wall which obliges the surgeon to be exceedingly meticulous. We consider that the complexity of this separation was not made evi-

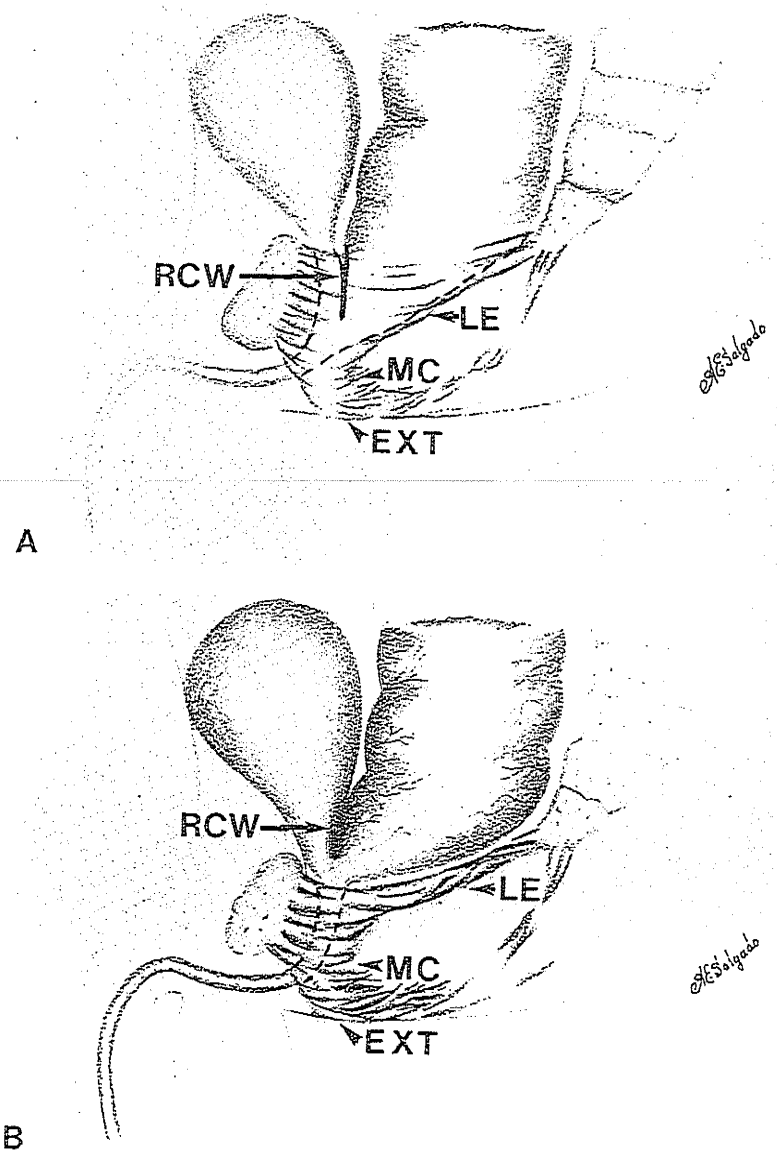

Fig. 15. Our current concept of the anatomy of imperforate anus. (A) Most common type; the funnel-like levator muscle is wider above. (B) A higher malformation; the levator funnel is closely attached to the urethra. Rectum and urethra share a common wall above the fistula. LE, levator muscle; MC, muscle complex; EXT, external sphincter; RCW, Rectourethral common wall.

dent in prior techniques since there was insufficient exposure for the surgeon to be aware of it. As a consequence, there are current publications[20-21] in which reference is made to rectal diverticula or stenosis left in the posterior urethra. In these cases, the surgeon probably removed only the portion of the rectum that was not joined to the urinary tract and, therefore, left the segment where the rectum and urethra shared a common wall.

We have been impressed by the very clear and exact visualization that is provided of the prostate and seminal vesicles, such important structures in the male child's anatomy. The prostate and rectum are closely joined with a common wall where the surgeon must create a plane of separation.

Possibly the most important contribution of this surgical technique is the recognition of the need to taper the intestine. There were cases in which this tailoring was not done because it was not necessary in the particular patient, but they were exceptions.

Each case is different and requires a degree and length of tapering that varies from one patient to another on which the surgeon must make a decision at the operating table. We believe that the reason satisfactory results have been obtained with techniques that do not involve tapering of the intestine lies in height of the malformation. In a case like the one shown in Fig. 15-A, the forcing through of an ectatic intestine would certainly destroy the small muscle structures caudad to the intestine. However, this malformation is low enough for the patient to have congenitally preserved a good part of the levator ani funnel which, most likely, conferred sufficient continence to be socially acceptable despite the destruction of the most distal part of the muscle structures. In the case of Fig. 15B, in pulling the intestine through without tapering, severe damage would be caused. For that reason, we believe that the caliber of the intestine must be reduced in order to permit suturing the levator ani behind it for the maximum possible length, as well as to allow wrapping the "muscle complex" around the rectum and, finally, keeping the external sphincter intact.

Dilatations must be careful and gradual in order to simulate the normal growth of the rectum which, in turn, will gently distend the muscle structures, avoiding their rupture. For that reason, we feel that the dilatations should cover a period of at least 3 mo.

Among anorectal malformations, one of the most challenging has always been retrocloacal fistula and its repair. We realize that our two cases are probably not representative of the entire spectrum of malformations to be found in the field of cloacas. However, one of our patients had an enormously dilated vagina which greatly facilitated dissecting and pulling it through at the edges of the skin. In the other case, the vaginal wall was exceedingly thin and friable and the vagina did not measure more than 4 cm., yet we were able to pull it through satisfactorily to the edges of the skin, thanks to the exposure obtained. The length of the cloaca itself was approximately 3–4 cm in our patients.

In one patient, despite the fact that the malformation was an intermediate one, of the kind we are usually able to pull through with this type of incision, we had to open the abdomen and free the sigmoidostomy to be able to pull the rectum through (Table 2). Therefore it is important for those who do sigmoidostomies to know that a loop of bowel should be left distal to its site which will allow the surgeon sufficient mobilization by the sacral route.

We have found it necessary to open the abdomen in only seven occasions but these involved patients in whom we were unable to locate the rectum upon entering via this route (Table 2). As we acquire greater skill in performing these procedures, we will feel safer in stating that if the rectum can be visualized by the sacral route, it can almost always be pulled through to the edges of the skin.

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Discussion

D. Johnson (Salt Lake City, Utah): Many of us were dismayed at first showing by Dr. Peña's suggestion that we cut through the entire sphincteric mechanism. One can legitimately question whether the obvious benefits from the vastly improved surgical exposure are counterbalanced by functional loss from incisional damage. Drs. Peña and deVries have performed anatomical dissections in live patients. Muscle function has been evaluated with the help of a stimulator, and under magnification. They have concluded the following. First, the anatomy of the sphincteric mechanism differs considerably from that described on the basis of cadaver dissections. Second, the disadvantage of cutting the sphincter is more than offset by increased precision in sphincter identification, bowel position and sphincter reconstruction. Third, rectal segment tapering of the blind ectatic pouch is essential to prevent damage by overstretching of the sphincteric mechanism. To date, in Salt Lake City we have used this procedure for 12 cases. One patient, my first, had excessive tapering, and I would warn you against this.

We believe this is a landmark technique in reconstruction of imperforate anus. Long term results are not available. Short term results are better than anything we have seen with the Stevens-Smith technique. The operative procedure demands meticulous technique, and is greatly facilitated by magnification and the repeated use of a muscle stimulator, both during dissection and reconstruction. And, lastly, this is not a procedure which one can read about or see in a movie and then do well himself. Experience with the procedure is essential for a safe and functional reconstruction.

K. Kimura (Kobe, Japan): I have borrowed Dr. Peña's technique for revision in 3 patients who had undergone an unsuccessful repair of imperforate anus during infancy. One of the patients is presented. A 7 yr old boy has been incontinent since primary operation. We have employed posterior sagittal approach to find the intact puborectal muscle anteriorly to the dilated rectum. The muscle was divided on the midline. Then a circular myotomy was made on the rectum, as the Livaditis procedure for the esophagus, providing a neck in the rectum. The neck was placed in the puborectalis sling that was approximated posteriorly. Six months after closure of colostomy, we found good spincteric function by digital examination and barium enema. Our 3 patients have been free of soiling. We have appreciated Dr. Peña for his great idea that is useful for revision of an unsuccessful repair of imperforate anus.

J. Eugene Lewis, Jr. (*St. Louis, Missouri*): I would like to say a few words about the timing of this procedure. I notice in the slides that the patients are not small infants. Immediately after World War II abdominoperineal repairs of imperforate anus were done in the newborn period. The results were incontinence and flabby rectums. Later we changed to a staged procedure. However, in recent years definitive repair has been favored in infants under a year of age. At this time the muscle sling is fragile and vulnerable to injury. Recently I have been using an anterior approach in the infant 18 mo to 2 yr of age. This gives excellent visualization of the muscles and avoids damage to a fragile muscle sling. The muscles shown by Dr. Peña are well developed and may be less vulnerable to damage in his procedure. His results appear excellent. However I would prefer not to divide the muscles. An anterior approach seems preferable in older infants 18 mo to 2 yr of age preserving the muscle integrity.

E.T. Boles (*Columbus, Ohio*): The exposure and the operative technique that Dr. Peña has shown us are extraordinarily elegant, and I would basically like to emphasize the comments that Dr. Dale Johnson has made. I do have one question for Dr. Peña and that concerns the degree of tapering. In order to fashion a precise anatomic closure, it is absolutely essential using this technique to do a very considerable tapering of the distal rectum, and I would like for Dr. Peña to address this question. How does he manage the distal rectum which may be not much larger than perhaps a #20 French catheter at the conclusion of the procedure?

A. Coran (*Ann Arbor, Michigan*): Dr. Peña, I would like to ask you two questions. Have you had any experience in redoing a Stephens' operation with this technique? Secondly, have you used this approach in the adult with a very low rectal carcinoma as a means of eliminating the need for an abdominoperineal resection.

John G. Raffensperger (*Chicago, Illinois*): Dr. DeVries showed the movie in Chicago several months ago. Technically, it is a nice operation, but I am concerned about potential damage to the levator muscle. Sutures don't always hold well in muscular tissue, and there might be a risk of dehiscence of the suture line. I am also concerned about mobilizing so much bowel from the back because it can become devascularized. Both Dr. Stephens and the 1976 publication by Drs. Donnellan and Swenson stressed the importance of bringing the bowel to the perineum between the muscle and the urethra. If there is any doubt as to the location of the muscle, it is a good idea to re-read the articles by Dr. Douglas Stephens and to dissect the pelvis in the autopsy room. All of us at The Children's Memorial Hospital in Chicago do the abdomino-perineal procedure and hug the urethra, which is found by having a metal sound as a guide and by continued use of the nerve stimulator. We agree with the authors on the importance of the external sphincter and agree that it is a part of the muscle complex, but it is perfectly easy to find with the nerve stimulator prior to the time the patient receives a muscle relaxant. We are now satisfied with the results of the abdomino-perineal procedure which has better than a 15 yr followup. I am not sure it is right to discuss a new technical procedure for imperforate anus after only a 1½ yr follow-up. The function of the levator sling depends not only on its anatomical position, but on innervation and training. It may take several years to know how the operation will work. Dr. Willis Potts said that we had to take great care with imperforate anus repairs because they have to last for 70 yr.

Alberto Peño (*closing*): First of all, Dr. Dale Johnson, thank you for your kind remarks, and Ken Kimura for trying this procedure in Japan. Dr. Lewis, we never operate on a child before 12 mo of age or 8 kilos, whatever he or she reaches first. Dr. Raffensperger, we do not think that we have found the final solution for anorectal problems. We think that we have the best procedure that we have ever tried. I would invite you to try it, and I am sure you are going to like it. You are right, we do not have long-term follow-up but we feel that we have better results than those we used to have. Dr. Boles, the degree of tapering is a decision that the surgeon makes on the operating table; higher malformations require longer taperings; it is a delicate step, if you taper it too much, you may jeopardize the blood supply and also may have some problems dilating it. We always dilate these patients for about 3 mo minimum. When the operation is finished we end up with an anus of about 6–12 mm. We had two patients in which we had trouble dilating the skin. Dr. Coran, there is a description of the

Krasky's technique that is basically this approach for cancer of the rectum. We have no experience with such disease. On the basis of what we have been finding with this approach, I think that the current secondary repairs taking muscle on both sides and tighting the rectum from behind is not rational. The ideal way to repair them would be what Ken Kimura demonstrated, namely to open the same way, lift the rectum up, and find out how much muscle was left in front of the rectum; cut the muscle, taper the bowel and redo everything.