

# MODIFIED POSTERIOR SAGITTAL ANO-RECTOPLASTY: A NEW APPROACH FOR THE MANAGEMENT OF ANO-RECTAL MALFORMATIONS IN CHILDREN

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## ABSTRACT

**Objectives:** To introduce a technical modification in Posterior Sagittal Ano-rectoplasty (PSARP), commonly known as Pena's procedure, and to analyse the outcome of such modified procedure in terms of fecal continence and other relevant complications in children with ano-rectal malformations.

**Methodology:** It was a prospective and descriptive study, conducted at the department of pediatric surgery, Lady Reading Hospital Peshawar from January 2004 to December 2006. Forty patients were studied. All children of either sex with ano-rectal malformation who presented first to our department were included in our study excluding others treated some where else. Relevant investigations were performed in all patients. Diverting colonic or small bowel stoma was created in all patients at presentation to our department. The technique was performed at or after six months of age, depending upon the clinical condition of the patient. After discharge, all patients were examined and monitored in the out-patient department over a period of two years.

**Results:** Out of 40 patients 25(62.5%) were male and 15 (37.5%) were female age range from 6-12 months. On 35 (87.5%). Isolated PSARP while on 5 (12.5%) patients modified PSARP with abdominal approach were performed. Anal stenosis was found in 3(7.50%) patients, rectal mucosal prolapse in 4(10%), faecal soiling and faecal incontinence in 17(43.58%) and 7(17.05%) patients were respectively. Faecal continence was good, fair and poor in 15(38.46%), 17(43.58%) and 7(17.94%) patients respectively.

**Conclusion:** Our results of the present series suggest that this procedure is a valuable alternative to PSARP for the treatment of anorectal malformations.

**Key Words:** Ano-rectal malformations, Posterior Sagittal Ano-rectoplasty Modified Pena's Procedure (PSARP).

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## INTRODUCTION

A number of procedures have been adopted in the past to treat patients with anorectal malformations<sup>1</sup>. Now-a-days, Pena's procedures i.e

PSARP is widely used throughout the world and is a well established and the gold standard procedure for the definitive treatment of ano-rectal anomalies<sup>2</sup>. Patients with low-type ano-rectal malformation (ARM) are treated with various perineal procedures in the neonatal period while intermediate and high malformations are managed in stages i.e first colostomy then PSARP followed by colostomy closure<sup>3</sup>. One stage PSARP in the neonatal period has been described recently with good functional results but in the developing countries like ours it is a risky job and may not be free of un-acceptable morbidity and mortality<sup>4</sup>. Chronic constipation, perineal soiling, faecal incontinence and urethral complications are the problems, which are of great concern in these patients being treated for anorectal malformations<sup>5</sup>. To overcome these problems,

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various surgeons have modified the techniques of ano-rectoplasty such as anterior sagittal anorectoplasty, limited PSARP, neonatal PSARP etc, but we have also tried to make an effort to modify the PSARP and see the clinical outcome of this procedure in patients with anorectal malformations.

## METHODOLOGY

It was a prospective and descriptive study, conducted at the Department of Pediatric Surgery, Lady Reading Hospital Peshawar from January 2004 to December 2006. Forty patients were studied. All children who had ano-rectal malformation, irrespective of sex were included in the study. Only children who presented first at our department with the anomaly were included and the rest who had some procedure done, in connection with the anomaly, somewhere else were excluded. Any other associated anomalies or abnormal clinical findings were recorded on a pre-designed proforma. Distal loopogram and other relevant investigations such as Hemoglobin (Hb), Hepatitis-B surface antigen (HBsAg), Anti-Hepatitis-C virus anti-bodies (HCV Ab) and ultrasound abdomen was performed in all the patients while echocardiography was done when needed. All the patients had diverting/covering colonic or small bowel stoma created at presentation to our department. The technique was performed at or after six months of age, depending upon the clinical condition of the patient. After discharge from the hospital, all the patients were examined and monitored in the out-patients department over a period of two years for fecal continence / incontinence and other relevant complications such as skin excoriations etc. Faecal continence was graded as good (completely clean), fair (occasional soiling), and poor (incontinence).

**Technique:** Pre-operative preparation is same for patients as for PSARP. Under general endotracheal anesthesia, urinary bladder is drained with a urethral catheter of adequate size and the patient is put in jack-knife (frog) position. The field of operation on the patient is painted with povidone-iodine solution. Skin-deep-incision starting from the tip of the coccyx and ending at the posterior margin of the prospective anus, is made but without cutting through the external anal sphincter complex (EASC) area. EASC muscle is identified by an electrical stimulator (AC and DC current adopter of 1.5 to 16 amp). Levatores ani muscles are split sparing the area of EASC muscle (Figure 1).

The retro-rectal space is entered by blunt dissection with a scissors, the lower end of the neo-rectum is identified and a stay suture is applied to its posterior wall.

Traction is applied on the stay suture and rectum is mobilized all around while remaining on the wall of the rectum through out dissection. Any fistula to the urogenital tract or abnormal skin site is transfixed and/or ligated using vicryl of No.3/0 or 4/0 size and divided proximal to the clamp applied at the distal end of the fistula from outside without opening the neo-rectum (Figure 2, 3).

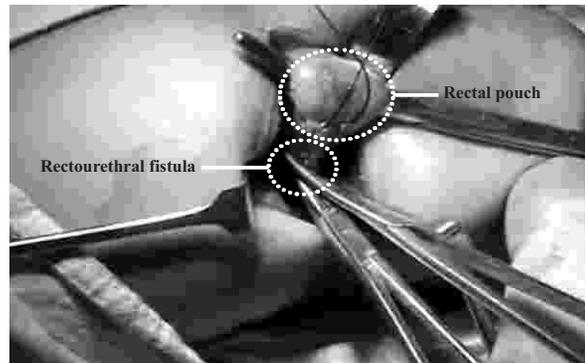
Further mobilization of the rectum is performed to an adequate length sufficient enough to be brought down to the prospective anal region without tension.

When the rectum at this stage is not found, centre of EASC is defined, the posterior sagittal wound is closed and laparotomy is performed to mobilize the rectum and ligate the fistula. If the neo-rectum is found through the posterior sagittal approach cruciate incisions are made on the skin of the proposed anal region and

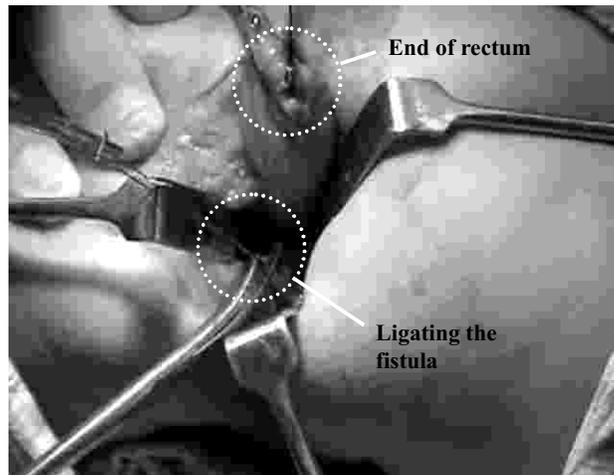
**Figure 1: Posterior Sagittal incision, sparing the External Anal Sphincter Complex (EASC) muscle**



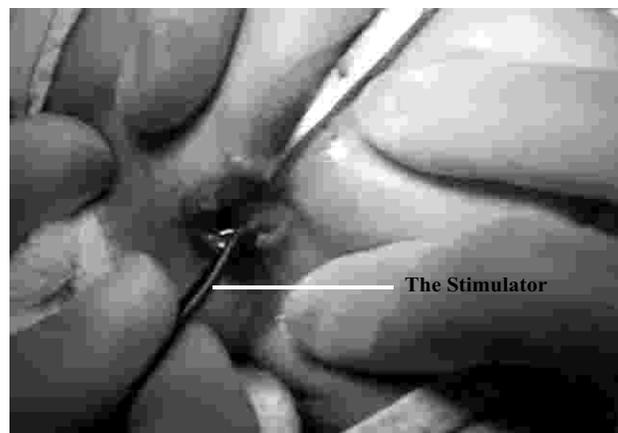
**Figure 2: Identifying the rectum and the rectourethral fistula**



**Figure 3: Repair of the fistula, after division from the rectal pouch.**



**Figure 4: Stimulation of the External Anal Sphincter Complex (EASC) muscle after cruciate skin incision.**



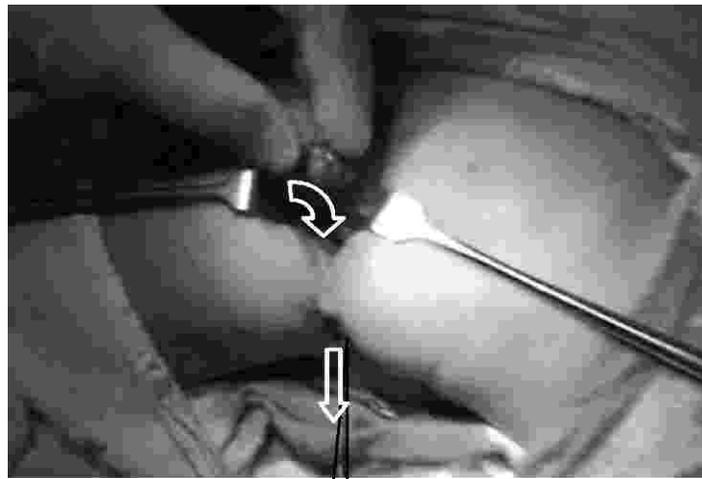
skin flaps are raised taking care not to damage the subcutaneous part of the EASC muscle. Using the muscle stimulator, the centre of the EASC muscle is identified and with the help of a small probe or a straight mosquito artery forceps of adequate size, a tunnel is made in the centre of the EASC (Figure 4, 5).

This tunnel is gradually dilated to an appropriate size with Hegar's dilators through which the rectum is brought out with the help of Babcock's forceps and the margins are stitched with the anal skin margins. (using silk 3/0 or vicryl 3/0) to make the neo-anus (Fig. 6).

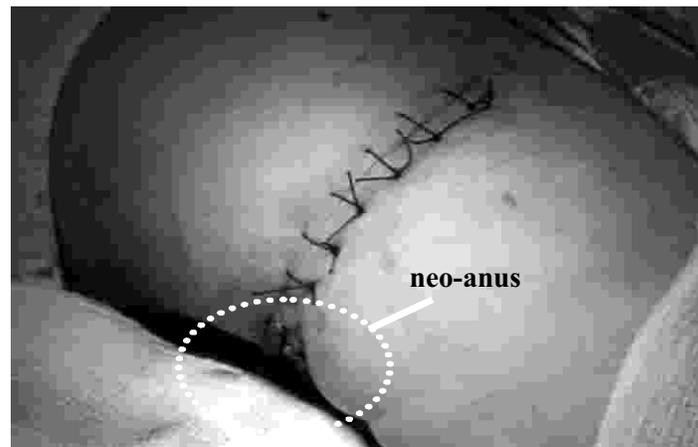
**Figure 5: Fashioning the tunnel in the External Anal Sphincter Complex (EASC) muscle with an artery forcep**



**Figure 6: Bringing down the rectum through the newly created tunnel**



**Figure 7: Final appearance of the Modified PSARP**



Muscle approximation, wound closure and rest of the management is similar to as in PSARP (Figure 7).

Postoperatively the patients were put on intravenous (I/V) fluids and I/V antibiotics for 2-3 days and they were kept nil by mouth for 12-24

hours after surgery except in abdominal approach, where patients were kept nil by mouth for 24-48 hours along with nasogastric suction. Urethral catheter was removed 3-5 days after the procedure and the patients were sent home. Home-based anal dilatation with Hegar's dilator of adequate size was advised two weeks after surgery and was continued for 2-3 months till the colostomy was closed. These patients were followed up in the out patient department (OPD) and were assessed for faecal continence, perineal soiling or constipation for an average period of 2 years.

**RESULTS**

Forty patients with intermediate and high type of ano-rectal malformation were studied over

a period of 3 years from January 2004 to December 2006. There were 25(62.50%) male and 15(37.50%) female infants who underwent modified PSARP. Age of the patients for this procedure ranged from 6-12 months with a mean of 11.3months and standard deviation of ± 1.17. Isolated modified PSARP was performed in 35(87.50%) infants while in 5(12.50%) patients this procedure was combined with abdominal approach (Table1) because of very high type of rectal anomaly. Post-operative course was uneventful except 01(2.50%) death and 01(2.50%) burst abdomen. The shape, size and location of the anus was acceptable to parents in all patients. Wound infection of the posterior sagittal incision was not found in any of these patients, (Table 2).

**Table 1: Sex distribution and the type of Procedure**

Procedure	Numbers of Patients	Sex	
		Male	Female
Isolated Modified PSARP	35 (87.5%)	21 (52.5%)	14(35%)
PSARP combined with Laparotomy	05(12.5%)	04(10%)	01(2.50%)
<b>Total</b>	40	25(37.5%)	15(62.5%)

**Table 2: Complication seen in patients treated with modified PSARP, n=40**

Complications	Numbers of Patients and Percentage
Mortality	01 (2.5%)
Wound Dehiscence	01(2.5%)
Anal Stenosis	03(7.5%)
Rectal Mucosal Prolapse	04(10%)
Faecal Soiling	05(12.5%)
Chronic Constipation	10(25%)
Incontinence of Faeces	07(17.5%)

**Table 3: Results of Modified PSARP in terms of faecal continence in 39 (97.50%) patients\***

Faecal Continence	Numbers of Patients	Procedure	
		PSARP	PSARP combined with Laparotomy
Completely Clean (Good)	15(38.46%)	14(40%)	01(25%)
Constipation & Occasional Perineal Soiling (Fair)	17(43.58%)	15(42.50%)	02(50%)
Faecal Incontinence (Poor)	7(17.94%)	06(17.14%)	01(25%)
<b>Total</b>	39	35(89.74%)	4(10.25%)

\*1 patient died

Anal stenosis was found in 3(7.50%) patients and rectal mucosal prolapse in 4 (10%) patients. Chronic constipation with faecal soiling and faecal incontinence was seen in 17(43.58%) and 07(17.50%) patients each respectively (Table 2). Faecal continence was good (completely clean) in 15 (38.46%), fair (occasional soiling) in 17(43.58%) and poor (incontinence) in 7(17.94%) patients respectively (Table 3).

## DISCUSSION

Modified PSARP was performed in 40 patients, only 5(12.50%) patients were combined with laparotomy to find the rectum and perform ano-rectoplasty. One (2.50%) patient died out of 40 patients from the group of patients with abdominal approach due to aspiration pneumonia and septicemia along with burst abdomen. Faecal continence was generally good in our patients and was comparable and even better than the results of Pena's procedure performed by different workers<sup>1-3</sup>. Patients with complete incontinence of faeces were more (7 patients, i.e 17%) as compared to the literature<sup>2-6</sup>. These observations are not unexpected as we did not exclude patients with poor prognostic factors and were offered the same type of treatment as in other patients. While counseling with the parents it was a common observation that majority of them would accept an incontinent child rather than to have a child with permanent colostomy. It is clear from the above facts that our results are likely to improve further if this procedure is performed in selected patients with ano-rectal malformations. While poor results would be expected in patients with poor prognostic factors. Even in patients with good perineal musculature, normal sacral and pelvic innervation with precise and perfect technique of ano-rectoplasty, still there can be patients showing poor results for unknown reasons<sup>4,7-11</sup>. It has been observed by some authors that there is some deficiency of motor neurons in sacral spinal ventral horn even in the presence of intact sacral spine in patients with imperforate anus. In addition they have also observed that the sensory and motor nerve endings in the confluence of the sphincter muscles were seen to be abnormal in patients with ano-rectal malformations<sup>12-15</sup>.

Wound infection or break down of the posterior sagittal wound was not seen in these patients, as the rectal pouch was not opened and any fistula to the urogenital tract was divided between the clamps form outside. In original PSARP the rectal pouch is opened and fistula is dissected from inside and repaired when found, thus providing a field which can contaminate the wound leading to wound infection and damaging the structures relevant to continence mechanism<sup>16-20</sup>.

The absence of urethral stricture or urethral diverticulum was another interesting observation in this study. Any fistula to the genitourinary tract was defined from outside and was divided between the clamps while a urethral catheter or a bougie remained in place during the dissection and division of the fistula. Fistula ligation or repair was done under direct vision without damaging the urethra or vagina. It is easy to see the fistula tract from outside as opposed to from inside the rectal pouch which is practiced in the original Pena's procedure<sup>21-26</sup>. In this way the surgical insult to the rectal wall and genitourinary tract is minimized to avoid urethral complications with expected good outcome of the procedure.

Although 15(38.46%) of these patients had good fecal continence but majority of these patients may have various other contributing factors relevant to continence mechanism such as sphincter muscle deficiency, sacral plexus deficiency and rectal actesia apart from the possible damage of these structures during surgery. We had patients with poor results probably because of these factors. Any how patient with perineal soiling and chronic constipation made a large number of patients (43.58%) who had poor compliance by the parents to do regular anal dilatation in these patients.

## CONCLUSION

Though the early results in this series are good but long-term results will need a prolonged follow up to reach a definitive conclusion. However it has been observed that this modification in PSARP allows the surgeon to securely identify, preserve and reconstruct all the anatomic structures that are relevant for faecal continence. It is relatively simple and safe, which can be applied to all kinds of ano-rectal anomalies in both sexes. Our results of the present series suggest that this procedure may be better option to the original PSARP for the treatment of patients with ano-rectal malformations. Further studies and long term follow up is needed to arrived at a firm conclusion.

## Grant Support, Financial Disclosure and Conflict of Interest

None Declared

## REFERENCE

1. Endo M, Hayashi A, Ishihara M, Maie M, Nagasaki A, Nishi T, et al. Analysis of 1,992 patients with ano-rectal malformations over the past two decades in Japan. *J Pediatr Surg* 1999;34: 435-41.

2. Rintala RJ, Lindahl HG. Posterior sagittal ano-rectoplasty is superior to sacroperineal-sacroabdominoperineal pull-through: A long-term follow-up study in boys with high ano-rectal anomalies. *J Pediatr Surg* 1999; 34: 334-7.
3. Templeton JM, O'Neill JA. Ano-rectal malformation; In Welch KJ, Randolph JG, Ravitch MM, et al. *Pediatric Surgery* (4th ed). Chicago: Year Book Medical, 1986;p.1022-37.
4. Albanese CT, Jennings RW, Lopoo JB, Bratton BJ, Harrison MR. One-stage correction of high imperforate anus in the male neonate. *J Pediatr Surg* 1999; 34: 834-6.
5. Poley MJ, Stolk EA, Tibboel D, Molenaar JC, Busschbach JJV. Short term and long term health related quality of life after congenital ano-rectal malformations and congenital diaphragmatic hernia. *Arch Dis child* 2004; 89: 836-41,
6. Yuan ZW, Lui VCH, Tam PKH. Deficient motor innervation of the sphincter mechanism in fetal rats with anorectal Malformation: A Quantitative Study by Fluorogold retrograde Tracing. *J Pediatr Surg* 2003; 38:1383-8.
7. Mittal A, Airon RK, Magu S, Rattan KN, Ratan SK. Associated anomalies with ano-rectal malformations. *Indian J Pediatr* 2004; 71: 509-14.
8. Tuuha SE, Aziz D, Drake J, [1:12:04 PM] Muhammad Irfan: Wales P, Kim PC. Is surgery necessary for a symptomatic tethered cord in ano-rectal malformation patients? *J Pediatr Surg* 2004 39: 773-7.
9. Chandrmouli B, Srinivasan K, Jagdish S, Awanthakrishnan N. Morbidity and mortality of colostomy and its closure in children. *J Pediatr Surg* 2004; 39: 596-9.
10. Kubota A, Kawahara H, Okuyama H, Oue T, Tazuke Y, Ihara Y, et al. Endorectal pull-through with posterior sagittal approach to the repair of postoperative rectourethral and rectovaginal fistula. *J Pediatr Surg* 2003; 38:1775-7.
11. Tei E, Yamataka A, Segawa O, Kobayashi H, Lane GJ, Tobayama S, et al. Laparoscopically assisted anorectovaginoplasty for selected types of female ano-rectal malformations. *J Pediatr Surg* 2003; 38: 1770-4.
12. David A, Partrick, and Frederick M K. Spectrum of Ano-rectal Anomalies in Pygopus Twins. *J Pediatr Surg* 2003; 38: 608-12.
13. Karaguzel G, Aslam A, Melikoglu M. An uncommon association relating to cloacal maldevelopment, bladder agenesis, ano-rectal atresia and absence of vulva, vagina and uterus. *J Pediatr Surg* 1999; 34: 612-4.
14. Doria F Amaral D. Ano-rectal anomalies by anterior perineal ano-rectoplasty. *J Pediatr Surg* 1999; 34: 1315-19.
15. Bouchard S, Yazbeck S, and Lallier M. Perineal hemangioma, ano-rectal malformation and genital anomaly: A new association? *J Pediatr Surg* 1999; 34: 1133-5.
16. Youssef NN, Pensabene L, Barksdale E, Di Lorenzo C. Is there a role for surgery beyond colonic aganglionosis and ano-rectal malformations in children with intractable constipation? *J Pediatr Surg* 2004; 39: 73-7.
17. Yamataka A, Segawa O, Yoshida R, Kobayashi H, Kameoka S, Miyano T. Laparoscopy muscle electrostimulation during laparoscopy-assisted colon pull-through for high imperforate anus. *J Pediatr Surg* 2001; 36:1659-61.
18. Yamataka A, Yoshida R, Kobayashi H, Tsukamoto K, Lane GJ, Segawa O, et al. Intraoperative endosonography enhances laparoscopy-assisted colon pull-through for high imperforate anus. *J Pediatr Surg* 2002; 37: 1657-60.
19. Pena A. Total urogenital mobilization: An easier way to repair cloacas. *J Pediatr Surg* 1997; 32: 263-7.
20. Yuan Z, Bai Y, Zhang Z, Ji S, Li Z, Wang W. Neural electrophysiological studies on the external anal sphincter in children with ano-rectal malformation. *J Pediatr Surg* 2000; 35:1052-7.
21. Aggarwal SK, Yadav S, Goel D, Sengar M. Combined abdominal and posterior sagittal approach for redo pull-through operation in Hirschsprung's disease. *J Pediatr Surg* 2002; 37: 1156-9.
22. Kluth D, Hillen M, Lamprecht W. The principles of normal and abnormal hindgut development. *J Pediatr Surg* 1995; 30: 1143-7.
23. Liu G, Yuan J, Geng J, Wang C, Li T, The treatment of high intermediate ano-rectal malformations: One stage or three procedures. *J Pediatr Surg* 2004; 39:1666-71.
24. Martucciello G, Torre M, Belloni E, Lerone M, Pini Prato A, Cama A, et al. Curraarino syndrome: Proposal of a diagnostic and therapeutic protocol. *J Pediatr Surg* 2004; 39: 1305-11.

25. Bai YZ, Chen H, Yuan ZW and Wang WL. Normal and abnormal embryonic development of the ano-rectum in rats. J Pediatr Surg 2004; 39: 587-90.
26. Pena A, Levitt MA, Hong A and Midulla P, Surgical management of cloacal malformations: A review of 339 patients. J Pediatr Surg 2004; 39: 470-79.

#### **CONTRIBUTORS**

KK conceived the idea and planned the study. MYK, MM, FM, MU, MF, MH, SR & MT did the data collection and analyzed the study. All the authors contributed significantly to the research that resulted in the submitted manuscript.