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Rectal prolapse following posterior sagittal anorectoplasty for anorectal malformations

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Abstract

Purpose: Rectal prolapse is a known postoperative problem in children with anorectal malformations. The aims of this study were to determine the incidence of significant rectal prolapse (>5 mm), to objectively quantify its predisposing factors, and to offer recommendations as to its prevention and surgical treatment.

Methods: The authors reviewed their series of 1619 patients with anorectal malformations; 1169 underwent primary posterior sagittal anorectoplasty (PSARP) at their institution between 1980 and 2002, and complete records were available for 833. The series was analyzed for incidence of prolapse, type of anorectal malformation, status of the sacrum, muscle quality, associated vertebral and spinal anomalies, and postoperative constipation. A specific technique for prolapse repair was used.

Results: Of 833 patients, 45 developed significant rectal prolapse (3.8%). The mean age at the time of PSARP was 0.73 years (range, 0.19-5 years). The average time to recognition of prolapse following PSARP was 13.1 months. Of these 45 patients, 32 required surgical repair and of those, 3 required a second surgical repair. The incidence of prolapse varied by complexity of anorectal defect: cloaca (6.2%), rectobladder neck fistula (6.8%), rectourethral fistula (5.4%), rectovestibular fistula (1.2%), rectal atresia (0%), and rectoperineal fistula (0%). There was a significantly increased incidence of prolapse in patients with a low muscle quality score and in patients with vertebral anomalies (20% vs 3.2%). The presence of a tethered cord and an abnormal sacral ratio did not correlate with an increased incidence of prolapse. Twenty-two patients developed prolapse following colostomy closure, and of these, 12 (55%) suffered from constipation.

Conclusions: The overall incidence of significant rectal prolapse following PSARP is low. Prevention of prolapse with the PSARP technique may be because of key technical steps. Patients with higher anorectal malformations, poorer muscle quality, and vertebral anomalies had a greater risk of developing postoperative rectal prolapse. The presence of tethered cord and quality of the sacrum were not predictive of postoperative prolapse. Constipation seems to be a factor in the development of prolapse.

Rectal prolapse is a recognized problem in patients with anorectal malformations [1-5]. Posterior sagittal anorectoplasty (PSARP) is an established technique to repair anorectal malformations [1-3] and may decrease the incidence of rectal prolapse, when compared with other techniques [5].

The incidence of prolapse after PSARP is low [6]; however, no study has determined its exact incidence in a large series or defined the contributing factors that may predispose a patient to developing prolapse. We hypothe-

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sized that postoperative rectal prolapse would be more likely in patients with complex anorectal anomalies, deficient muscles, those with spinal or sacral abnormalities, and those with severe constipation.

The aim of this study was to determine the incidence of significant rectal prolapse (>5 mm), objectively quantify the predisposing factors that lead to it, to offer recommendations as to its prevention, and to describe our technique of prolapse repair.

1. Materials and methods

We reviewed our series of 1619 patients born with anorectal malformations. Of these, 1169 underwent primary PSARP at our institution between 1980 and 2002. The cases were reviewed for incidence of postoperative rectal prolapse, average time to the development of prolapse, type of anorectal malformation, status of the sacrum, muscle quality, associated spinal anomalies, and postoperative constipation. Muscle quality is an unvalidated subjective score from 0 to 3, given during each operation, by a single surgeon. Those patients with complete data for each specific question were analyzed. Postoperative rectal prolapse was defined as prolapse greater than 5 mm. It was felt that this amount of prolapse was more likely to lead to clinical sequelae, such as excessive mucous production, ulceration, and potential interference with anal sensation. Student's t tests and χ^2 were used for the statistical analysis, and the study was

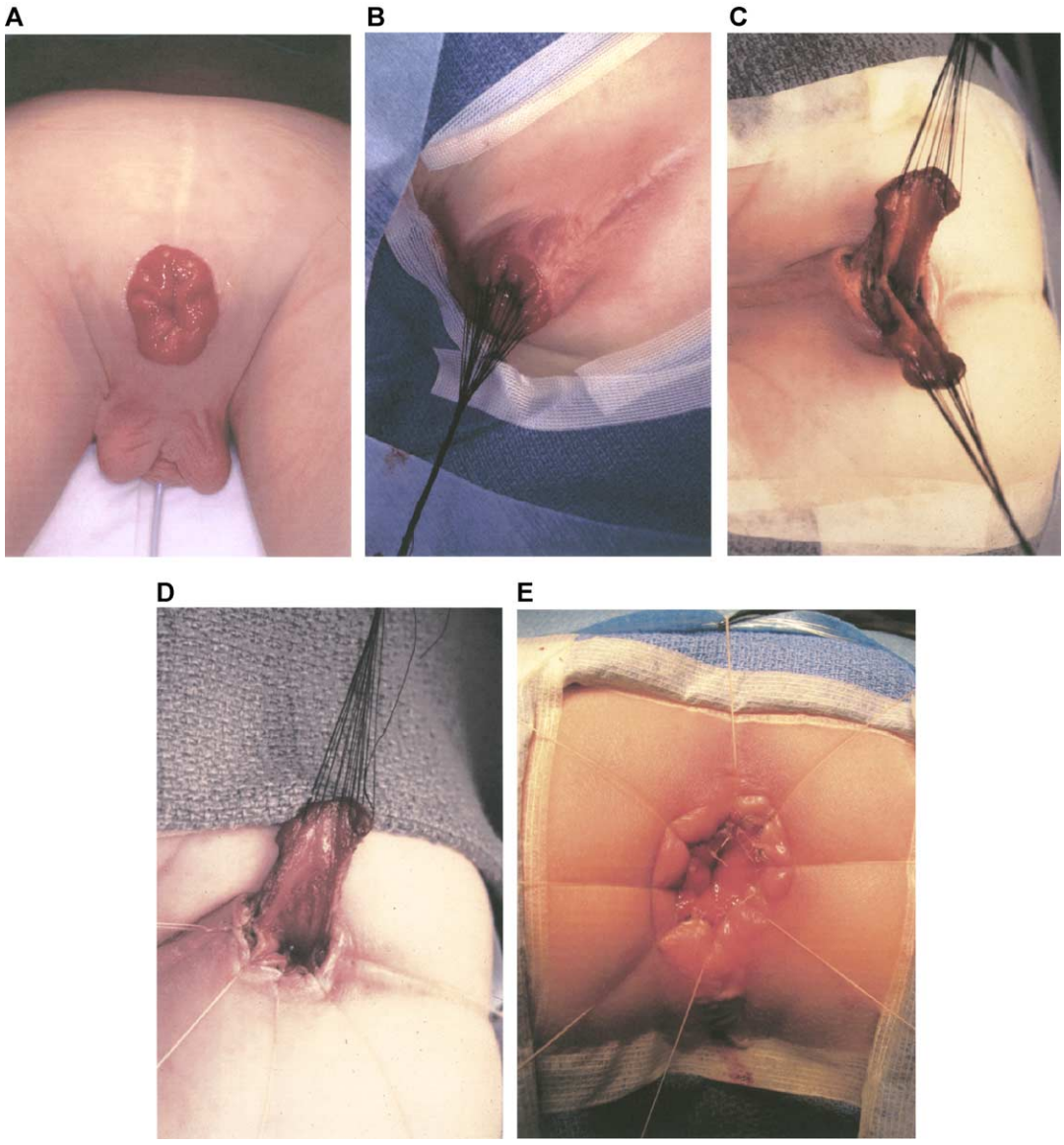

Fig. 1 Surgical technique for prolapse repair. A, Circumferential prolapse after PSARP. B, Traction sutures at the mucocutaneous junction for distributed tension, preserving the anal skin. C, Circumferential incision and mobilization of redundant rectum. D, Redundant rectum trimmed. E, Anoplasty performed under slight tension.

Table 1 Anorectal malformation type and incidence of prolapse

Anorectal malformation	Total number	Cases of rectal prolapse	Percent with rectal prolapse (%)
Cloaca	289	19	6.2
Rectobladder neck fistula	69	5	6.8
Rectourethral fistula (bulbar + prostatic)	312	17	5.4
Vestibular fistula	163	2	1.2
Rectal atresia	12	0	0.0
Rectoperineal fistula	62	0	0.0

performed under the guidelines of the Institutional Review Board.

The surgical technique for prolapse repair begins with traction sutures for distributed tension being placed at the mucocutaneous junction, preserving the anal skin (Fig. 1A and B). A circumferential incision is performed peripheral to the traction sutures (Fig. 1C). The redundant rectum is dissected and mobilized, and then trimmed off on each side (Fig. 1D). An anoplasty is performed under slight tension to provoke some inversion of the suture line (Fig. 1E).

2. Results

Of 833 patients who underwent primary repair for anorectal anomalies, by a single surgeon using the PSARP technique, 45 developed rectal prolapse (incidence of 3.8%). The mean age of the patients at the time of PSARP was 0.73 years (range, 0.195 years). The average time to development of prolapse after PSARP was 13.1 months. Of the 45 patients that developed rectal prolapse, 32 underwent surgical repair and of those, 3 required an additional surgical repair. Sixteen (36%) of the patients that eventually developed prolapse had their rectum tapered during the initial surgery. Twenty-two (44%) patients developed rectal prolapse before colostomy closure, and 23 (46%) developed prolapse after colostomy closure.

The incidence of rectal prolapse was determined for each anatomic subgroup (Table 1). The highest incidence was found in the cloaca and rectobladder neck fistula groups (6.2% and 6.8%, respectively), followed by a lower incidence in patients with rectourethral (prostatic and bulbar) fistula (5.4%). A lower incidence was found in the vestibular fistula group (1.2%), and no patients with rectal atresia or rectoperineal fistula developed prolapse.

Table 2 Muscle quality scores for both groups

Anorectal malformation	No prolapse	With prolapse
All malformations	2.3 (n = 601)	1.6 (n = 44)
Cloaca	2.6 (n = 188)	1.4 (n = 19)*
Rectobladder neck	1.7 (n = 37)	1 (n = 6)*
Rectourethral fistula (bulbar + prostatic)	1.9 (n = 244)	1.8 (n = 17)*
Rectovestibular	2.8 (n = 132)	3 (n = 2)

* Significant $P < .05$.

Table 3 Factors associated with prolapse

Height of anorectal defect
Muscle quality
Associated vertebral anomaly
Associated spinal anomaly
Postoperative constipation

$P < .05$ for all factors.

The sphincter muscles are scored during PSARP for all patients at our center (from 0 [no sphincter] to 3 [excellent sphincters]). We found a decreased muscle quality score in the patients that went on to develop rectal prolapse (Table 2). This difference was most evident in the higher malformations. Overall, the average muscle quality score for the patients who did not develop prolapse was 2.3 as compared with 1.6 in those that developed rectal prolapse. The most significant difference was seen in the cloaca group (2.6 vs 1.4).

Of the 1169 patients, 45 had a tethered cord, 2 of whom (4.4%) developed rectal prolapse compared with a 3.8% incidence of rectal prolapse in patients without tethered cord. Forty-five patients had associated vertebral anomalies (including sacral hemivertebrae and scoliosis), 9 of whom (20%) developed postoperative prolapse compared with a 3.2% incidence of rectal prolapse in patients without vertebral anomalies. The lateral sacral ratios were 0.73 for the prolapse group and 0.62 for the nonprolapse group. There were 22 patients who developed prolapse after colostomy closure. Of these, 12 (55%) suffered from constipation.

A summary of the factors associated with rectal prolapse is presented in Table 3.

3. Discussion

The definition of rectal prolapse differs among surgeons and therefore, the range of its reported incidence varies widely [6]. The condition can be a slight mucosal protrusion to a large full-thickness prolapse. We defined significant rectal prolapse as greater than 5 mm of prolapse mucosa because it is associated with more significant clinical implications. These include mucous production, a tendency to erode and bleed, and potential interference with anal canal sensation impacting on fecal continence and the patient's quality of life.

The overall incidence of significant rectal prolapse (>5 mm) after PSARP procedure in our series was relatively low (3.8%). This low incidence is likely because of the focus on 3 important parts of the repair. The first is the technical step of tacking the rectum to the muscle complex [4]. This concept of tacking the retrorectal area posteriorly to the levator muscle complex has been described for treatment of prolapse in patients with non–anorectal malformation (Fig. 2A and B) [7].

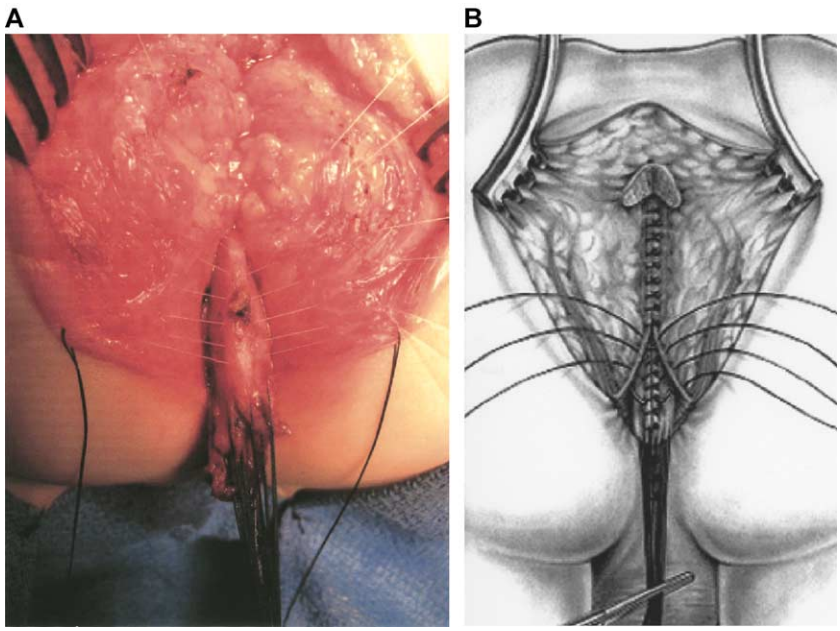

Fig. 2 A and B, Fixation of the posterior rectal wall to the muscle complex.

The second is tapering the dilated rectum. A dilated rectum may contribute to prolapse because the rectum is lax and stretches the perirectal supporting tissues [4]. Tapering of the rectum is thought to eliminate these problems [5,8]. Our data seem to suggest that tapering is not the only factor, because even patients who were tapered developed prolapse.

The third factor is the tension that is maintained while anchoring the rectum to the muscle complex and when placing the anoplasty sutures [4] (Fig. 3). This allows for the anus to retract slightly after completion of the procedure and may serve to prevent prolapse. All these maneuvers depend on the pelvic musculature, which if deficient will more likely allow for prolapse.

The average time to develop prolapse was relatively short (within 1-2 years). We recommend that prolapse, if diagnosed, be repaired before reversing the colostomy. This keeps the fecal stream diverted and allows for an easier healing process. The repair is performed as an ambulatory procedure with minimal discomfort for the patient. If a patient develops prolapse after the colostomy has been reversed, our protocol is to perform the repair and keep the patient without oral intake, on 48 hours of intravenous antibiotics, and on intravenous nutrition, for at least 5 to 10 days after the procedure.

Rectal prolapse seems to be related to the height of the anorectal malformation. A higher malformation is indicative of more sever caudal regression, and therefore weaker muscles and nerves. It is this underdeveloped sphincter complex of muscles and nerves in patients with high malformations that predictably leads to prolapse. Muscle quality was clearly shown to have an impact on the development of prolapse. Therefore, those patients with higher malformations and weaker muscles predictably had a higher incidence of rectal prolapse.

Patients with vertebral anomalies such as hemivertebrae were more likely to develop rectal prolapse. These patients also exhibit the caudal regression syndrome, having abnormal nerve development and therefore, a weaker pelvic floor musculature. Conversely, our objective assessment of the sacrum did not show predictive value with regard to the development of prolapse. With regard to tethered cord, although the numbers were too small to make a definitive conclusion, they suggest that the presence of a tethered cord is not an important factor in developing prolapse.

We hypothesized that postoperative constipation associated with increased straining would increase the likelihood

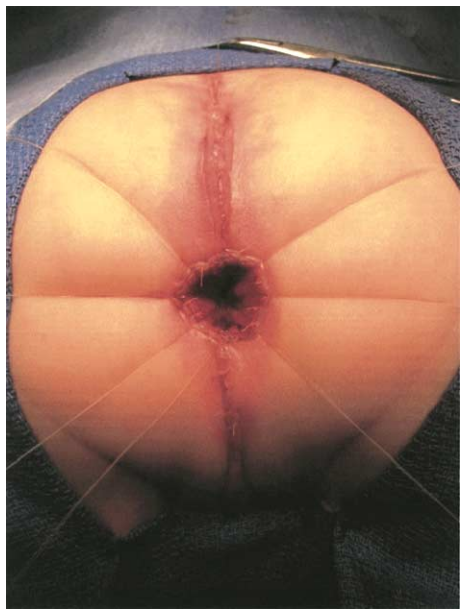

Fig. 3 Anoplasty performed under tension.

of prolapse. Although the sample group is small, it is clear that more than half of the patients who developed prolapse after their colostomies were closed had constipation. Therefore, constipation itself may predispose the patient to developing prolapse, and for this and other reasons must be aggressively treated [9].

With the recent advances in laparoscopy, laparoscopic repairs of anorectal malformations have gained popularity [10-12]. It has yet to be determined if the incidence of postoperative prolapse is different from the PSARP procedure, when long-term results are assessed. One key difference is that during the laparoscopic technique the rectum is not sutured to the levator musculature [10]. The laparoscopic technique does include retracting the rectum cephalad and securing it to the presacral fascia [10,12]. It is unclear whether omitting the step of securing the rectum to the muscle complex and replacing it with the pelvic hitch is successful in the long term in avoiding postoperative prolapse.

The technique we describe to repair prolapse is effective. It involves a minimal posterior sagittal approach, mobilization of excess rectum, and a redo-anoplasty under tension, which is similar to the approach described for patients without anorectal malformations [8,13-17].

The incidence of rectal prolapse after PSARP is relatively low. We found that higher malformations, poor muscle quality, and constipation are predictive risk factors for prolapse. Our technique for prolapse repair, using the posterior sagittal approach, has good results with a low failure rate. The low incidence of prolapse is likely because of adherence to the basic anatomic principles of the PSARP technique.

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Discussion

T. Buchmiller-Crair (New York, NY): Did you note a correlation between the occurrence of prolapse and constipation? Was there any association with the need for enema therapy or instrumentation of the anus?

Unidentified speaker: That is something we did not look at. It is important and bears further investigation.

D. Caniano (Columbus, OH): I thought this was an excellent presentation but I have 1 question. In your determination of muscle quality, is that objective, subjective, or a combination of both?

Unidentified speaker: Thank you. That is an important question. All the patients that undergo PSARP are evaluated intraoperatively by Dr Pena. It is a subjective evaluation but it is consistent for all the patients. All the patients were operated on by the same surgeon and evaluated by the single surgeon.