

Rectal Pouch Index: A Prognostic Indicator for Constipation after Surgery for High and Intermediate Anorectal Malformations

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Abstract

Background and Introduction Constipation following posterior sagittal anorectoplasty (PSARP) is common. We correlated the dimensions of rectal pouch before PSARP with the postoperative bowel habit. Classical PSARP was modified with tapering of rectal pouch by plication of its walls thus preserving the internal sphincter because we believe that this preserves continence and lead to better results. It was observed that a distinct relationship exists between the preoperative size of the rectal pouch and constipation. **Aim** The aim of this study is to correlate the dimensions of preoperative rectal pouch with postoperative constipation.

Materials and Methods PSARP was performed (n : 45) in anorectal malformations using an indigenous muscle stimulator. Before PSARP, a distal cologram via high sigmoid colostomy was performed. All the distal cologram were performed by a single senior radiologist and the pressure was kept constant between 15 and 20 cm of water while filling to rule out the confounding factor related to incomplete filling. Rectum index was calculated as follows: The maximum radiological diameter of the rectum within the pelvis in the sagittal plane was multiplied by the maximum diameter of the rectum in the frontal plane. The result of this calculation was divided by the product of multiplying the distance between the ischial spines and the distance between the posterior surface of the pubic symphysis and the anterior surface of the last sacral vertebrae.

Results Symptomatic constipation requiring treatment developed in 25 patients (48%). None of these patients had anal stenosis or stricture. Constipation was managed by dietary measures and laxatives. Fifteen patients (60%) had grade 1 constipation and responded favorably. Eight and two patients had grades 2 and 3 constipation, respectively. Those patients who had a rectal pouch index of less than 0.8 had mild constipation grades 0 and 1, whereas those in whom the rectal pouch index was more than 0.8 had severe degrees of constipation (grades 2 and 3).

Conclusion Measuring the rectal pouch index can help in identifying the group which is likely to develop constipation after PSARP. These patients can be put on bowel training early on, after the colostomy closure, instead of waiting.

Keywords

- ▶ rectal pouch index
- ▶ constipation
- ▶ PSARP
- ▶ rectal plication
- ▶ ARM

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Introduction

Posterior sagittal anorectoplasty (PSARP) described by deVries and Pena 20 years ago¹ is the more commonly done procedure for the treatment of anorectal malformations. Some surgeons have modified the classical PSARP by preserving the internal anal sphincter (which they believe is the circular smooth muscle layer near the fistula) by preserving the distal most part of the fistula and preventing unnecessary excision; it is thought that this modification improves continence.^{2,3} Long-term results for bowel function are now available in patients who had undergone classical PSARP⁴⁻⁶ and internal anal sphincter saving PSARP.⁷ Constipation has been found to be the most common sequelae following surgery in both the groups.^{4,5} In the present series, tapering of the rectal pouch was done by plicating its walls while also preserving the internal sphincter. We have correlated the bowel habit with the dimensions of the rectal pouch before PSARP. It was noted that a distinct relationship exists between the preoperative size of the rectal pouch and constipation, thus it can serve as a guide to institute early measures for treating constipation and prevent the formation of rectal inertia.

Aim

The aim of this study is to correlate the dimensions of preoperative rectal pouch with postoperative constipation.

Inclusion Criteria

1. All operated cases of anorectal malformations (ARM) with documented rectal pouch index.
2. PSARP done using rectal plication and internal sphincter preserved.
3. Follow-up of at least 2 years to document the status of constipation.

Exclusion Criteria

1. Incomplete data.
2. Patient lost to follow-up after surgery or death.
3. Patients whose distal cologram showed impacted meconium in the distal pouch or obvious spinal abnormalities.
4. Patients where distal bowel was defunctionalized for more than 6 months due to colostomy.

Study Design

This is a retrospective study.

Methods

This study was conducted in the Department of Pediatric Surgery, All India Institute of Medical Sciences, New Delhi. PSARP was performed on 45 patients with high or intermediate anorectal malformations using an indigenous muscle stimulator. All patients in the neonatal period underwent an invertogram,⁸ followed by a high sigmoid

loop colostomy. All of them had a distal wash out done following colostomy creation to remove impacted meconium which could affect results. A pressure augmented distal cologram via the protecting colostomy was performed in all patients before PSARP to delineate the exact anatomy of the malformation, the presence of fistula, and the number of sacral pieces. All the distal colograms were performed by a single senior radiologist and the pressure was kept constant between 15 and 20 cm of water while filling to rule out the confounding factor related to incomplete filling. Another cologram was performed before the closure of the colostomy as a protocol to rule out distal obstruction, this was not used in the calculation of the rectal pouch index.

The types of anomalies were classified according to the Wingspread International Classification for Anorectal Malformations.⁹ They underwent PSARP with the help of an indigenous muscle electro-stimulator. Every effort was made to preserve the rectal end of the fistula with its thickened muscular wall. The fistula was then transposed within the external sphincter and sutured to the perineal skin. If the distal rectum was dilated it was plicated. A radiological index¹⁰ was evaluated to obtain comparable data concerning the size of the rectum in relation to the bony pelvis.

This rectum index was calculated as follows (as shown in **Fig. 1**):

$$\frac{(\text{Maximum radiological diameter of the rectum within the pelvis in the sagittal plane}) \times (\text{maximum diameter of the rectum in the frontal plane})}{(\text{Distance between the ischial spines}) \times (\text{distance between the posterior surface of the pubic symphysis and the anterior surface of the last vertebrae})}$$

All patients were operated by one senior author (M.B.) with considerable experience in managing these cases and clinical evaluation done by the other author to eliminate the component of bias in the assessment of results. Patients were evaluated for constipation in the follow-up. During this evaluation, special attention was paid to the occurrence of voluntary bowel movements, soiling, and constipation. For the purpose of the study, the degree of constipation was graded¹⁰ as shown in **Table 1**.

Statistical analysis was done by Student *t* test, with *p* value < 0.01 taken as statistically significant.

Results

We had a total of 45 patients included in this study. Among them 33 were males while 12 were females; 41 of them had anorectal malformation, 2 had pouch colon, and 2 had common cloaca. Of the 41 patients, 30 had high anomalies while 11 had intermediate anomaly. The median follow-up period was 52 months (range, 24–88 months). At the last follow-up visit, the median age of the patients was 66 months (range, 30–100 months).

The types of anomaly and the distribution of fistula are given in **Table 2**. The distribution of the type of fistula is given in **Table 3**.

Symptomatic constipation requiring treatment developed in 25 patients (48%). None of these patients had anal stenosis or stricture. The incidence of constipation was higher in the

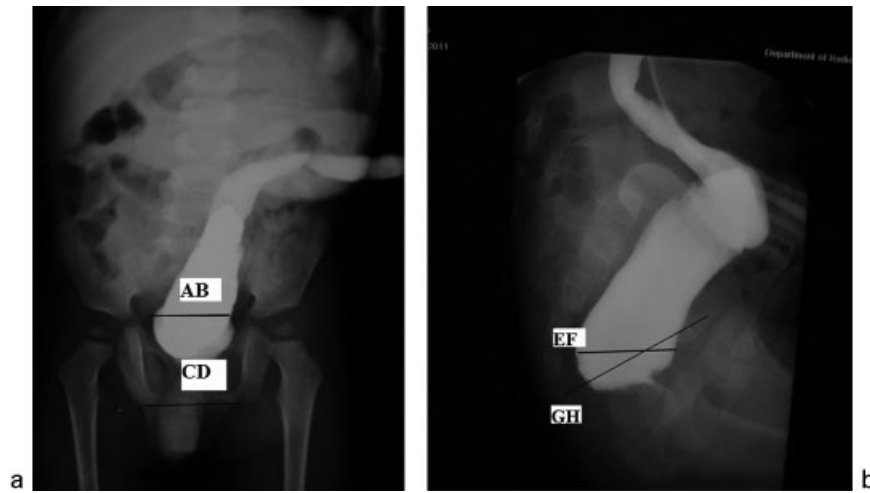


Fig. 1 Barium enema showing calculation of rectal pouch index: (a) anteroposterior view and (b) lateral view. AB, maximum diameter of the rectum in the frontal plane; CD, distance between the ischial spines; EF, maximum radiological diameter of the rectum within the pelvis in the sagittal plane; GH, distance between the posterior surface of the pubic symphysis and the anterior surface of the last vertebrae.

vestibular fistula group. Constipation was managed by dietary measures and laxatives. Fifteen patients (60%) had grade 1 constipation and responded favorably. Eight (32%) patients had large fecalomas, which had to be disimpacted. Satisfactory bowel function with dietary measures could be restored in them. In two patients (8%), constipation and overflow soiling could not be managed and they required enemas. The rectal pouch index in relation to the grade of constipation is given in [Table 4](#).

Discussion

The objective of repair of high anorectal malformations is to achieve normal bowel function of a normal healthy person. Since 1985, PSARP has led us to a better understanding of the internal anatomy of these defects. In 1988, Pena emphasized the PSARP approach for achieving good results.⁴ A modification of the classical PSARP, the internal anal sphincter saving PSARP was introduced by Rintala et al.¹⁰

Table 1 Grading for degree of constipation

Grade 0	No constipation
Grade 1	Constipation manageable with diet or bulk laxatives
Grade 2	Constipation manageable with stimulant laxatives or enemas
Grade 3	Severe, unmanageable constipation

Table 2 Types of anomaly

Sex	High and intermediate anomalies	Pouch colon	Common cloaca	Total
Male	32	1	Nil	33
Female	9	1	2	12
Total	41	2	2	45

Table 3 Distribution of the type of fistula

Sex	Recto bulbar	Rectoprostatic	Rectovestibular	Rectovaginal	Colovesical
Male	6	26	Nil	Nil	1
Female	Nil	Nil	5	4	1
Total	6	26	5	4	2

Table 4 Rectal pouch index in relation to grade of constipation

Grade of constipation	Rectal pouch index
Grade 0 (n = 15)	0.2
Grade 1 (n = 15)	0.5
Grade 2 (n = 8)	0.8
Grade 3 (n = 2)	1.4

It was based on the histological findings that the end of the rectum along with the rectourinary fistula is composed of circular muscle fibers, constituting the internal anal sphincter.

Long-term results for bowel function are available following both the classical PSARP as well as the internal anal sphincter saving PSARP.⁴⁻⁷ Constipation has been a major problem common in both these procedures, varying from 40 to 80%.^{5,10} Various theories have been postulated to account for this,¹¹⁻¹⁷ including rectosigmoid hypomotility leading to megarectum,¹¹ partial denervation and subepithelial fibrosis,⁴ neuronal intestinal dysplasia and aganglionosis,¹² and overflow incontinence.¹⁷ More recently Caldaro et al¹⁸ have tried to correlate three-dimensional endorectal ultrasound and anorectal manometry to document sphincter deficiency and defecation dysfunction and have shown disruption of internal sphincter as the cause of constipation, but their results need further validation.

Burjonrappa et al¹⁹ tried to look at the problem other way round, they evaluated the patients of ARM with mega rectum and correlated it with impaired proprioception and concluded that sacral anomalies, which are more prevalent in children who developed mega rectum, may result in abnormal rectal proprioception contributing to this pathology.

The classical PSARP involves a wedge resection of distal half to one-third of the dilated and hypertrophied blind rectal pouch to accommodate it within the striated muscle complex.¹ We believe this excision creates two local disturbances:

1. Infringement on the collateral circulation of the distal rectum which is vital for its blood supply thereby producing a state of partial ischemia making the neorectum less pliable.
2. Damage to the autonomic nerve supply, which also carries the sensory afferent fibers.

Thus wedge resection rectoplasty has the hazard of forming a more rigid rectum, which is partially devoid of its afferent nerve fibers, and this could be responsible for the common sequelae such as soiling and constipation. We tried to avoid this by plicating the dilated rectum.

Constipation is considered pathological if it produces stasis with overflow incontinence and soiling, as has been the observation in larger series.^{4,10,13} In some reports, constipation became recalcitrant to treatment in as many as 30% patients. These patients had to be put either on permanent evacuation procedures such as continent appendicostomy or

required a redo surgery.^{14,15} In contrast to excision and tapering rectoplasty, we believe in preserving as much length of the fistula as possible after disconnecting it from the genitourinary tract and plicating the dilated rectal wall sufficient enough to accommodate it within the vertical fibers. Constipation, however, was still seen in 45% of our cases but was amenable to dietary modification and was of short duration. These results could be attributed to the superior quality of collateral's and intact afferent nerve endings achieved by plication of the distal rectum rather than performing excision rectoplasty though this needs further validation.

We also correlated our clinical results with the rectal pouch index,¹⁰ which has not commonly been used. We saw that the severity of constipation was related to the size of the rectum before the closure of colostomy. Those patients who had a rectal pouch index of less than 0.8 had mild constipation grades 0 and 1 (–Table 4), whereas those in whom the rectal pouch index was more than 0.8 had severe degrees of constipation (grades 2 and 3). Thus rectal pouch index had significant correlation with the grades of constipation and this correlation has important prognostic significance.

Conclusion

Rectal plication with internal sphincter preservation can be tried instead of excision rectoplasty though the difference the results of the two approaches needs to be studied by large randomized controlled trials. Rectal pouch index measurement helps us in identifying the group of cases who are likely to develop constipation following PSARP. These patients can thus be counseled and put on bowel training early on, after the colostomy closure, instead of waiting till they develop megarectum later on. Thus calculation of rectal pouch index can help us in predicting the outcomes in cases of ARM.

Conflict of Interest

None

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